

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

| SOIL DESCRIPTION | | GRADATION | | ROCK DESCRIPTION | | TERMS AND DEFINITIONS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| <p>SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED OR WEATHERED EARTH MATERIALS WHICH CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND WHICH YIELDS LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM AND BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLES:</p> <p align="center"><i>VERY STIFF, GRAY SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i></p> | | <p>WELL GRADED- INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE UNIFORM. INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED)</p> <p>POORLY GRADED</p> <p>GAP-GRADED- INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.</p> <p align="center">ANGULARITY OF GRAINS</p> <p>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS ARE DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.</p> | | <p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WHEN TESTED, WOULD YIELD SPT REFUSAL. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p> <p>WEATHERED ROCK (WR)  NON-COASTAL PLAIN MATERIAL THAT YIELDS SPT N VALUES > 100 BLOWS PER FOOT.</p> <p>CRYSTALLINE ROCK (CR)  FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.</p> <p>NON-CRYSTALLINE ROCK (NCR)  FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.</p> <p>COASTAL PLAIN SEDIMENTARY ROCK (CP)  COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.</p> | | <p>ALLUVIUM (ALLUV.)- SOILS WHICH HAVE BEEN TRANSPORTED BY WATER.</p> <p>AQUIFER - A WATER BEARING FORMATION OR STRATA.</p> <p>ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.</p> <p>ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.</p> <p>ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.</p> <p>CALCAREOUS (CALC.)- SOILS WHICH CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.</p> <p>COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.</p> <p>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.</p> <p>DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.</p> <p>DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.</p> <p>DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.</p> <p>FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.</p> <p>FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.</p> <p>FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.</p> <p>FLOOD PLAIN (F.P.) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.</p> <p>FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.</p> <p>JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.</p> <p>LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.</p> <p>LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.</p> <p>MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.</p> <p>PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.</p> <p>RESIDUAL SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.</p> <p>ROCK QUALITY DESIGNATION (R.Q.D.) - 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.</p> <p>SAPROLITE (SAP.) - RESIDUAL SOIL WHICH RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.</p> <p>SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, WHICH HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.</p> <p>SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.</p> <p>STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR B.P.F.) 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 LESS THAN 0.1 FOOT PENETRATION WITH 60 BLOWS.</p> <p>STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.</p> <p>STRATA ROCK QUALITY DESIGNATION (S.R.Q.D.) - 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.</p> <p>TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p align="center">SOIL LEGEND AND AASHTO CLASSIFICATION</p> <table border="1"> <tr> <th>GENERAL CLASS.</th> <th>GRANULAR MATERIALS (95% PASSING #200)</th> <th>SILT-CLAY MATERIALS (>85% PASSING #200)</th> <th colspan="2">ORGANIC MATERIALS</th> </tr> <tr> <td>GROUP CLASS.</td> <td>A-1, A-1-b, A-3</td> <td>A-2, A-2-4, A-2-5, A-2-6, A-2-7</td> <td>A-4, A-5, A-6, A-7, A-7-5, A-7-6</td> <td>A-1, A-2, A-3, A-4, A-5, A-6, A-7</td> </tr> <tr> <td>SYMBOL</td> <td></td> <td></td> <td></td> <td></td> </tr> </table> | | GENERAL CLASS. | GRANULAR MATERIALS (95% PASSING #200) | SILT-CLAY MATERIALS (>85% PASSING #200) | ORGANIC MATERIALS | | GROUP CLASS. | A-1, A-1-b, A-3 | A-2, A-2-4, A-2-5, A-2-6, A-2-7 | A-4, A-5, A-6, A-7, A-7-5, A-7-6 | A-1, A-2, A-3, A-4, A-5, A-6, A-7 | SYMBOL | | | | | <p>MINERALOGICAL COMPOSITION</p> <p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.</p> <p align="center">COMPRESSIBILITY</p> <p>SLIGHTLY COMPRESSIBLE MODERATELY COMPRESSIBLE HIGHLY COMPRESSIBLE</p> <p>LIQUID LIMIT LESS THAN 30 LIQUID LIMIT 31-50 LIQUID LIMIT GREATER THAN 50</p> <p align="center">PERCENTAGE OF MATERIAL</p> <table border="1"> <tr> <th>ORGANIC MATERIAL</th> <th>GRANULAR SOILS</th> <th>SILT-CLAY SOILS</th> <th>OTHER MATERIAL</th> </tr> <tr> <td>TRACE OF ORGANIC MATTER</td> <td>2 - 3%</td> <td>3 - 5%</td> <td>TRACE 1 - 10%</td> </tr> <tr> <td>LITTLE ORGANIC MATTER</td> <td>3 - 5%</td> <td>5 - 12%</td> <td>LITTLE 10 - 20%</td> </tr> <tr> <td>MODERATELY ORGANIC</td> <td>5 - 10%</td> <td>12 - 20%</td> <td>SOME 20 - 35%</td> </tr> <tr> <td>HIGHLY ORGANIC</td> <td>>10%</td> <td>>20%</td> <td>HIGHLY 35% AND ABOVE</td> </tr> </table> <p align="center">GROUND WATER</p> <p> WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING.</p> <p> STATIC WATER LEVEL AFTER 24 HOURS.</p> <p> PERCHED WATER, SATURATED ZONE OR WATER BEARING STRATA</p> <p> SPRING OR SEEPAGE</p> <p align="center">MISCELLANEOUS SYMBOLS</p> <table border="1"> <tr> <td> ROADWAY EMBANKMENT WITH SOIL DESCRIPTION</td> <td> SOIL SYMBOL</td> <td> ARTIFICIAL FILL OTHER THAN ROADWAY EMBANKMENTS</td> <td> INFERRED SOIL BOUNDARIES</td> <td> INFERRED ROCK LINE</td> <td> ALLUVIAL SOIL BOUNDARY</td> <td> DIP/DIP DIRECTION OF ROCK STRUCTURES</td> <td> SOUNDING ROD</td> <td> SPT TEST BORING</td> <td> AUGER BORING</td> <td> CORE BORING</td> <td> MONITORING WELL</td> <td> PIEZOMETER INSTALLATION</td> <td> SLOPE INDICATOR INSTALLATION</td> <td> SPT N-VALUE</td> <td> SPT REFUSAL</td> <td> SPT CORE BORING</td> <td> SAMPLE DESIGNATIONS</td> <td> S- BULK SAMPLE</td> <td> SS- SPLIT SPOON SAMPLE</td> <td> ST- SHELBY TUBE SAMPLE</td> <td> RS- ROCK SAMPLE</td> <td> RT- RECOMPACTED TRIAXIAL SAMPLE</td> <td> CBR - CBR SAMPLE</td> </tr> </table> <p align="center">ABBREVIATIONS</p> <table border="1"> <tr> <td>AR - AUGER REFUSAL</td> <td>BT - BORING TERMINATED</td> <td>CL - CLAY</td> <td>CPT - CONE PENETRATION TEST</td> <td>CSE - COARSE</td> <td>DMT - DILATOMETER TEST</td> <td>DPT - DYNAMIC PENETRATION TEST</td> <td>o - VOID RATIO</td> <td>F - FINE</td> <td>FOSS. - FOSSILIFEROUS</td> <td>FRAC. - FRACTURED</td> <td>FRAGS. - FRAGMENTS</td> <td>MED. - MEDIUM</td> <td>PMT - PRESSUREMETER TEST</td> <td>SD. - SAND, SANDY</td> <td>SL. - SILT, SILTY</td> <td>SLI. - SLIGHTLY</td> <td>TCR - TRICONE REFUSAL</td> <td>γ - UNIT WEIGHT</td> <td>γ_d - DRY UNIT WEIGHT</td> <td>w - MOISTURE CONTENT</td> <td>v - VERY</td> <td>VST - VANE SHEAR TEST</td> </tr> </table> | | ORGANIC MATERIAL | GRANULAR SOILS | SILT-CLAY SOILS | OTHER MATERIAL | TRACE OF ORGANIC MATTER | 2 - 3% | 3 - 5% | TRACE 1 - 10% | LITTLE ORGANIC MATTER | 3 - 5% | 5 - 12% | LITTLE 10 - 20% | MODERATELY ORGANIC | 5 - 10% | 12 - 20% | SOME 20 - 35% | HIGHLY ORGANIC | >10% | >20% | HIGHLY 35% AND ABOVE |  ROADWAY EMBANKMENT WITH SOIL DESCRIPTION |  SOIL SYMBOL |  ARTIFICIAL FILL OTHER THAN ROADWAY EMBANKMENTS |  INFERRED SOIL BOUNDARIES |  INFERRED ROCK LINE |  ALLUVIAL SOIL BOUNDARY |  DIP/DIP DIRECTION OF ROCK STRUCTURES |  SOUNDING ROD |  SPT TEST BORING |  AUGER BORING |  CORE BORING |  MONITORING WELL |  PIEZOMETER INSTALLATION |  SLOPE INDICATOR INSTALLATION |  SPT N-VALUE |  SPT REFUSAL |  SPT CORE BORING |  SAMPLE DESIGNATIONS |  S- BULK SAMPLE |  SS- SPLIT SPOON SAMPLE |  ST- SHELBY TUBE SAMPLE |  RS- ROCK SAMPLE |  RT- RECOMPACTED TRIAXIAL SAMPLE |  CBR - CBR SAMPLE | AR - AUGER REFUSAL | BT - BORING TERMINATED | CL - CLAY | CPT - CONE PENETRATION TEST | CSE - COARSE | DMT - DILATOMETER TEST | DPT - DYNAMIC PENETRATION TEST | o - VOID RATIO | F - FINE | FOSS. - FOSSILIFEROUS | FRAC. - FRACTURED | FRAGS. - FRAGMENTS | MED. - MEDIUM | PMT - PRESSUREMETER TEST | SD. - SAND, SANDY | SL. - SILT, SILTY | SLI. - SLIGHTLY | TCR - TRICONE REFUSAL | γ - UNIT WEIGHT | γ _d - DRY UNIT WEIGHT | w - MOISTURE CONTENT | v - VERY | VST - VANE SHEAR TEST |
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| SYMBOL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ORGANIC MATERIAL | GRANULAR SOILS | SILT-CLAY SOILS | OTHER MATERIAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TRACE OF ORGANIC MATTER | 2 - 3% | 3 - 5% | TRACE 1 - 10% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| LITTLE ORGANIC MATTER | 3 - 5% | 5 - 12% | LITTLE 10 - 20% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MODERATELY ORGANIC | 5 - 10% | 12 - 20% | SOME 20 - 35% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HIGHLY ORGANIC | >10% | >20% | HIGHLY 35% AND ABOVE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| <p align="center">CONSISTENCY OR DENSENESS</p> <table border="1"> <tr> <th>PRIMARY SOIL TYPE</th> <th>COMPACTNESS OR CONSISTENCY</th> <th>RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)</th> <th>RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT²)</th> </tr> <tr> <td>GENERALLY GRANULAR MATERIAL (NON-COHESIVE)</td> <td>VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE</td> <td><4 4 TO 10 10 TO 30 30 TO 50 >50</td> <td>N/A</td> </tr> <tr> <td>GENERALLY SILT-CLAY MATERIAL (COHESIVE)</td> <td>VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD</td> <td><2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 >30</td> <td><0.25 0.25 TO 0.5 0.5 TO 1 1 TO 2 2 TO 4 >4</td> </tr> </table> | | PRIMARY SOIL TYPE | COMPACTNESS OR CONSISTENCY | RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) | RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²) | GENERALLY GRANULAR MATERIAL (NON-COHESIVE) | VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE | <4 4 TO 10 10 TO 30 30 TO 50 >50 | N/A | GENERALLY SILT-CLAY MATERIAL (COHESIVE) | VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD | <2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 >30 | <0.25 0.25 TO 0.5 0.5 TO 1 1 TO 2 2 TO 4 >4 | <p align="center">TEXTURE OR GRAIN SIZE</p> <table border="1"> <tr> <th>U.S. STD. SIEVE SIZE OPENING (MM)</th> <th>4</th> <th>10</th> <th>40</th> <th>60</th> <th>200</th> <th>270</th> </tr> <tr> <td></td> <td>4.76</td> <td>2.0</td> <td>0.42</td> <td>0.25</td> <td>0.075</td> <td>0.053</td> </tr> </table> <table border="1"> <tr> <th>BOULDER (BLDR.)</th> <th>COBBLE (COB.)</th> <th>GRAVEL (GR.)</th> <th>COARSE SAND (CSE. SD.)</th> <th>FINE SAND (F. SD.)</th> <th>SILT (SL.)</th> <th>CLAY (CL.)</th> </tr> <tr> <td>GRAIN SIZE</td> <td>MM 305 IN. 12"</td> <td>75 3"</td> <td>2.0</td> <td>0.25</td> <td>0.05</td> <td>0.005</td> </tr> </table> | | U.S. STD. SIEVE SIZE OPENING (MM) | 4 | 10 | 40 | 60 | 200 | 270 | | 4.76 | 2.0 | 0.42 | 0.25 | 0.075 | 0.053 | BOULDER (BLDR.) | COBBLE (COB.) | GRAVEL (GR.) | COARSE SAND (CSE. SD.) | FINE SAND (F. SD.) | SILT (SL.) | CLAY (CL.) | GRAIN SIZE | MM 305 IN. 12" | 75 3" | 2.0 | 0.25 | 0.05 | 0.005 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| GENERALLY GRANULAR MATERIAL (NON-COHESIVE) | VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE | <4 4 TO 10 10 TO 30 30 TO 50 >50 | N/A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| GENERALLY SILT-CLAY MATERIAL (COHESIVE) | VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD | <2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 >30 | <0.25 0.25 TO 0.5 0.5 TO 1 1 TO 2 2 TO 4 >4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| U.S. STD. SIEVE SIZE OPENING (MM) | 4 | 10 | 40 | 60 | 200 | 270 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 4.76 | 2.0 | 0.42 | 0.25 | 0.075 | 0.053 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BOULDER (BLDR.) | COBBLE (COB.) | GRAVEL (GR.) | COARSE SAND (CSE. SD.) | FINE SAND (F. SD.) | SILT (SL.) | CLAY (CL.) