

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

**STRUCTURE**  
**SUBSURFACE INVESTIGATION**

PROJ. REFERENCE NO. 32815.1.1 (B-3019) F.A. PROJ. BRZ-1517(I)  
COUNTY POLK  
PROJECT DESCRIPTION BRIDGE NO. 19 ON SR-1517  
OVER PACOLET RIVER

SITE DESCRIPTION \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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**CAUTION NOTICE**

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE, THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION, AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THIS PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

PERSONNEL

M M HAGER

D O CHEEK

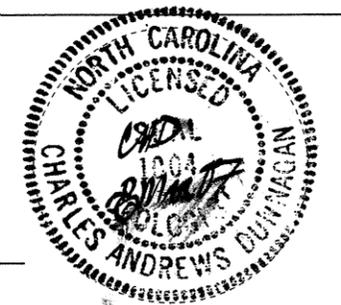
G K ROSE

INVESTIGATED BY C A DUNNAGAN

CHECKED BY W D FRYE, Jr

SUBMITTED BY W D FRYE, Jr

DATE MARCH 2007



*C.A. Dunnagan*

**PROJECT: 32815.1.1 ID: B-3019**

DRAWN BY: C A DUNNAGAN

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

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

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

PROJECT REFERENCE NO. 32815.1J (B-3019) SHEET NO. 2/10

**SUBSURFACE INVESTIGATION**

**SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS**

SOIL DESCRIPTION										GRADATION										ROCK DESCRIPTION										TERMS AND DEFINITIONS									
<p>SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:                      VERY STIFF, GRN, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</p>										<p>WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED)                      GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.</p> <p style="text-align: center;"><b>ANGULARITY OF GRAINS</b></p> <p>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: <u>ANGULAR</u>, <u>SUBANGULAR</u>, <u>SUBROUNDED</u>, OR <u>ROUNDED</u>.</p>										<p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.                      ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p> <p><b>WEATHERED ROCK (WR)</b>  NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES &gt; 100 BLOWS PER FOOT IF TESTED.</p> <p><b>CRYSTALLINE ROCK (CR)</b>  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><b>NON-CRYSTALLINE ROCK (NCR)</b>  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><b>COASTAL PLAIN SEDIMENTARY ROCK (CP)</b>  COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.</p>										<p><b>ALLUVIUM (ALLUV.)</b> - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.  <b>AQUIFER</b> - A WATER BEARING FORMATION OR STRATA.  <b>ARENACEOUS</b> - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.  <b>ARGILLACEOUS</b> - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.  <b>ARTESIAN</b> - 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.  <b>CALCAREOUS (CALC.)</b> - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.  <b>COLLUVIUM</b> - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.  <b>CORE RECOVERY (REC.)</b> - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.  <b>DIKE</b> - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.  <b>DIP</b> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.  <b>DIP DIRECTION (DIP AZIMUTH)</b> - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.  <b>FAULT</b> - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.  <b>FISSILE</b> - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.  <b>FLOAT</b> - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOADED FROM PARENT MATERIAL.  <b>FLOOD PLAIN (FP)</b> - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.  <b>FORMATION (FM)</b> - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.  <b>JOINT</b> - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.  <b>LEDGE</b> - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.  <b>LENS</b> - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.  <b>MOTTLED (MOT.)</b> - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.  <b>PERCHED WATER</b> - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.  <b>RESIDUAL (RES.) SOIL</b> - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.  <b>ROCK QUALITY DESIGNATION (RQD)</b> - 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.  <b>SAPROLITE (SAP.)</b> - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.  <b>SILL</b> - 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.  <b>SLICKENSIDE</b> - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.  <b>STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT)</b> - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.  <b>STRATA CORE RECOVERY (SRC.)</b> - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.  <b>STRATA ROCK QUALITY DESIGNATION (SRQD)</b> - 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.  <b>TOPSOIL (TS.)</b> - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>									
SOIL LEGEND AND AASHTO CLASSIFICATION										MINERALOGICAL COMPOSITION										COMPRESSIBILITY										PERCENTAGE OF MATERIAL									