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| GRAIN SIZE | MM 305 IN. 12" | 75 3" | 2.0 | 0.25 | 0.05 | 0.005 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p align="center">SOIL MOISTURE - CORRELATION OF TERMS</p> <table border="1"> <tr> <th>SOIL MOISTURE SCALE (ATTERBERG LIMITS)</th> <th>FIELD MOISTURE DESCRIPTION</th> <th>GUIDE FOR FIELD MOISTURE DESCRIPTION</th> </tr> <tr> <td>LL - LIQUID LIMIT</td> <td>- SATURATED - (SAT.)</td> <td>USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE</td> </tr> <tr> <td>PL - PLASTIC LIMIT</td> <td>- WET - (W)</td> <td>SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE</td> </tr> <tr> <td>OM - OPTIMUM MOISTURE SHRINKAGE LIMIT</td> <td>- MOIST - (M)</td> <td>SOLID; AT OR NEAR OPTIMUM MOISTURE</td> </tr> <tr> <td>SL - SHRINKAGE LIMIT</td> <td>- DRY - (D)</td> <td>REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE</td> </tr> </table> | | SOIL MOISTURE SCALE (ATTERBERG LIMITS) | FIELD MOISTURE DESCRIPTION | GUIDE FOR FIELD MOISTURE DESCRIPTION | LL - LIQUID LIMIT | - SATURATED - (SAT.) | USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE | PL - PLASTIC LIMIT | - WET - (W) | SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE | OM - OPTIMUM MOISTURE SHRINKAGE LIMIT | - MOIST - (M) | SOLID; AT OR NEAR OPTIMUM MOISTURE | SL - SHRINKAGE LIMIT | - DRY - (D) | REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE | <p align="center">EQUIPMENT USED ON SUBJECT PROJECT</p> <table border="1"> <tr> <td>DRILL UNITS:</td> <td>ADVANCING TOOLS:</td> <td>HAMMER TYPE:</td> </tr> <tr> <td><input type="checkbox"/> MOBILE B-_____</td> <td><input type="checkbox"/> CLAY BITS</td> <td><input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL</td> </tr> <tr> <td><input type="checkbox"/> BK-51</td> <td><input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER</td> <td>CORE SIZE:</td> </tr> <tr> <td><input type="checkbox"/> CME-45</td> <td><input checked="" type="checkbox"/> 8" HOLLOW AUGERS</td> <td><input type="checkbox"/> -B_____</td> </tr> <tr> <td><input type="checkbox"/> CME-550</td> <td><input type="checkbox"/> HARD FACED FINGER BITS</td> <td><input checked="" type="checkbox"/> -N X_____</td> </tr> <tr> <td><input type="checkbox"/> PORTABLE HOIST</td> <td><input type="checkbox"/> TUNG-CARBIDE INSERTS</td> <td><input type="checkbox"/> -H_____</td> </tr> <tr> <td><input type="checkbox"/> OTHER _____</td> <td><input checked="" type="checkbox"/> CASING <input checked="" type="checkbox"/> W/ ADVANCER</td> <td>HAND TOOLS:</td> </tr> <tr> <td><input type="checkbox"/> OTHER _____</td> <td><input checked="" type="checkbox"/> TRICONE 3.6" STEEL TEETH</td> <td><input type="checkbox"/> POST HOLE DIGGER</td> </tr> <tr> <td></td> <td><input type="checkbox"/> TRICONE _____" TUNG-CARB.</td> <td><input type="checkbox"/> HAND AUGER</td> </tr> <tr> <td></td> <td><input checked="" type="checkbox"/> CORE BIT</td> <td><input type="checkbox"/> SOUNDING ROD</td> </tr> <tr> <td></td> <td><input type="checkbox"/> OTHER _____</td> <td><input type="checkbox"/> VANE SHEAR TEST</td> </tr> <tr> <td></td> <td></td> <td><input type="checkbox"/> OTHER _____</td> </tr> </table> | | DRILL UNITS: | ADVANCING TOOLS: | HAMMER TYPE: | <input type="checkbox"/> MOBILE B-_____ | <input type="checkbox"/> CLAY BITS | <input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL | <input type="checkbox"/> BK-51 | <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER | CORE SIZE: | <input type="checkbox"/> CME-45 | <input checked="" type="checkbox"/> 8" HOLLOW AUGERS | <input type="checkbox"/> -B_____ | <input type="checkbox"/> CME-550 | <input type="checkbox"/> HARD FACED FINGER BITS | <input checked="" type="checkbox"/> -N X_____ | <input type="checkbox"/> PORTABLE HOIST | <input type="checkbox"/> TUNG-CARBIDE INSERTS | <input type="checkbox"/> -H_____ | <input type="checkbox"/> OTHER _____ | <input checked="" type="checkbox"/> CASING <input checked="" type="checkbox"/> W/ ADVANCER | HAND TOOLS: | <input type="checkbox"/> OTHER _____ | <input checked="" type="checkbox"/> TRICONE 3.6" STEEL TEETH | <input type="checkbox"/> POST HOLE DIGGER | | <input type="checkbox"/> TRICONE _____" TUNG-CARB. | <input type="checkbox"/> HAND AUGER | | <input checked="" type="checkbox"/> CORE BIT | <input type="checkbox"/> SOUNDING ROD | | <input type="checkbox"/> OTHER _____ | <input type="checkbox"/> VANE SHEAR TEST | | | <input type="checkbox"/> OTHER _____ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SOIL MOISTURE SCALE (ATTERBERG LIMITS) | FIELD MOISTURE DESCRIPTION | GUIDE FOR FIELD MOISTURE DESCRIPTION | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| LL - LIQUID LIMIT | - SATURATED - (SAT.) | USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PL - PLASTIC LIMIT | - WET - (W) | SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| OM - OPTIMUM MOISTURE SHRINKAGE LIMIT | - MOIST - (M) | SOLID; AT OR NEAR OPTIMUM MOISTURE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SL - SHRINKAGE LIMIT | - DRY - (D) | REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DRILL UNITS: | ADVANCING TOOLS: | HAMMER TYPE: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <input type="checkbox"/> MOBILE B-_____ | <input type="checkbox"/> CLAY BITS | <input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <input type="checkbox"/> BK-51 | <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER | CORE SIZE: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <input type="checkbox"/> CME-45 | <input checked="" type="checkbox"/> 8" HOLLOW AUGERS | <input type="checkbox"/> -B_____ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <input type="checkbox"/> CME-550 | <input type="checkbox"/> HARD FACED FINGER BITS | <input checked="" type="checkbox"/> -N X_____ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <input type="checkbox"/> PORTABLE HOIST | <input type="checkbox"/> TUNG-CARBIDE INSERTS | <input type="checkbox"/> -H_____ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <input type="checkbox"/> OTHER _____ | <input checked="" type="checkbox"/> CASING <input checked="" type="checkbox"/> W/ ADVANCER | HAND TOOLS: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <input type="checkbox"/> OTHER _____ | <input checked="" type="checkbox"/> TRICONE 3.6" STEEL TEETH | <input type="checkbox"/> POST HOLE DIGGER | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <input type="checkbox"/> TRICONE _____" TUNG-CARB. | <input type="checkbox"/> HAND AUGER | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <input checked="" type="checkbox"/> CORE BIT | <input type="checkbox"/> SOUNDING ROD | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <input type="checkbox"/> OTHER _____ | <input type="checkbox"/> VANE SHEAR TEST | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | <input type="checkbox"/> OTHER _____ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p align="center">PLASTICITY</p> <table border="1"> <tr> <th>NONPLASTIC</th> <th>PLASTICITY INDEX (PI)</th> <th>DRY STRENGTH</th> </tr> <tr> <td>LOW PLASTICITY</td> <td>0-5</td> <td>VERY LOW</td> </tr> <tr> <td>MED. PLASTICITY</td> <td>6-15</td> <td>SLIGHT</td> </tr> <tr> <td>HIGH PLASTICITY</td> <td>16-25</td> <td>MEDIUM</td> </tr> <tr> <td></td> <td>26 OR MORE</td> <td>HIGH</td> </tr> </table> <p align="center">COLOR</p> <p>DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YEL-BRN, BLUE-GRAY) MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.</p> | | NONPLASTIC | PLASTICITY INDEX (PI) | DRY STRENGTH | LOW PLASTICITY | 0-5 | VERY LOW | MED. PLASTICITY | 6-15 | SLIGHT | HIGH PLASTICITY | 16-25 | MEDIUM | | 26 OR MORE | HIGH | <p align="center">FRACTURE SPACING</p> <table border="1"> <tr> <th>TERM</th> <th>SPACING</th> </tr> <tr> <td>VERY WIDE</td> <td>MORE THAN 10 FEET</td> </tr> <tr> <td>WIDE</td> <td>3 TO 10 FEET</td> </tr> <tr> <td>MODERATELY CLOSE</td> <td>1 TO 3 FEET</td> </tr> <tr> <td>CLOSE</td> <td>0.16 TO 1 FEET</td> </tr> <tr> <td>VERY CLOSE</td> <td>LESS THAN 0.16 FEET</td> </tr> </table> <p align="center">BEDDING</p> <table border="1"> <tr> <th>TERM</th> <th>THICKNESS</th> </tr> <tr> <td>VERY THICKLY BEDDED</td> <td>> 4 FEET</td> </tr> <tr> <td>THICKLY BEDDED</td> <td>1.5 - 4 FEET</td> </tr> <tr> <td>THINLY BEDDED</td> <td>0.16 - 1.5 FEET</td> </tr> <tr> <td>VERY THINLY BEDDED</td> <td>0.03 - 0.16 FEET</td> </tr> <tr> <td>THICKLY LAMINATED</td> <td>0.008 - 0.03 FEET</td> </tr> <tr> <td>THINLY LAMINATED</td> <td>< 0.008 FEET</td> </tr> </table> <p align="center">INDURATION</p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <table border="1"> <tr> <td>FRIABLE</td> <td>RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</td> </tr> <tr> <td>MODERATELY INDURATED</td> <td>GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</td> </tr> <tr> <td>INDURATED</td> <td>GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</td> </tr> <tr> <td>EXTREMELY INDURATED</td> <td>SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</td> </tr> </table> | | TERM | SPACING | VERY WIDE | MORE THAN 10 FEET | WIDE | 3 TO 10 FEET | MODERATELY CLOSE | 1 TO 3 FEET | CLOSE | 0.16 TO 1 FEET | VERY CLOSE | LESS THAN 0.16 FEET | TERM | THICKNESS | VERY THICKLY BEDDED | > 4 FEET | THICKLY BEDDED | 1.5 - 4 FEET | THINLY BEDDED | 0.16 - 1.5 FEET | VERY THINLY BEDDED | 0.03 - 0.16 FEET | THICKLY LAMINATED | 0.008 - 0.03 FEET | THINLY LAMINATED | < 0.008 FEET | 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. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NONPLASTIC | PLASTICITY INDEX (PI) | DRY STRENGTH | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| LOW PLASTICITY | 0-5 | VERY LOW | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MED. PLASTICITY | 6-15 | SLIGHT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HIGH PLASTICITY | 16-25 | MEDIUM | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 26 OR MORE | HIGH | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TERM | SPACING | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| VERY WIDE | MORE THAN 10 FEET | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| WIDE | 3 TO 10 FEET | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MODERATELY CLOSE | 1 TO 3 FEET | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CLOSE | 0.16 TO 1 FEET | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| VERY CLOSE | LESS THAN 0.16 FEET | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TERM | THICKNESS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| VERY THICKLY BEDDED | > 4 FEET | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| THICKLY BEDDED | 1.5 - 4 FEET | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| THINLY BEDDED | 0.16 - 1.5 FEET | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| VERY THINLY BEDDED | 0.03 - 0.16 FEET | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| THICKLY LAMINATED | 0.008 - 0.03 FEET | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| THINLY LAMINATED | < 0.008 FEET | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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 align="center">SOIL MOISTURE - CORRELATION OF TERMS</p> <p>LL - LIQUID LIMIT</p> <p>PL - PLASTIC LIMIT</p> <p>OM - OPTIMUM MOISTURE SHRINKAGE LIMIT</p> <p>SL - SHRINKAGE LIMIT</p> | | <p align="center">FRACURE SPACING</p> <p>TERM: VERY WIDE, WIDE, MODERATELY CLOSE, CLOSE, VERY CLOSE</p> <p>SPACING: MORE THAN 10 FEET, 3 TO 10 FEET, 1 TO 3 FEET, 0.16 TO 1 FEET, LESS THAN 0.16 FEET</p> <p align="center">BEDDING</p> <p>TERM: VERY THICKLY BEDDED, THICKLY BEDDED, THINLY BEDDED, VERY THINLY BEDDED, THICKLY LAMINATED, THINLY LAMINATED</p> <p>THICKNESS: > 4 FEET, 1.5 - 4 FEET, 0.16 - 1.5 FEET, 0.03 - 0.16 FEET, 0.008 - 0.03 FEET, < 0.008 FEET</p> <p align="center">INDURATION</p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <p>FRIABLE: RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</p> <p>MODERATELY INDURATED: GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</p> <p>INDURATED: GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</p> <p>EXTREMELY INDURATED: SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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17+00

18+00

19+00

20+00

21+00

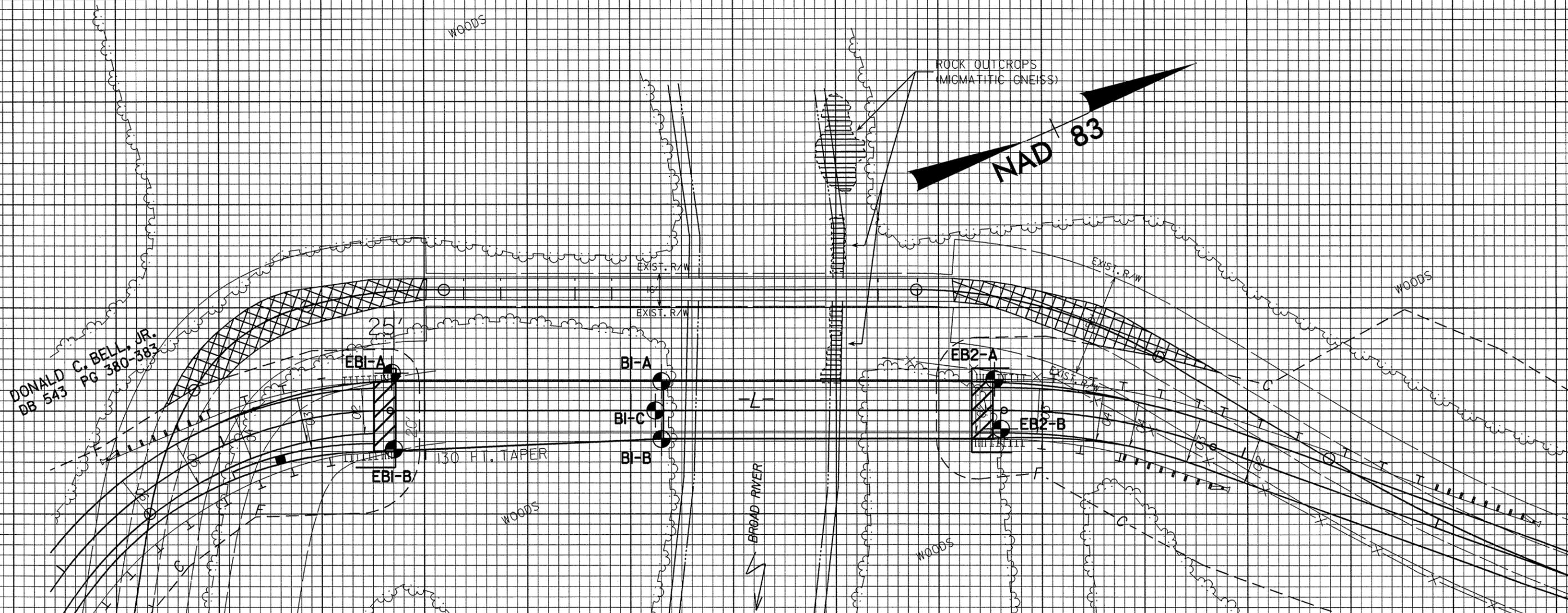
22+00

23+00

24+00

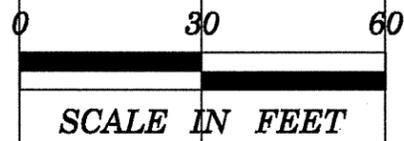
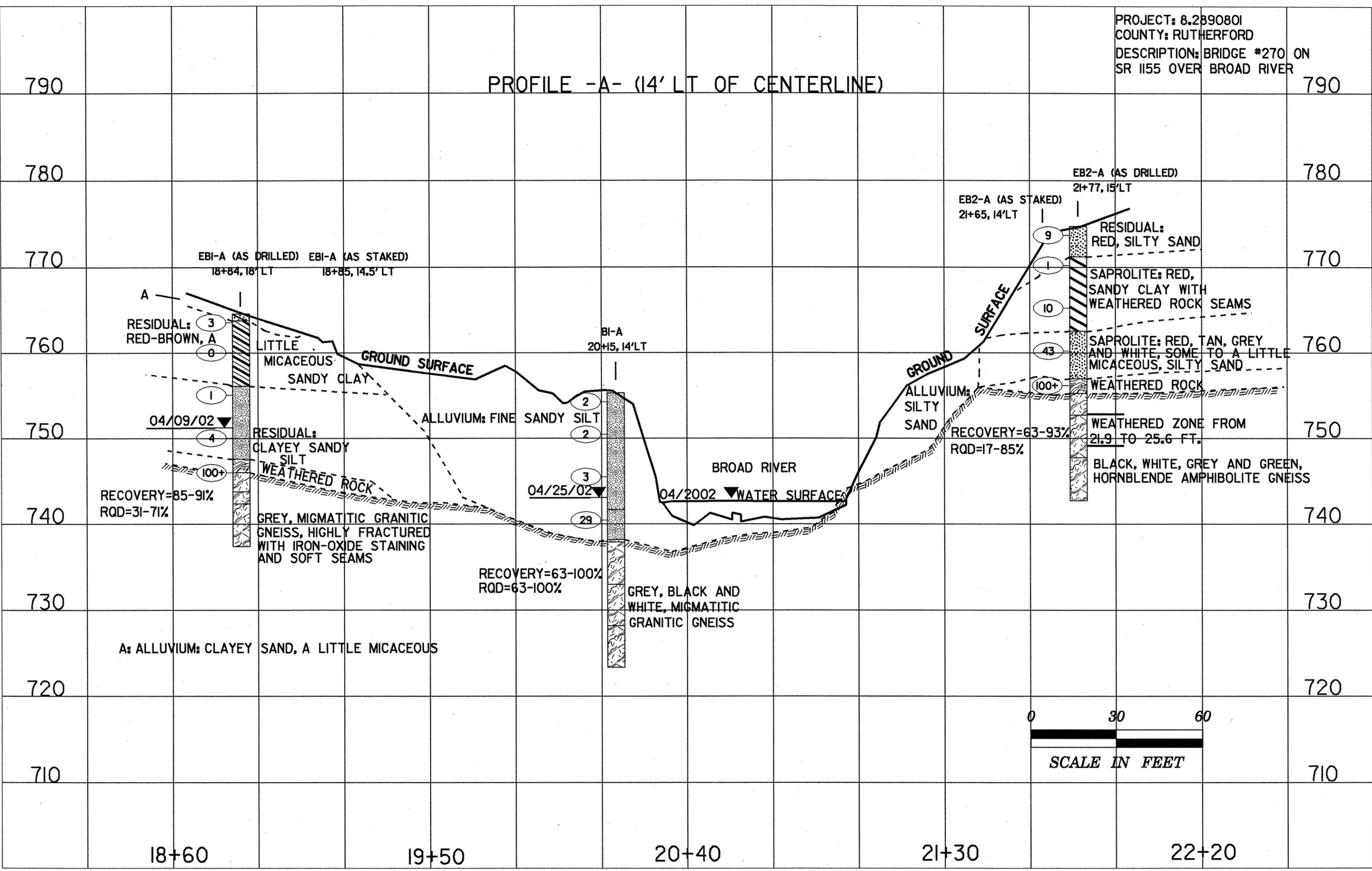
BRIDGE NO. 270 ON SR-1155 OVER BROAD RIVER

8.2890801
B-3697
RUTHERFORD CO.



PROJECT: 8.2890801
COUNTY: RUTHERFORD
DESCRIPTION: BRIDGE #270 ON
SR 1155 OVER BROAD RIVER

PROFILE -A- (14' LT OF CENTERLINE)



18+60

19+50

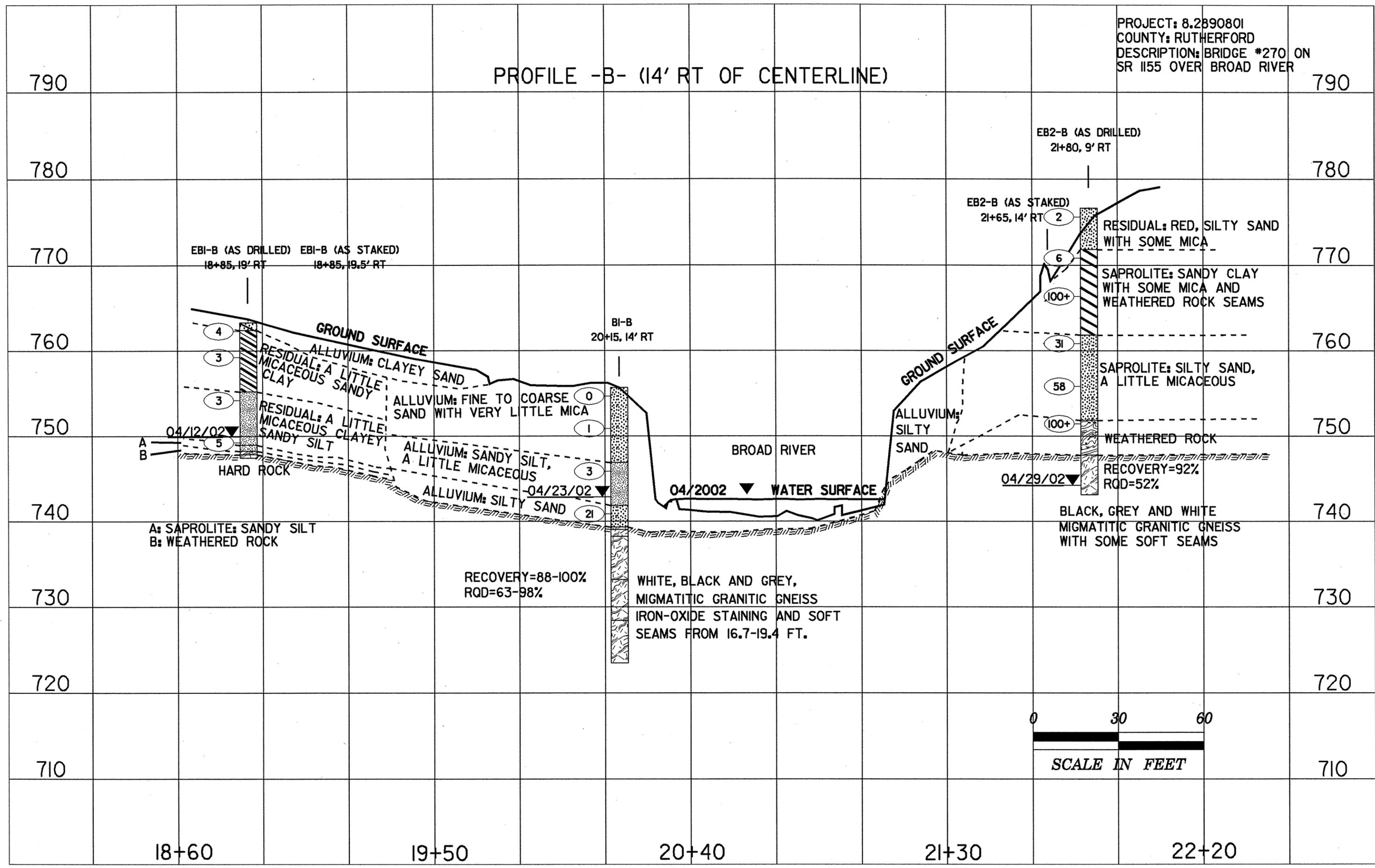
20+40

21+30

22+20

PROJECT: 8.2890801
COUNTY: RUTHERFORD
DESCRIPTION: BRIDGE #270 ON
SR 1155 OVER BROAD RIVER

PROFILE -B- (14' RT OF CENTERLINE)



EBI-B (AS DRILLED) 18+85, 19' RT
EBI-B (AS STAKED) 18+85, 19.5' RT

BI-B 20+15, 14' RT

EB2-B (AS DRILLED) 21+80, 9' RT

EB2-B (AS STAKED) 21+65, 14' RT

04/12/02
A: SAPROLITE: SANDY SILT
B: WEATHERED ROCK

RECOVERY=88-100%
RQD=63-98%

WHITE, BLACK AND GREY,
MIGMATITIC GRANITIC GNEISS
IRON-OXIDE STAINING AND SOFT
SEAMS FROM 16.7-19.4 FT.