<p>GENERAL CLASS. GRANULAR MATERIALS (&lt;= 35% PASSING #200) SILT-CLAY MATERIALS (&gt; 35% PASSING #200) ORGANIC MATERIALS</p> <p>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-3, A-4, A-5, A-6, A-7</p> <p>SYMBOL </p> <p>% PASSING: 10, 20, 40, 60, 75, 100</p> <p>LIQUID LIMIT PLASTIC INDEX: 6 MX, NP, 10 MX, 11 MN, 12 MN, 13 MN, 14 MN, 15 MN, 16 MN, 17 MN, 18 MN, 19 MN, 20 MN, 21 MN, 22 MN, 23 MN, 24 MN, 25 MN, 26 MN, 27 MN, 28 MN, 29 MN, 30 MN, 31 MN, 32 MN, 33 MN, 34 MN, 35 MN, 36 MN, 37 MN, 38 MN, 39 MN, 40 MN, 41 MN, 42 MN, 43 MN, 44 MN, 45 MN, 46 MN, 47 MN, 48 MN, 49 MN, 50 MN, 51 MN, 52 MN, 53 MN, 54 MN, 55 MN, 56 MN, 57 MN, 58 MN, 59 MN, 60 MN, 61 MN, 62 MN, 63 MN, 64 MN, 65 MN, 66 MN, 67 MN, 68 MN, 69 MN, 70 MN, 71 MN, 72 MN, 73 MN, 74 MN, 75 MN, 76 MN, 77 MN, 78 MN, 79 MN, 80 MN, 81 MN, 82 MN, 83 MN, 84 MN, 85 MN, 86 MN, 87 MN, 88 MN, 89 MN, 90 MN, 91 MN, 92 MN, 93 MN, 94 MN, 95 MN, 96 MN, 97 MN, 98 MN, 99 MN, 100 MN</p> <p>GROUP INDEX: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100</p> <p>USUAL TYPES OF MAJOR MATERIALS: STONE FRAGS, GRAVEL, AND SAND; FINE SAND; SILTY OR CLAYEY GRAVEL AND SAND; SILTY SOILS; CLAYEY SOILS; GRANULAR SOILS; SILT-CLAY SOILS; MUCK, PEAT; HIGHLY ORGANIC SOILS</p> <p>GENERAL RATING AS A SUBGRADE: EXCELLENT TO GOOD, FAIR TO POOR, FAIR TO POOR, POOR, UNSUITABLE</p> <p>PI OF A-7-5 SUBGROUP IS &lt;= LL - 30 ; PI OF A-7-6 SUBGROUP IS &gt;= LL - 30</p>										<p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.</p>										<p>SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31                      MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50                      HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50</p>										<p>ORGANIC MATERIAL GRANULAR SOILS SILT - CLAY SOILS OTHER MATERIAL</p> <p>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 &gt;10% &gt;20% HIGHLY 35% AND ABOVE</p>									
CONSISTENCY OR DENSENESS										GROUND WATER										WEATHERING										ROCK HARDNESS									
<p>PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT<sup>2</sup>)</p> <p>GENERALLY GRANULAR MATERIAL (NON-COHESIVE) VERY LOOSE, LOOSE, MEDIUM DENSE, DENSE, VERY DENSE</p> <p>GENERALLY SILT-CLAY MATERIAL (COHESIVE) VERY SOFT, SOFT, MEDIUM STIFF, STIFF, VERY STIFF, HARD</p>										<p>WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING                      STATIC WATER LEVEL AFTER 24 HOURS                      PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA                      SPRING OR SEEP</p>										<p>FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.                      VERY SLIGHT (V SLI.) ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN. CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.                      SLIGHT (SLI.) ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.                      MODERATE (MOD.) SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.                      MODERATELY SEVERE (MOD. SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i>                      SEVERE (SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. <i>IF TESTED, YIELDS SPT N VALUES &gt; 100 BPF</i>                      VERY SEVERE (V SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. <i>IF TESTED, YIELDS SPT N VALUES &lt; 100 BPF</i>                      COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.</p>										<p>VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.                      HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.                      MODERATELY HARD CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.                      MEDIUM HARD CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.                      SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.                      VERY SOFT CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.</p>									
TEXTURE OR GRAIN SIZE										MISCELLANEOUS SYMBOLS										ROCK HARDNESS										ROCK HARDNESS									
<p>U.S. STD. SIEVE SIZE OPENING (MM) 4, 10, 40, 60, 200, 270</p> <p>BOULDER (BLDR.), COBBLE (COB.), GRAVEL (GR.), COARSE SAND (CSE. SD.), FINE SAND (F. SD.), SILT (SL.), CLAY (CL.)</p>										<p>ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION                      SOIL SYMBOL                      ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT                      INFERRED SOIL BOUNDARY                      INFERRED ROCK LINE                      ALLUVIAL SOIL BOUNDARY                      DIP &amp; DIP DIRECTION OF ROCK STRUCTURES                      SOUNDING ROD</p>										<p>TEST BORING DESIGNATIONS: S - BULK SAMPLE, SS - SPLIT SPOON SAMPLE, ST - SHELBY TUBE SAMPLE, RS - ROCK SAMPLE, RT - RECOMPACTED TRIAXIAL SAMPLE, CBR - CALIFORNIA BEARING RATIO SAMPLE</p>										<p>VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.                      HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.                      MODERATELY HARD CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.                      MEDIUM HARD CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.                      SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.                      VERY SOFT CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.</p>									