04/29/02
RECOVERY=92%
RQD=52%

0 30 60
SCALE IN FEET

18+60

19+50

20+40

21+30

22+20

790

780

770

760

750

740

730

720

710

790

780

770

760

750

740

730

720

710

RESIDUAL: RED, SILTY SAND
WITH SOME MICA

SAPROLITE: SANDY CLAY
WITH SOME MICA AND
WEATHERED ROCK SEAMS

SAPROLITE: SILTY SAND,
A LITTLE MICACEOUS

WEATHERED ROCK

BLACK, GREY AND WHITE
MIGMATITIC GRANITIC GNEISS
WITH SOME SOFT SEAMS

GROUND SURFACE
ALLUVIUM: CLAYEY SAND
RESIDUAL: A LITTLE
MICACEOUS SANDY CLAY

ALLUVIUM: FINE TO COARSE
SAND WITH VERY LITTLE MICA

ALLUVIUM: SANDY SILT,
A LITTLE MICACEOUS

ALLUVIUM: SILTY SAND

RESIDUAL: A LITTLE
MICACEOUS CLAYEY
SANDY SILT

HARD ROCK

GROUND SURFACE
ALLUVIUM:
SILTY SAND

04/2002 WATER SURFACE

A

B

2

6

100+

31

58

100+

4

3

3

5

0

1

3

21

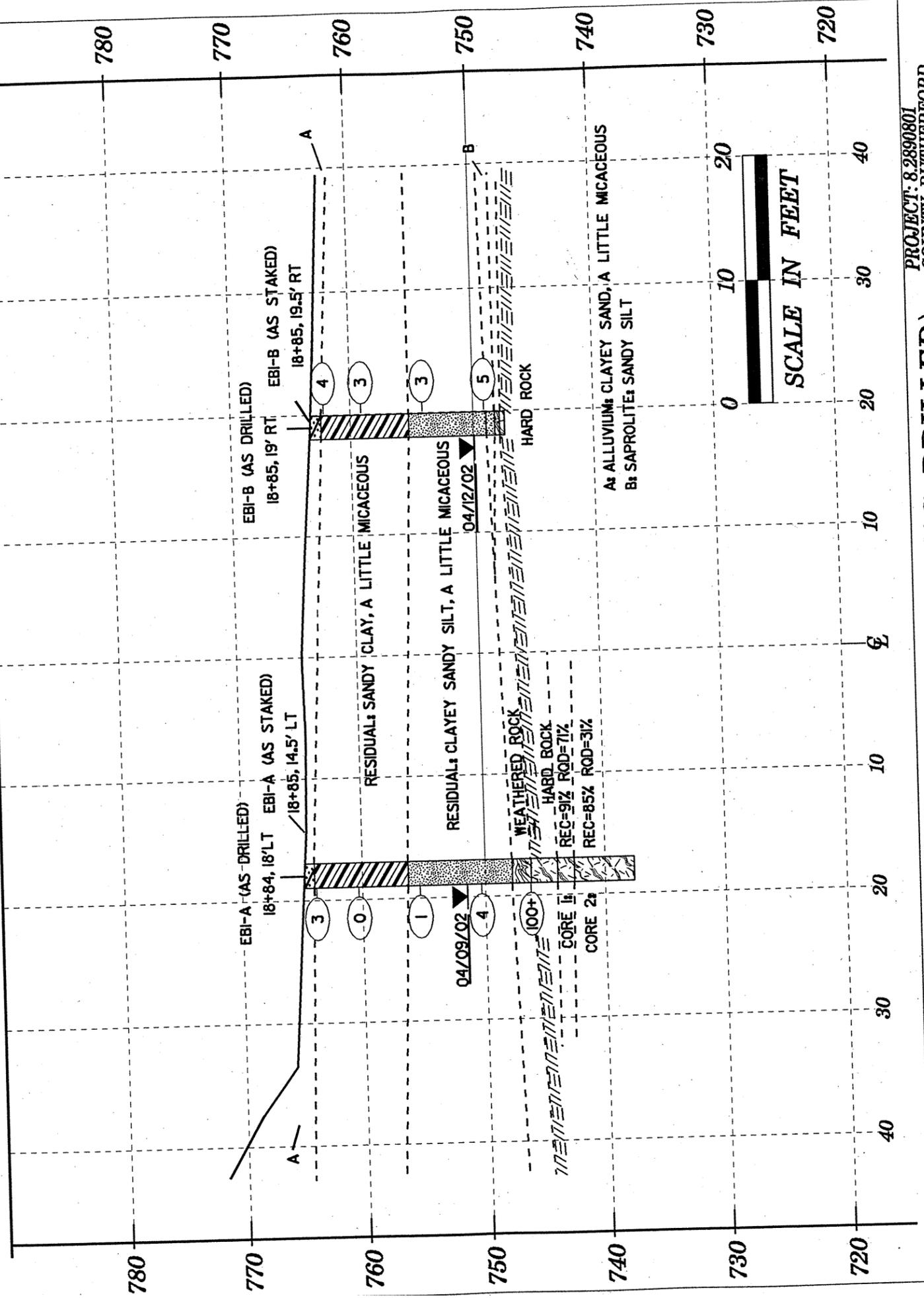
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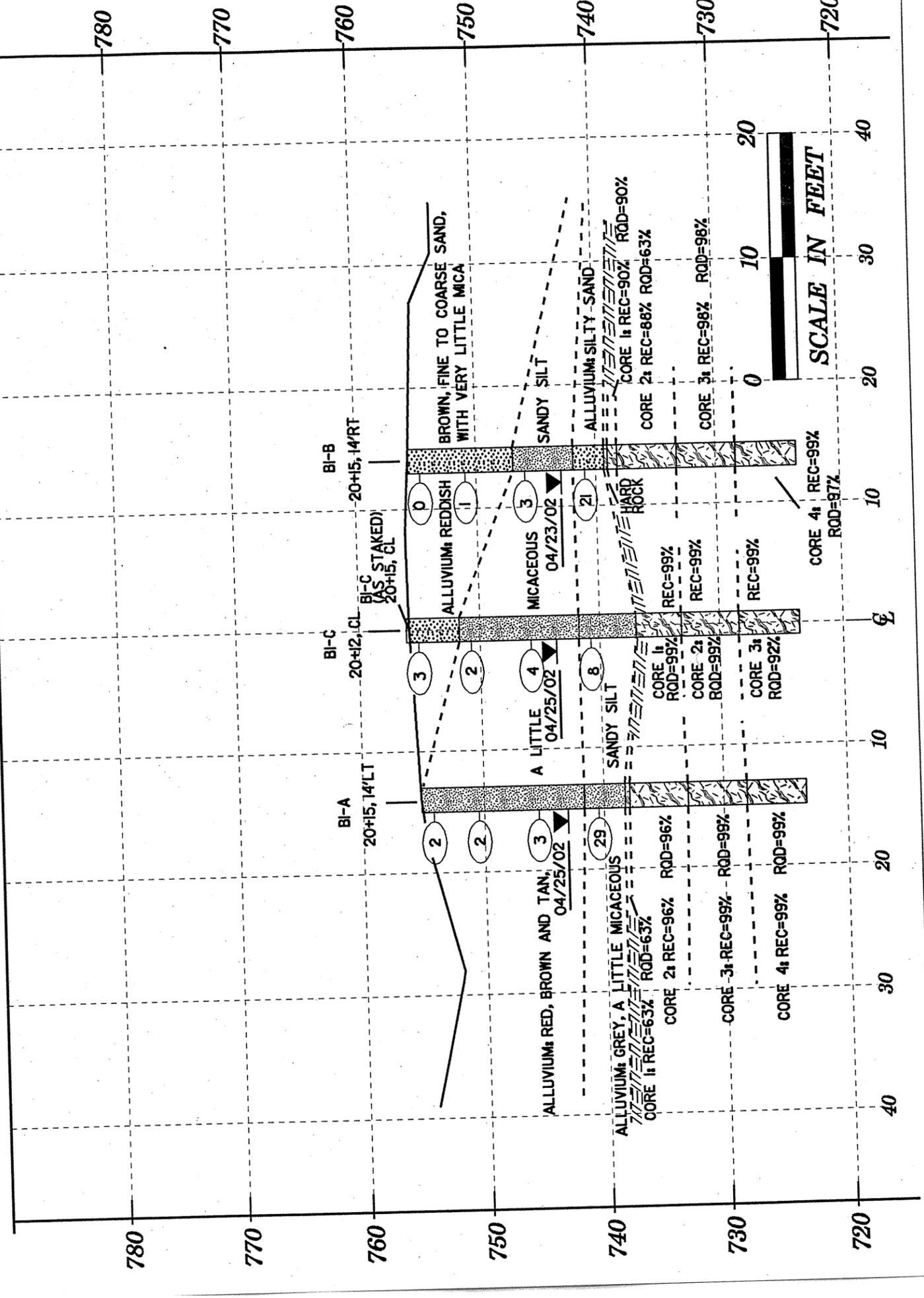
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SCALE IN FEET

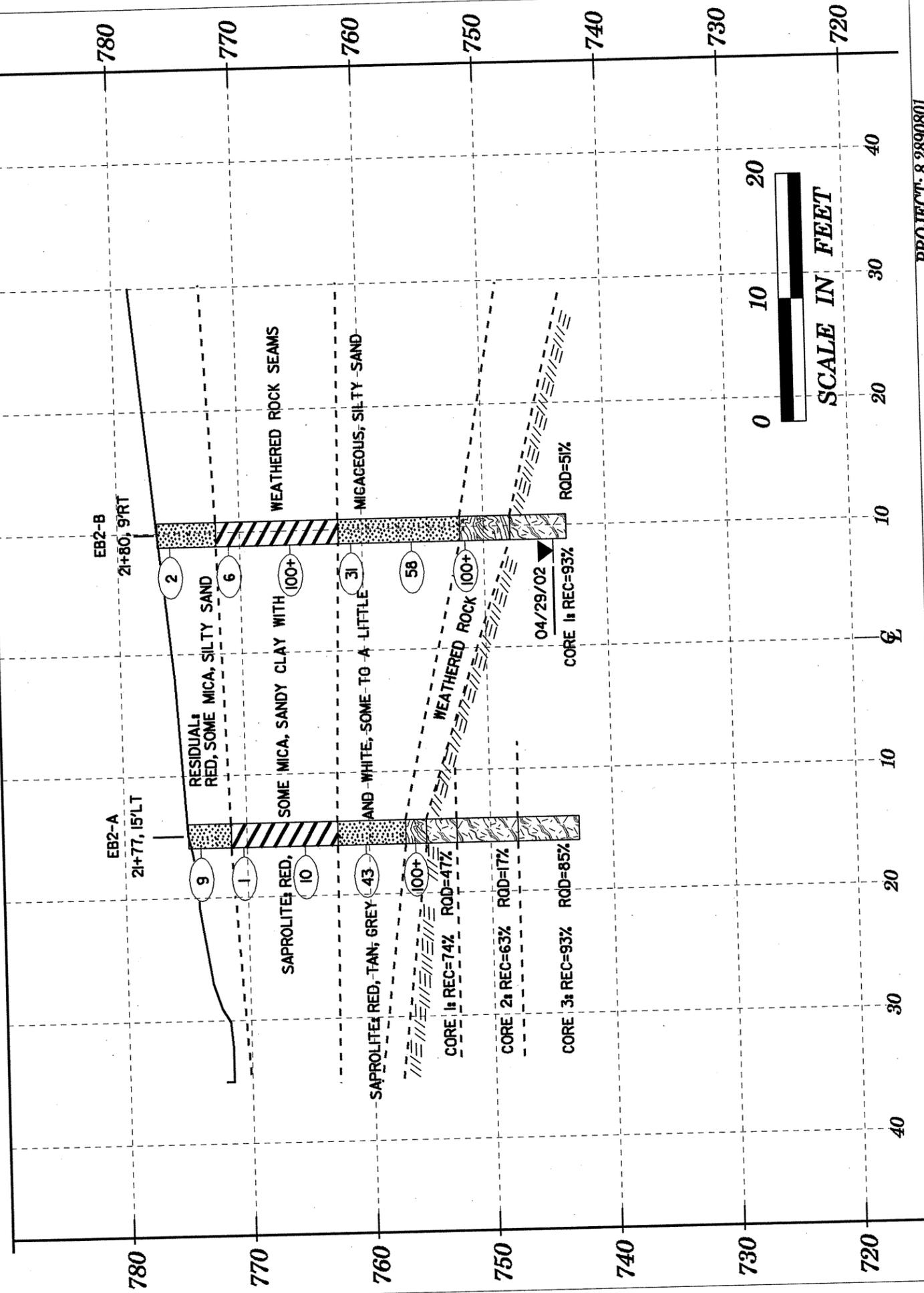
SECTION THROUGH EB1 (AS STAKED)



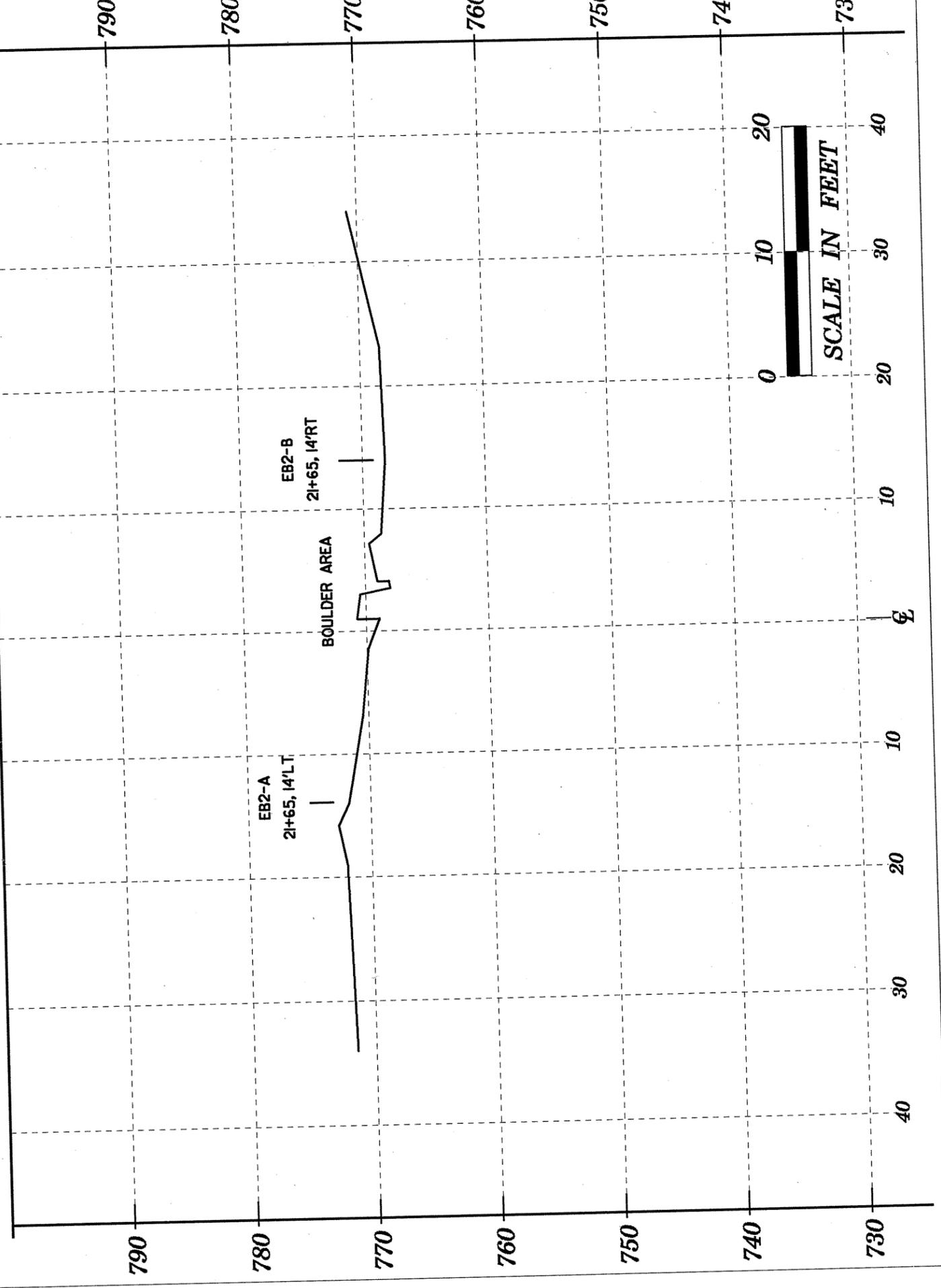
SECTION THROUGH BI (AS DRILLED)



SECTION THROUGH EB2 (AS DRILLED)



SECTION THROUGH EB2 (AS STAKED)



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

| | | | | | | | | | | |
|---------------------------------------------------------------|-------|--------------------------|-----|---------------------------|------|--------------------------|----|-----------|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PROJECT NO 8.2890801 | | ID B-3697 | | COUNTY RUTHERFORD | | GEOLOGIST D.P. MURPHY | | | | |
| SITE DESCRIPTION #270 ON SR-1155 (GRAYS RD.) OVER BROAD RIVER | | | | | | GND WATER | | | | |
| BORING NO B1-B | | | | | | 0 HR 13.00ft | | | | |
| NORTHING 0.00 | | EASTING 0.00 | | TOTAL DEPTH 32.20ft | | 24 HR 12.80ft | | | | |
| BORING LOCATION 20+15.000 | | OFFSET 14.00ft RT | | START DATE 4/22/02 | | COMPLETION DATE 04/22/02 | | | | |
| ALIGNMENT -L- | | DRILL METHOD CORE BORING | | HAMMER TYPE AUTOMATIC | | | | | | |
| COLLAR ELEV 755.70ft | | DEPTH TO ROCK 16.40ft | | Log B1-B, Page 1 of 1 | | | | | | |
| DRILL MACHINE CME-550 | | SURFACE WATER DEPTH | | SOIL AND ROCK DESCRIPTION | | | | | | |
| ELEV | DEPTH | BLOW CT | | | PEN | BLOWS PER FOOT | | SAMPLE NO | LOG | SOIL AND ROCK DESCRIPTION |
| | | 6in | 6in | 6in | (ft) | 0 | 25 | | | |
| 755.70 | 0.00 | | | | 1.0 | | | | | Ground Surface |
| 750.00 | 3.80 | 1 | 0 | 1 | 1.0 | | | | | D-M ALLUVIUM: BROWN, A LITTLE TO SOME MICACEOUS, SILTY SAND, VERY LOOSE. |
| | 8.80 | 2 | 1 | 2 | 1.0 | | | | | SS-9 D-M ALLUVIUM: TAN BROWN, A LITTLE MICACEOUS, SANDY SILT, SOFT. |
| 740.00 | 13.80 | 1 | | 20 | 1.0 | | | | | SS-10 M-W ALLUVIUM: SL. SD. V. SLI. ORG. |
| | | | | | | | | | | HARD CRYSTALLINE ROCK CORE 1: REC=90% RQD=90% CORE 2: MIGMATITIC GRANITIC GNEISS. REC=88% RQD=63% CORE 3: GRANITIC AND BIOTITE GNEISS. REC=98% RQD=98% CORE 4: BLACK, WHITE AND GREY, MIGMATITIC GRANITIC GNEISS. REC=99% RQD=97% |
| 723.50 | | | | | | | | | | BORING WAS TERMINATED AT ELEVATION 723.5 FT. IN MIGMATITIC GRANITIC GNEISS. |

SHEET 1 OF 1

DATE 5/10/02

CORE BORING REPORT

PROJECT: 8.2890801 I. D. NO: B-3697 BORING NO: B1-B GEOLOGIST: D.P. MURPHY
 DESCRIPTION: BRIDGE NO. 270 ON S.R. 1155 OVER BROAD RIVER
 COUNTY: RUTHERFORD COLLAR ELEVATION: 755.7 FT. TOTAL DEPTH: 32.2 FT.

| ELEV. (FEET) | DEPTH (FEET) | RUN (FEET) | REC. FEET % | RQD. FEET % | SAMP. # | FIELD CLASSIFICATION AND REMARKS |
|--------------|--------------|------------|-------------|-------------|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 739.0 | 16.7 | 0.8 | 0.7 | 0.7 | | Very slightly weathered to fresh, hard to very hard, white and grey granitic gneiss, very close to close fracture spacing. Iron-oxide staining on joint faces. Soft seams throughout strata. |
| 738.2 | 17.5 | | 90 | 90 | | Strata run=2.65 Strata recovery=1.95, 74% Strata RQD=0.72, 27% |
| 738.2 | 17.5 | 5.0 | 4.4 | 3.2 | | |
| | | | 88 | 63 | | |
| 733.2 | 22.5 | | | | | |
| 733.2 | 22.5 | 4.8 | 4.7 | 4.7 | RS-3 25.94- 26.66' | Fresh, hard to very hard, white, black and grey migmatitic granitic gneiss, close to moderately close fracture spacing. Strata run=12.85 Strata recovery=12.75, 99% Strata RQD=12.49, 97% |
| 728.4 | 27.3 | | 98 | 98 | | |
| 728.4 | 27.3 | 4.9 | 4.9 | 4.8 | | |
| | | | 100 | 97 | | |
| 723.5 | 32.2 | | | | | |

CORING TERMINATED AT ELEVATION 723.5 FT.

DRILLER: E.A. SMITH CORE SIZE: NXWL EQUIPMENT: CME-550

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

| PROJECT NO 8.2890801 | | ID B-3697 | | COUNTY RUTHERFORD | | GEOLOGIST D.P. MURPHY | | | | | | | | |
|---------------------------------------------------------------|-------|---------------------------|-----|--------------------------|----------|--------------------------|----|----|----|-----|-----------|-----|---------------------------|----------------------------------------------------------------------------------------------------------|
| SITE DESCRIPTION #270 ON SR-1155 (GRAYS RD.) OVER BROAD RIVER | | | | | | GND WATER | | | | | | | | |
| BORING NO EB2-A | | NORTHING 0.00 | | EASTING 0.00 | | 0 HR 18.20ft | | | | | | | | |
| ALIGNMENT -L- | | BORING LOCATION 21+77.000 | | OFFSET 15.00ft LT | | 24 HR 19.40ft | | | | | | | | |
| COLLAR ELEV 774.72ft | | TOTAL DEPTH 32.00ft | | START DATE 4/26/02 | | COMPLETION DATE 04/29/02 | | | | | | | | |
| DRILL MACHINE CME-550 | | | | DRILL METHOD CORE BORING | | HAMMER TYPE AUTOMATIC | | | | | | | | |
| SURFACE WATER DEPTH | | | | DEPTH TO ROCK 19.40ft | | Log EB2-A, Page 1 of 1 | | | | | | | | |
| ELEV | DEPTH | BLOW CT | | | PEN (ft) | BLOWS PER FOOT | | | | | SAMPLE NO | LOG | SOIL AND ROCK DESCRIPTION | |
| | | 6in | 6in | 6in | | 0 | 25 | 50 | 75 | 100 | | | | |
| 774.72 | 0.00 | 1 | 3 | 6 | 1.0 | | | | | | | | | Ground Surface |
| 770.00 | 3.50 | 0 | 1 | 0 | 1.0 | | | | | | | | | RESIDUAL: RED, SOME MICA, CLAYEY SILTY SAND, LOOSE. |
| | 8.50 | 2 | 4 | 6 | 1.0 | | | | | | | | | SAPROLITE: RED, SOME MICA, SANDY, SILTY CLAY, VERY SOFT - STIFF, WEATHERED ROCK SEAMS THROUGHOUT STRATA. |
| 760.00 | 13.50 | 8 | 16 | 27 | 1.0 | | | | | | | | | SAPROLITE: GREY, TAN & WHITE, A LITTLE MIC., SL. SD. W/ WEATH. RK. FRAGS., DENSE. |
| | 18.50 | 100 | | | 0.1 | | | | | | | | | WEATHERED ROCK |
| | | | | | | | | | | | | | | CORE 1: BLK, WHT & GRY, MIGMATITIC GRANITIC GNEISS. |
| | | | | | | | | | | | | | | CORE 2: BLK, WHT & GRY, MIGMATITIC GRANITIC GNEISS W/ WEATH. RK. & SAP. SEAMS. |
| | | | | | | | | | | | | | | CORE 3: GREY, WHITE AND BLACK, MIGMATITIC GRANITIC GNEISS. |
| | | | | | | | | | | | | | | BORING WAS TERMINATED AT ELEVATION 742.72 FT. IN MIGMATITIC GRANITIC GNEISS. |

SHEET 1 OF 1

DATE 5/8/02

CORE BORING REPORT

PROJECT: 8.2890801 I. D. NO: B-3697 BORING NO: EB2-A GEOLOGIST: D.P. MURPHY

DESCRIPTION: BRIDGE NO. 270 ON S.R. 1155 OVER BROAD RIVER

COUNTY: RUTHERFORD COLLAR ELEVATION: 774.7 FT. TOTAL DEPTH: 32.0 FT.

| ELEV. (FEET) | DEPTH (FEET) | RUN (FEET) | REC. FEET % | RQD. FEET % | SAMP. # | FIELD CLASSIFICATION AND REMARKS |
|--------------|--------------|------------|-------------|-------------|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 755.2 | 19.5 | 2.5 | 1.8 | 1.2 | | Very slightly weathered, hard to very hard, white and light grey, migmatitic granitic gneiss. Seams throughout run. Iron-oxide staining on joint faces, very close to close fracture spacing. Strata run=3.4 Strata recovery=2.8, 82% Strata RQD=1.69, 50% |
| 752.7 | 22.0 | 5.0 | 3.2 | 0.9 | | Very slightly weathered, moderately hard to hard, black, white and grey hornblende amphibolite gneiss with soft seams throughout run. Some iron-oxide staining on joint faces. Very close to close fracture spacing. Strata run=3.7 Strata recovery=1.9, 51% Strata RQD= 0.0, 0% |
| 747.7 | 27.0 | 5.0 | 4.6 | 4.2 | | Fresh, hard to very hard, grey, green-grey and white hornblende amphibolite gneiss. Moderately close fracture spacing with a few very closely spaced fractures. Strata run=5.4 Strata recovery=5.2, 96% Strata RQD=4.7, 87% |
| 742.7 | 32.0 | | | | | |

CORING TERMINATED AT ELEVATION 742.7 FT.

DRILLER: E.A. SMITH CORE SIZE: NXWL EQUIPMENT: CME-550

SOIL TEST RESULTS

| SAMPLE NO. | OFFSET | STATION | DEPTH INTERVAL | AASHTO CLASS. | L.L. | PL. I. | % BY WEIGHT | | | | % PASSING SIEVES | | | % MOISTURE | % ORGANIC |
|------------|--------|---------|----------------|---------------|------|--------|-------------|---------|------|------|------------------|-----|-----|------------|-----------|
| | | | | | | | C. SAND | F. SAND | SILT | CLAY | 10 | 40 | 200 | | |
| SS-1 | 18' LT | 18+84 | 0.5-1.5 | A-6 | 33 | 13 | 42 | 22 | 18 | 18 | 96 | 69 | 38 | | |
| SS-2 | 18' LT | 18+84 | 4.0-5.0 | A-6 | 34 | 14 | 26 | 27 | 17 | 30 | 98 | 83 | 50 | | |
| SS-3 | 18' LT | 18+84 | 9.0-10.0 | A-4 | 28 | 7 | 30 | 27 | 19 | 24 | 100 | 83 | 48 | | |
| SS-4 | 18' LT | 18+84 | 14.0-15.0 | A-4 | 29 | 6 | 21 | 42 | 19 | 18 | 100 | 92 | 46 | | |
| SS-5 | 18' LT | 18+84 | 14.0-15.0 | A-4 | 29 | 6 | 21 | 42 | 19 | 18 | 100 | 92 | 46 | | |
| SS-5 | 19' RT | 18+85 | 0.5-1.5 | A-6 | 40 | 19 | 29 | 19 | 22 | 30 | 89 | 74 | 49 | | |
| SS-5 | 19' RT | 18+85 | 0.5-1.5 | A-6 | 40 | 19 | 29 | 19 | 22 | 30 | 89 | 74 | 49 | | |
| SS-6 | 19' RT | 18+85 | 3.6-4.6 | A-6 | 35 | 11 | 21 | 25 | 28 | 26 | 100 | 91 | 58 | | |
| SS-6 | 19' RT | 18+85 | 3.6-4.6 | A-6 | 35 | 11 | 21 | 25 | 28 | 26 | 100 | 91 | 58 | | |
| SS-6 | 19' RT | 18+85 | 3.6-4.6 | A-6 | 35 | 11 | 21 | 25 | 28 | 26 | 100 | 91 | 58 | | |
| SS-6 | 19' RT | 18+85 | 3.6-4.6 | A-6 | 35 | 11 | 21 | 25 | 28 | 26 | 100 | 91 | 58 | | |
| SS-7 | 19' RT | 18+85 | 8.6-9.6 | A-4 | 27 | 7 | 21 | 40 | 15 | 24 | 100 | 96 | 51 | | |
| SS-7 | 19' RT | 18+85 | 8.6-9.6 | A-4 | 27 | 7 | 21 | 40 | 15 | 24 | 100 | 96 | 51 | | |
| SS-7 | 19' RT | 18+85 | 8.6-9.6 | A-4 | 27 | 7 | 21 | 40 | 15 | 24 | 100 | 96 | 51 | | |
| SS-8 | 19' RT | 18+85 | 13.6-14.6 | A-4 | 31 | 10 | 14 | 43 | 19 | 24 | 100 | 96 | 54 | | |
| SS-8 | 19' RT | 18+85 | 13.6-14.6 | A-4 | 31 | 10 | 14 | 43 | 19 | 24 | 100 | 96 | 54 | | |
| SS-8 | 19' RT | 18+85 | 13.6-14.6 | A-4 | 31 | 10 | 14 | 43 | 19 | 24 | 100 | 96 | 54 | | |
| SS-9 | 14' RT | 20+15 | 8.8-10.3 | A-4 | 27 | NP | 33 | 29 | 30 | 8 | 100 | 75 | 46 | | |
| SS-9 | 14' RT | 20+15 | 8.8-10.3 | A-4 | 27 | NP | 33 | 29 | 30 | 8 | 100 | 75 | 46 | | |
| SS-9 | 14' RT | 20+15 | 8.8-10.3 | A-4 | 27 | NP | 33 | 29 | 30 | 8 | 100 | 75 | 46 | | |
| SS-10 | 14' RT | 20+15 | 13.8-15.3 | A-2-4 | 28 | NP | 9 | 75 | 6 | 10 | 88 | 87 | 20 | | |
| SS-10 | 14' RT | 20+15 | 13.8-15.3 | A-2-4 | 28 | NP | 9 | 75 | 6 | 10 | 88 | 87 | 20 | | |
| SS-10 | 14' RT | 20+15 | 13.8-15.3 | A-2-4 | 28 | NP | 9 | 75 | 6 | 10 | 88 | 87 | 20 | | |
| SS-11 | 14' LT | 20+15 | 3.8-5.3 | A-4 | 35 | NP | 4 | 54 | 29 | 13 | 100 | 100 | 57 | | |
| SS-11 | 14' LT | 20+15 | 3.8-5.3 | A-4 | 35 | NP | 4 | 54 | 29 | 13 | 100 | 100 | 57 | | |
| SS-11 | 14' LT | 20+15 | 3.8-5.3 | A-4 | 35 | NP | 4 | 54 | 29 | 13 | 100 | 100 | 57 | | |
| SS-12 | 14' LT | 20+15 | 8.8-10.3 | A-4 | 36 | NP | 2 | 56 | 24 | 18 | 100 | 100 | 55 | | |
| SS-12 | 14' LT | 20+15 | 8.8-10.3 | A-4 | 36 | NP | 2 | 56 | 24 | 18 | 100 | 100 | 55 | | |
| SS-12 | 14' LT | 20+15 | 8.8-10.3 | A-4 | 36 | NP | 2 | 56 | 24 | 18 | 100 | 100 | 55 | | |
| SS-13 | CL | 20+12 | 14.4-15.9 | A-4 | 38 | NP | 8 | 52 | 24 | 16 | 100 | 98 | 47 | | |
| SS-13 | CL | 20+12 | 14.4-15.9 | A-4 | 38 | NP | 8 | 52 | 24 | 16 | 100 | 98 | 47 | | |
| SS-13 | CL | 20+12 | 14.4-15.9 | A-4 | 38 | NP | 8 | 52 | 24 | 16 | 100 | 98 | 47 | | |
| SS-14 | 9' RT | 21+80 | 4.8-6.3 | A-7-5 | 56 | 25 | 26 | 20 | 9 | 45 | 92 | 77 | 53 | | |
| SS-14 | 9' RT | 21+80 | 4.8-6.3 | A-7-5 | 56 | 25 | 26 | 20 | 9 | 45 | 92 | 77 | 53 | | |
| SS-14 | 9' RT | 21+80 | 4.8-6.3 | A-7-5 | 56 | 25 | 26 | 20 | 9 | 45 | 92 | 77 | 53 | | |
| SS-15 | 15' LT | 21+77 | 8.5-10.0 | A-7-5 | 47 | 11 | 32 | 32 | 12 | 24 | 97 | 78 | 41 | | |
| SS-15 | 15' LT | 21+77 | 8.5-10.0 | A-7-5 | 47 | 11 | 32 | 32 | 12 | 24 | 97 | 78 | 41 | | |
| SS-15 | 15' LT | 21+77 | 8.5-10.0 | A-7-5 | 47 | 11 | 32 | 32 | 12 | 24 | 97 | 78 | 41 | | |

GEOTECHNICAL UNIT FIELD SCOUR REPORT

PROJECT: 8.2890801 ID: B-3697 COUNTY: RutherfordDESCRIPTION(1): Bridge No. 270 On SR-1155 (Grays Rd.) Over Broad River

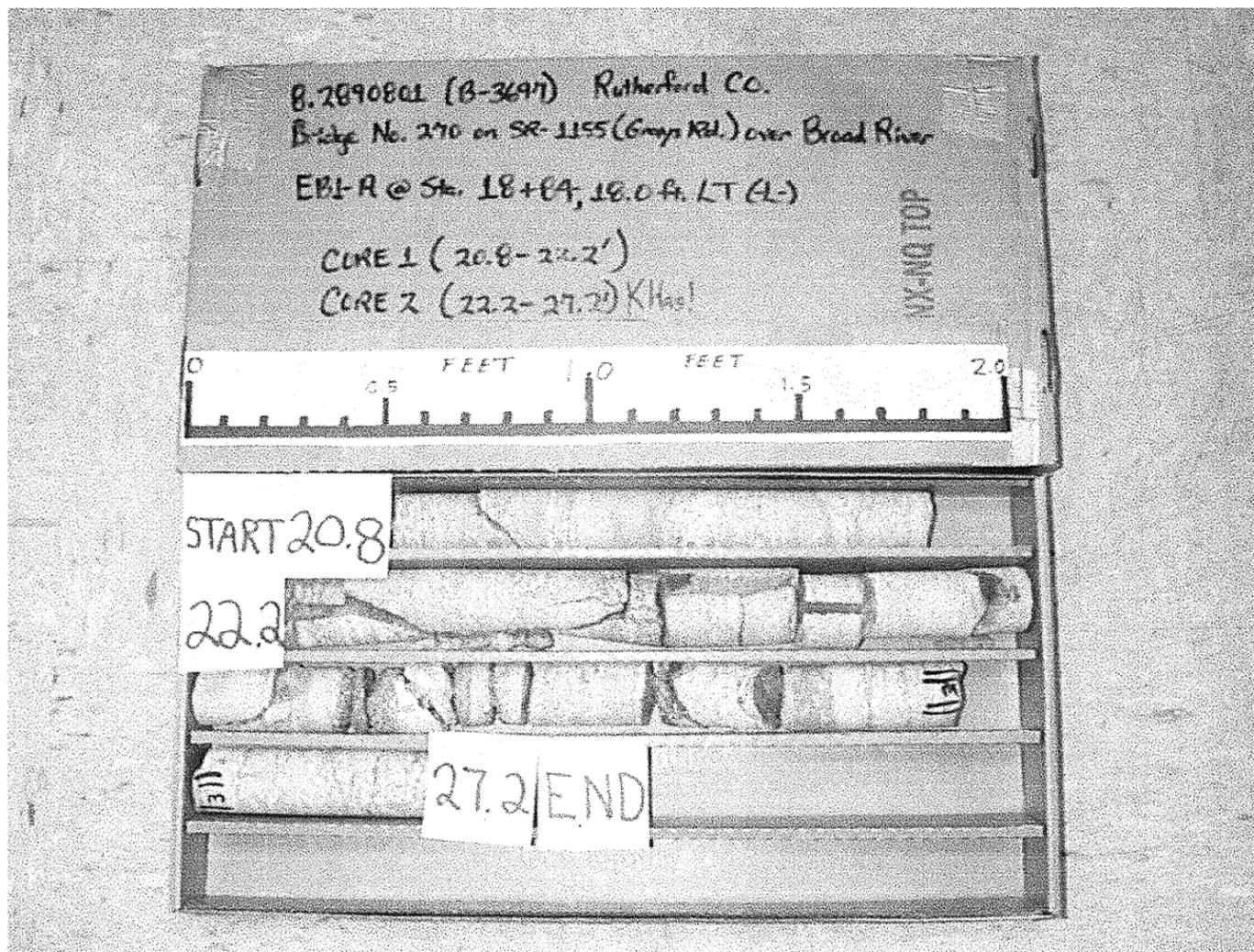
INFORMATION ON EXISTING BRIDGES Information obtained from: field inspection
 microfilm(Reel: Pos:)
 other Hydraulic Design Report

COUNTY BRIDGE NO. 270 BRIDGE LENGTH 256.75' NO. BENTS IN: CHANNEL 0 FLOOD PLAIN 8FOUNDATION TYPE: Pilings; footings on piles at Interior Bent 6 (IB6).**EVIDENCE OF SCOUR(2):**ABUTMENTS OR END BENT SLOPES: No noticeable scour.INTERIOR BENTS: No visible scour.CHANNEL BED: A few, small scour holes - mostly in central two-thirds of channel.CHANNEL BANKS: Some undermining along both N and S banks. More prominent downstream (E) of existing bridge where several trees appear somewhat unstable & a couple of large trees have fallen.**EXISTING SCOUR PROTECTION:** across the channel.TYPE(3): Widely scattered boulders on the slope adjoining EB2 Abutment.EXTENT(4) Within a 10' (N-S) x 19' (E-W) area contiguous to EB2 Abutment and mainly beneath the bridge.EFFECTIVENESS(5): Effective - scour is not a problem.OBSTRUCTIONS(6) (DAMS, DEBRIS, ETC.): Logs, limbs & leaves at approx. 37' W (upstream), 10-30' E (downstream),**DESIGN INFORMATION** fallen trees and partial dams.CHANNEL BED MATERIAL(7) (SAMPLE RESULTS ATTACHED): Silt, sand, pebbles, cobbles, boulders and occasional hard crystalline rock (migmatitic gneiss).CHANNEL BANK MATERIAL(8) (SAMPLE RESULTS ATTACHED): Silt, sand, & sporadic pebbles, cobbles and boulders. Some notable bedrock (migmatitic gneiss) on the northern bank.FOUNDATION BEARING MATERIAL(9): Hard crystalline rock (migmatitic gneiss); weathered rock; saprolite.CHANNEL BANK COVER(10): Grass, brushwood and trees.FLOOD PLAIN WIDTH(11): Recent floodplain: 180-210 feet Ancient floodplain: 325-375 feetFLOOD PLAIN COVER(12): Grass, brush and trees.**DESIGN INFORMATION CONT.**

PAGE 2

STREAM IS DEGRADING AGGRADING (13)OTHER OBSERVATIONS AND COMMENTS Some large trees appear to be rather unstable along the downstream banks. A couple have fallen from the southern bank at a distance approx. 337-600 feet east of existing bridge.CHANNEL MIGRATION TENDENCY (14): No observable tendency.GEOTECHNICALLY ADJUSTED SCOUR ELEVATION (15): B1-A: 738.1 feet on crystalline rockB1-C: 736.9 feet on crystalline rockB1-B: 739.3 feet on crystalline rockREPORTED BY: M. A. Treadway, TEG-II DATE: 04/19/02**INSTRUCTIONS**

- (1) GIVE THE DESCRIPTION OF THE SPECIFIC SITE GIVING ROUTE NUMBER AND BODY OF WATER CROSSED.
- (2) NOTE ANY EVIDENCE OF SCOUR AT THE EXISTING END BENTS OR ABUTMENTS (UNDERMINING, SLOUGHING, SCOUR LOCATIONS, DEGRADATIONS, ETC.)
- (3) NOTE ANY EXISTING SCOUR PROTECTION (RIP RAP, ETC.)
- (4) DESCRIBE THE EXTENT OF ANY EXISTING SCOUR PROTECTION.
- (5) DESCRIBE WHETHER OR NOT THE SCOUR PROTECTION APPEARS TO BE WORKING.
- (6) NOTE ANY DAMS, FALLEN TREES, DEBRIS AT BENTS, ETC.
- (7) DESCRIBE THE CHANNEL BED MATERIAL: A SAMPLE SHOULD BE TAKEN FOR GRAIN SIZE DISTRIBUTION, ATTACH LAB RESULTS.
- (8) DESCRIBE THE CHANNEL BANK MATERIAL: A SAMPLE SHOULD BE TAKEN FOR GRAIN SIZE DISTRIBUTION, ATTACH LAB RESULTS.
- (9) DESCRIBE THE FOUNDATION BEARING MATERIAL,
- (10) DESCRIBE THE BANK COVERING (GRASS, TREES, RIP RAP, NONE, ETC.)
- (11) GIVE THE APPROXIMATE FLOOD PLAIN WIDTH (ESTIMATE).
- (12) DESCRIBE THE FLOOD PLAIN COVERING (GRASS, TREES, CROPS, ETC.)
- (13) CHECK THE APPROPRIATE SPACE AS TO WHETHER THE STREAM IS DEGRADING OR AGGRADING
- (14) DESCRIBE THE POTENTIAL OF THE BODY OF WATER TO MIGRATE Laterally DURING THE LIFE OF THE BRIDGE (APPROXIMATELY 100 YEARS).
- (15) GIVE THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION EXPECTED OVER THE LIFE OF THE BRIDGE (APPROXIMATELY 100 YEARS). THIS CAN BE GIVEN AS AN ELEVATION RANGE ACROSS THE SITE, OR ON A BENT BY BENT BASIS WHERE VARIATIONS EXIST. DISCUSS RELATIONSHIP BETWEEN THE HYDRAULICS THEORETICAL SCOUR AND THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION. THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION IS BASED ON THE ERODABILITY OF MATERIALS WITH CONSIDERATION FOR JOINTING, FOLIATION, BEDDING ORIENTATION AND FREQUENCY; CORE RECOVERY PERCENTAGE; PERCENTAGE RQD; DIFFERENTIAL WEATHERING, SHEAR STRENGTH; OBSERVATIONS AT EXISTING STRUCTURES; OTHER TESTS DEEMED APPROPRIATE; AND OVERALL GEOLOGIC CONDITIONS AT THE SITE.

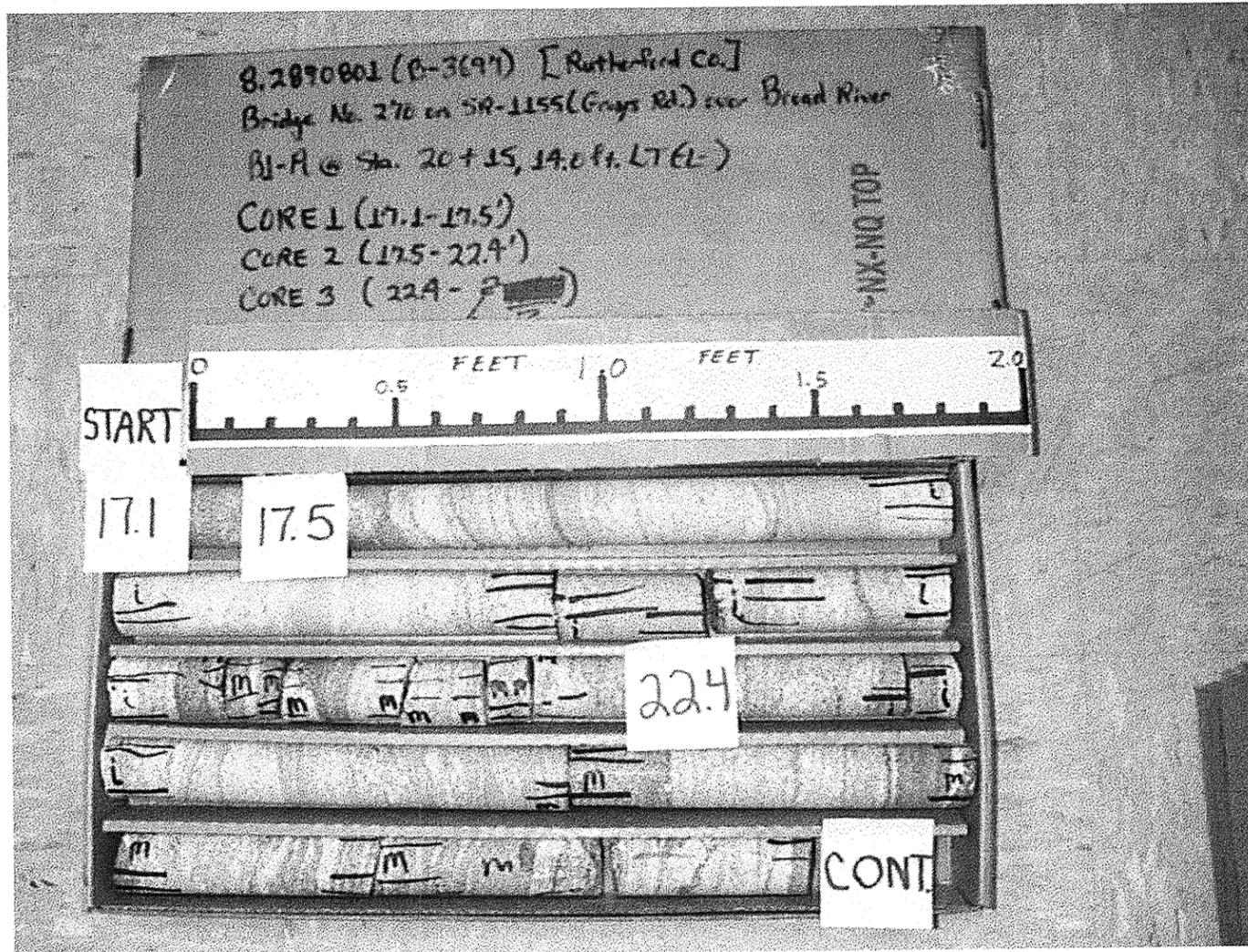


8.2890801 (B-3697)
 RUTHERFORD COUNTY
 BRIDGE NO. 270 ON SR-1155 OVER BROAD RIVER

EB1-A @ STATION 18+84, 18.0 ft. LT (-L-)

BOX 1 OF 1

DEPTH: 20.8-27.2 ft.

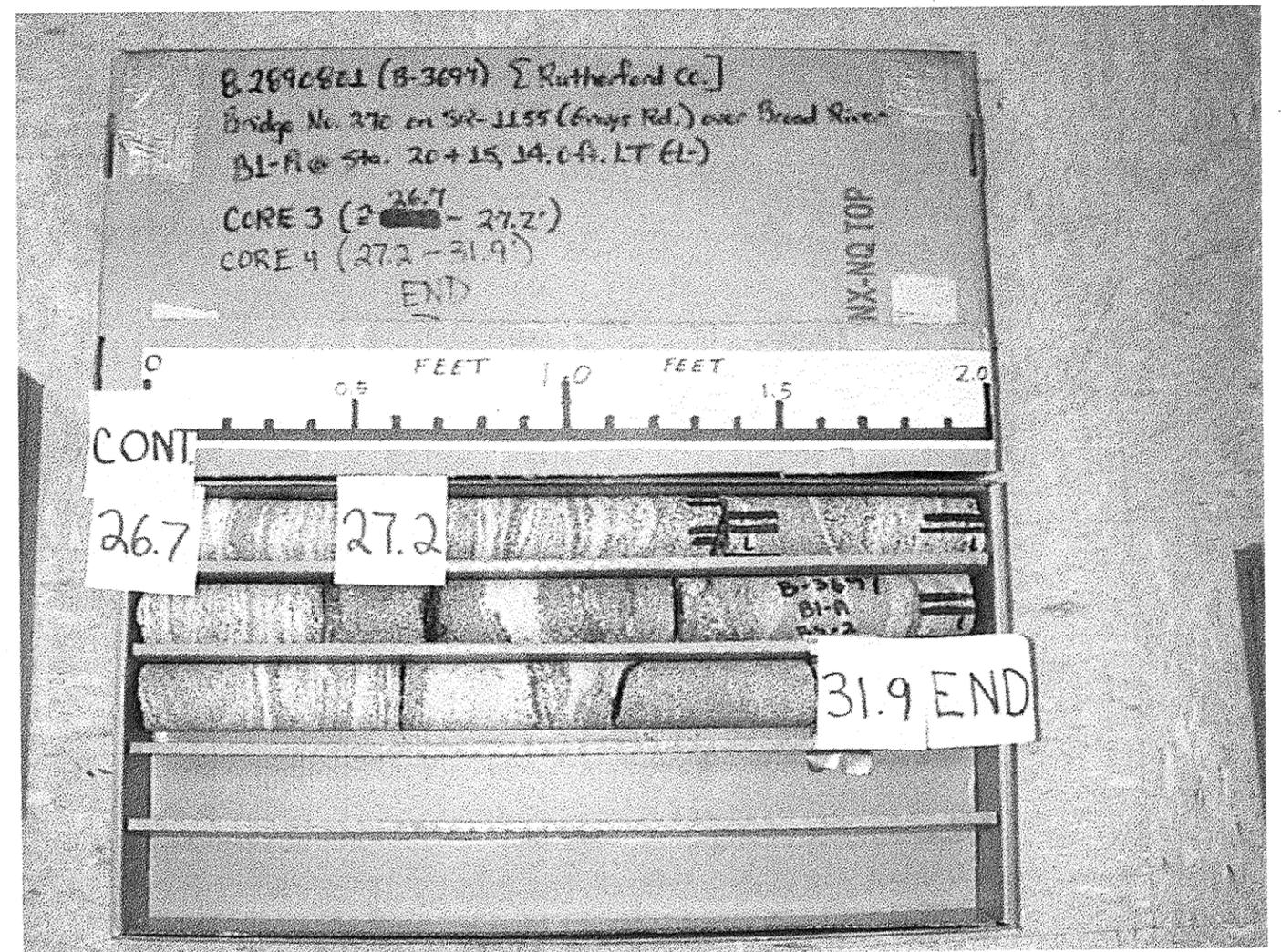


8.2890801 (B-3697)
 RUTHERFORD COUNTY
 BRIDGE NO. 270 ON SR-1155 OVER BROAD RIVER

B1-A @ STATION 20+15, 14.0 ft. LT (-L-)

BOX 1 OF 2

DEPTH: 17.1-26.7 ft.

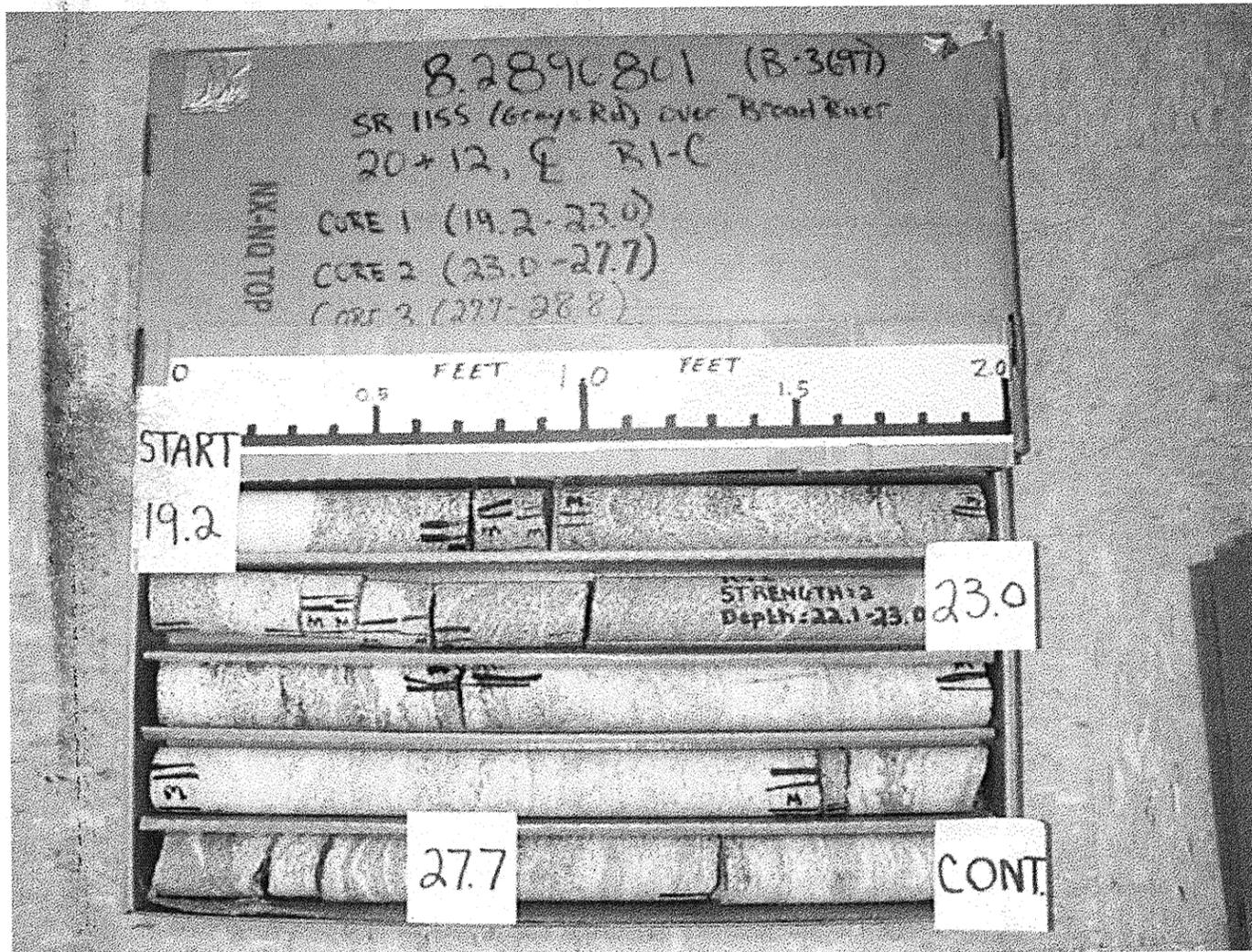


8.2890801 (B-3697)
 RUTHERFORD COUNTY
 BRIDGE NO. 270 ON SR-1155 OVER BROAD RIVER

B1-A @ STATION 20+15, 14.0 ft. LT (-L-)

BOX 2 OF 2

DEPTH: 26.7-31.9 ft.

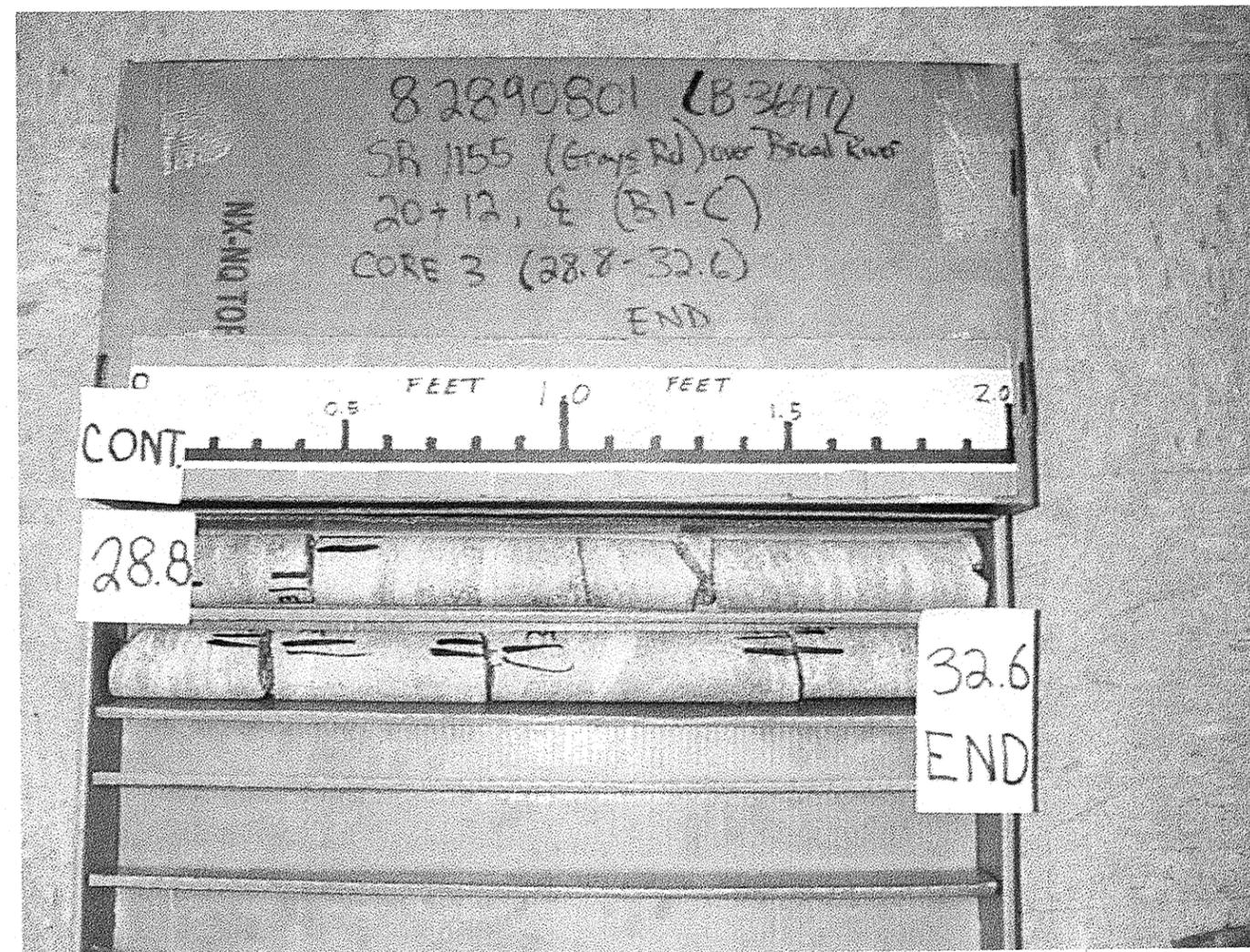


8.2890801 (B-3697)
 RUTHERFORD COUNTY
 BRIDGE NO. 270 ON SR-1155 OVER BROAD RIVER

B1-C @ STATION 20+12, CL (-L-)

BOX 1 OF 2

DEPTH: 19.2-28.8 ft.

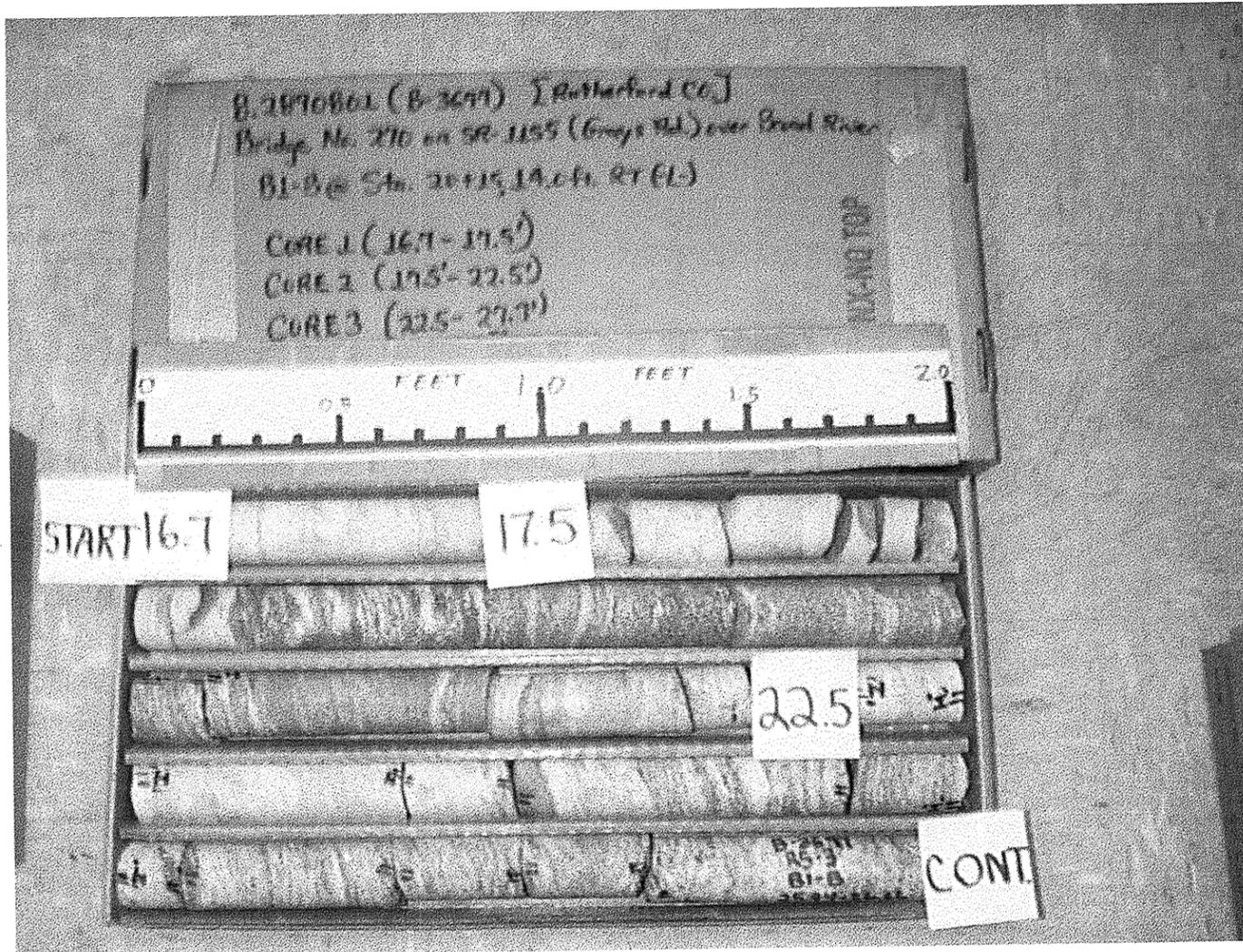


8.2890801 (B-3697)
 RUTHERFORD COUNTY
 BRIDGE NO. 270 ON SR-1155 OVER BROAD RIVER

B1-C @ STATION 20+12, CL (-L-)

BOX 2 OF 2

DEPTH: 28.8-32.6 ft.

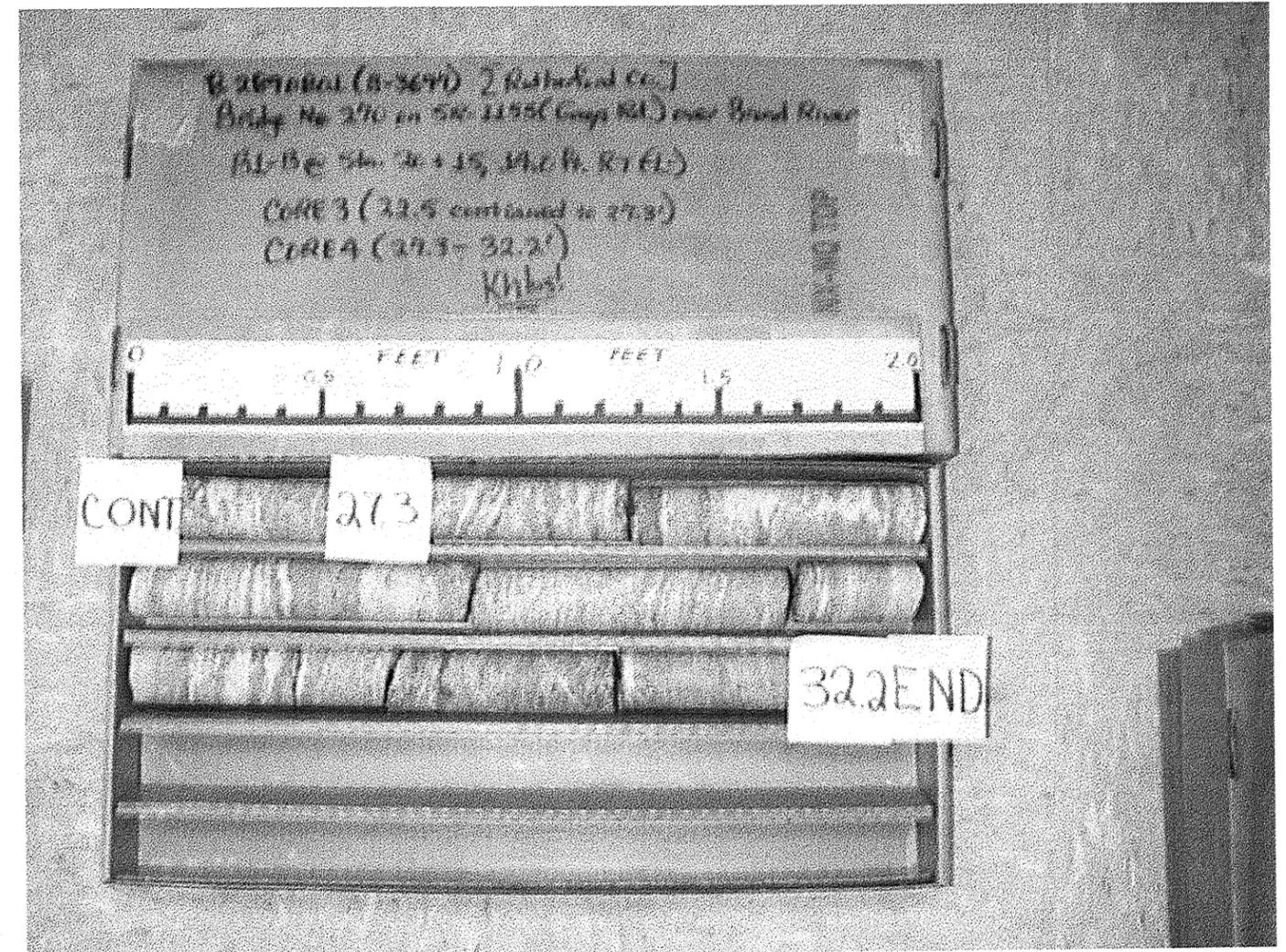


8.2890801 (B-3697)
 RUTHERFORD COUNTY
 BRIDGE NO. 270 ON SR-1155 OVER BROAD RIVER

B1-B @ STATION 20+15, 14.0 ft. RT (-L-)

BOX 1 OF 2

DEPTH: 16.7-26.7 ft.

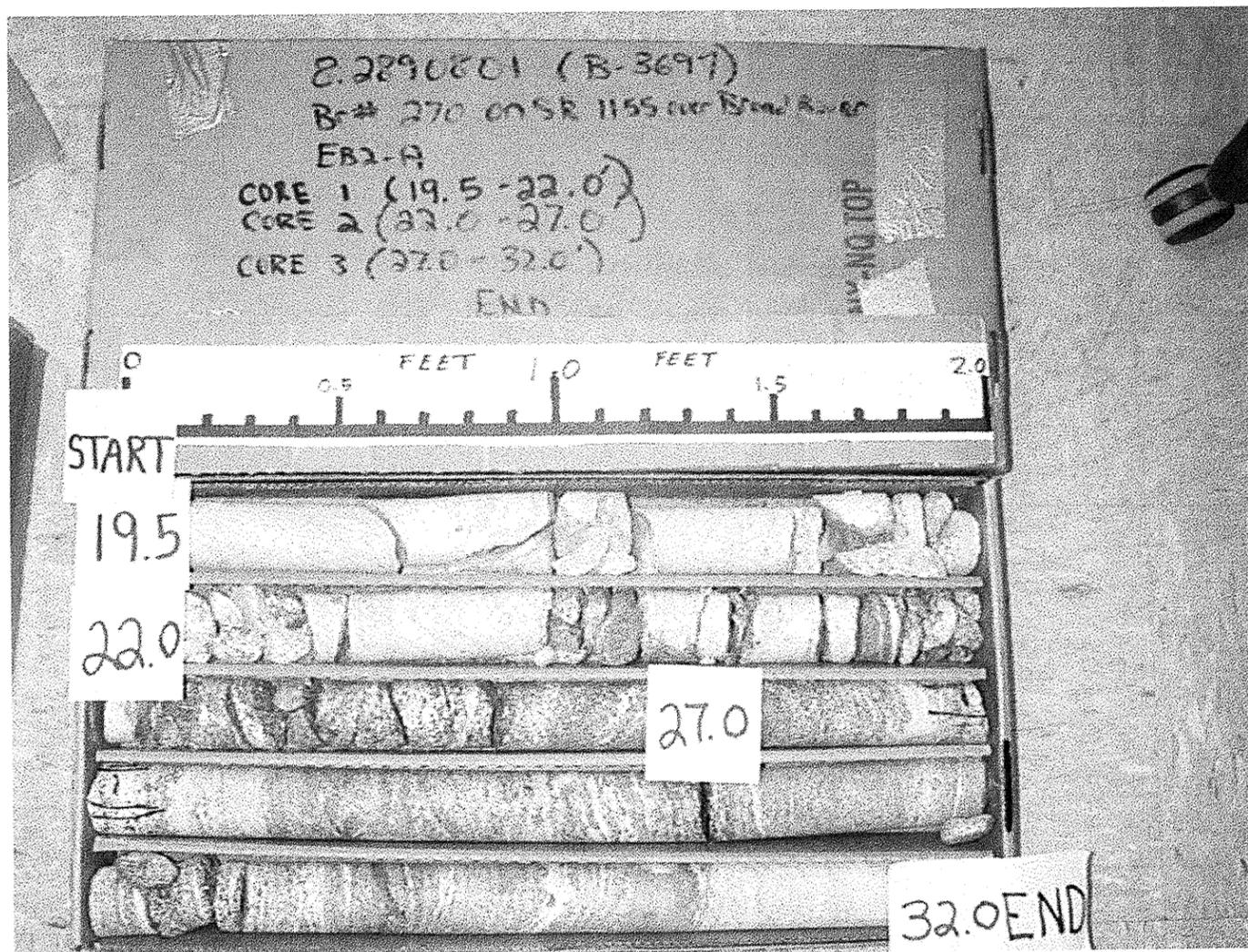


8.2890801 (B-3697)
 RUTHERFORD COUNTY
 BRIDGE NO. 270 ON SR-1155 OVER BROAD RIVER

B1-B @ STATION 20+15, 14.0 ft. RT (-L-)

BOX 2 OF 2

DEPTH: 26.7-32.2 ft.



8.2890801 (B-3697)
RUTHERFORD COUNTY
BRIDGE NO. 270 ON SR-1155 OVER BROAD RIVER

EB2-A @ STATION 21+77, 15'LT (-L-)

BOX 1 OF 1

DEPTH: 19.5-32.0 ft.



8.2890801 (B-3697)
RUTHERFORD COUNTY
BRIDGE NO. 270 ON SR-1155 OVER BROAD RIVER

EB2-B @ STATION 21+80, 9'RT (-L-)

BOX 1 OF 1

DEPTH: 28.9-33.5 ft.



8.2890801 (B-3697)
BRIDGE NO. 270 ON
SR-1155 (GRAYS RD.)
OVER BROAD RIVER

RUTHERFORD
COUNTY

DOWNSTATION
VIEW (SOUTHERLY)
OF EXISTING
BRIDGE



8.2890801 (B-3697)
BRIDGE NO. 270 ON
SR-1155 (GRAYS RD.)
OVER BROAD RIVER

RUTHERFORD
COUNTY

DOWNSTATION
VIEW (SOUTHERLY)
OF PROPOSED
REPLACEMENT
BRIDGE LOCALE.



8.2890801 (B-3697)
BRIDGE NO. 270 ON
SR-1155 (GRAYS RD.)
OVER BROAD RIVER

RUTHERFORD
COUNTY

DOWNSTATION
VIEW OF END BENT 2
AREA OF PROPOSED
REPLACEMENT
BRIDGE LOCALE



8.2890801 (B-3697)
BRIDGE NO. 270 ON
SR-1155 (GRAYS RD.)
OVER BROAD RIVER

RUTHERFORD
COUNTY

DOWNSTATION
(SOUTHERLY) VIEW
OF PROPOSED
REPLACEMENT
BRIDGE LOCALE
FROM TOP OF
BROAD RIVER BANK



8.2890801 (B-3697)
BRIDGE NO. 270 ON
SR-1155 (GRAYS RD.)
OVER BROAD RIVER

RUTHERFORD
COUNTY

DOWNSTREAM VIEW
(EASTERLY) OF
PROPOSED
REPLACEMENT
BRIDGE LOCALE
FROM EXISTING
BRIDGE



8.2890801 (B-3697)
BRIDGE NO. 270 ON
SR-1155 (GRAYS RD.)
OVER BROAD RIVER

RUTHERFORD
COUNTY

UPSTATION VIEW
(NORTHERLY) OF
EXISTING BRIDGE



8.2890801 (B-3697)
BRIDGE NO. 270 ON
SR-1155 (GRAYS RD.)
OVER BROAD RIVER

RUTHERFORD
COUNTY

UPSTREAM
(WESTERLY) VIEW
FROM EXISTING
BRIDGE



8.2890801 (B-3697)
BRIDGE NO. 270 ON
SR-1155 (GRAYS RD.)
OVER BROAD RIVER

RUTHERFORD
COUNTY

UPSTATION
(NORTHERLY) VIEW
OF END BENT 1
AREA OF PROPOSED
BRIDGE LOCALE



8.2890801 (B-3697)
BRIDGE NO. 270 ON
SR-1155 (GRAYS RD.)
OVER BROAD RIVER

RUTHERFORD
COUNTY

UPSTATION VIEW
(NORTHERLY) OF
INTERIOR BENT
AREA OF PORPOSED
BRIDGE LOCALE
FROM END BENT 1



8.2890801 (B-3697)
BRIDGE NO. 270 ON
SR-1155 (GRAYS RD.)
OVER BROAD RIVER

RUTHERFORD
COUNTY

UPSTREAM
(WESTERLY) VIEW
OF EXISTING
BRIDGE FROM
INTERIOR BENT
AREA



8.2890801 (B-3697)
BRIDGE NO. 270 ON
SR-1155 (GRAYS RD.)
OVER BROAD RIVER

RUTHERFORD
COUNTY

UPSTATION
(NORTHERLY) VIEW
OF PROPOSED
BRIDGE LOCALE
FROM TOP OF
BROAD RIVER BANK



8.2890801 (B-3697)
BRIDGE NO. 270 ON
SR-1155 (GRAYS RD.)
OVER BROAD RIVER

RUTHERFORD
COUNTY

DOWNSTREAM
(EASTERLY) VIEW
OF EXISTING
BRIDGE