SOIL MOISTURE - CORRELATION OF TERMS										ABBREVIATIONS										ROCK HARDNESS										ROCK HARDNESS									
<p>SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION</p> <p>LL - LIQUID LIMIT                      PL - PLASTIC LIMIT                      OM - OPTIMUM MOISTURE                      SL - SHRINKAGE LIMIT</p> <p>- SATURATED - (SAT.) USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE                      - WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE                      - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE                      - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE</p>										<p>AR - AUGER REFUSAL, BT - BORING TERMINATED, CL - CLAY, CPT - CONE PENETRATION TEST, CSE. - COARSE, DMT - DILATOMETER TEST, DPT - DYNAMIC PENETRATION TEST, e - VOID RATIO, F - FINE, FOSS. - FOSSILIFEROUS, FRAC. - FRACTURED, FRACTURES, FRAGS. - FRAGMENTS, HL. - HIGHLY, MED. - MEDIUM, MICA. - MICACEOUS, MOD. - MODERATELY, NP - NON PLASTIC, ORG. - ORGANIC, PHT - PRESSUREMETER TEST, SAP. - SAPROLITIC, SD. - SAND, SANDY, SL. - SILT, SILTY, SLI. - SLIGHTLY, TCR - TRICONE REFUSAL, w - MOISTURE CONTENT, v - VERY, VST - VANE SHEAR TEST, WEA. - WEATHERED, 1/2 - UNIT WEIGHT, 1/4 - DRY UNIT WEIGHT, FIAD - FILLED IMMEDIATELY AFTER DRILLING</p>										<p>VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.                      HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.                      MODERATELY HARD CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.                      MEDIUM HARD CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.                      SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.                      VERY SOFT CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.</p>										<p>VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.                      HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.                      MODERATELY HARD CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.                      MEDIUM HARD CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.                      SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.                      VERY SOFT CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.</p>									
PLASTICITY										EQUIPMENT USED ON SUBJECT PROJECT										FRACTURE SPACING										BEDDING									
<p>PLASTICITY INDEX (PI) DRY STRENGTH</p> <p>NONPLASTIC 0-5 VERY LOW                      LOW PLASTICITY 6-15 SLIGHT                      MED. PLASTICITY 16-25 MEDIUM                      HIGH PLASTICITY 26 OR MORE HIGH</p>										<p>DRILL UNITS: MOBILE B-, BK-51, CME-45C, CME-550, PORTABLE HOIST</p> <p>ADVANCING TOOLS: CLAY BITS, 6" CONTINUOUS FLIGHT AUGER, 8" HOLLOW AUGERS, HARD FACED FINGER BITS, TUNG.-CARBIDE INSERTS, CASING, W/ ADVANCER, TRICONE * STEEL TEETH, TRICONE * TUNG.-CARB., CORE BIT</p> <p>HAMMER TYPE: AUTOMATIC, MANUAL</p> <p>CORE SIZE: B, N, H</p> <p>HAND TOOLS: POST HOLE DIGGER, HAND AUGER, SOUNDING ROD, VANE SHEAR TEST</p>										<p>TERM SPACING: VERY WIDE, WIDE, MODERATELY CLOSE, CLOSE, VERY CLOSE</p> <p>TERM THICKNESS: MORE THAN 10 FEET, 3 TO 10 FEET, 1 TO 3 FEET, 0.16 TO 1 FEET, LESS THAN 0.16 FEET</p>										<p>TERM THICKNESS: VERY THICKLY BEDDED, THICKLY BEDDED, THINLY BEDDED, VERY THINLY BEDDED, THICKLY LAMINATED, THINLY LAMINATED</p>									
COLOR										INDURATION										FRACTURE SPACING										BEDDING									
<p>DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.</p>										<p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <p>FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.                      MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.                      INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.                      EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p>										<p>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</p>										<p>VERY THICKLY BEDDED &gt; 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 &lt; 0.008 FEET</p>									
BENCH MARK										EQUIPMENT USED ON SUBJECT PROJECT										FRACTURE SPACING										BEDDING									
<p>BENCH MARK: BM 1:8 INCH SPIKE IN ROOT OF 10 INCH BRADFORD PEAR TREE, 10' LEFT OF -BL- STA 5+01 ELEVATION: 863.77 FT.</p>										<p>DRILL UNITS: MOBILE B-, BK-51, CME-45C, CME-550, PORTABLE HOIST</p> <p>ADVANCING TOOLS: CLAY BITS, 6" CONTINUOUS FLIGHT AUGER, 8" HOLLOW AUGERS, HARD FACED FINGER BITS, TUNG.-CARBIDE INSERTS, CASING, W/ ADVANCER, TRICONE * STEEL TEETH, TRICONE * TUNG.-CARB., CORE BIT</p> <p>HAMMER TYPE: AUTOMATIC, MANUAL</p> <p>CORE SIZE: B, N, H</p> <p>HAND TOOLS: POST HOLE DIGGER, HAND AUGER, SOUNDING ROD, VANE SHEAR TEST</p>										<p>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</p>										<p>VERY THICKLY BEDDED &gt; 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 &lt; 0.008 FEET</p>									
NOTES										EQUIPMENT USED ON SUBJECT PROJECT										FRACTURE SPACING										BEDDING									
<p>NOTES:</p>										<p>DRILL UNITS: MOBILE B-, BK-51, CME-45C, CME-550, PORTABLE HOIST</p> <p>ADVANCING TOOLS: CLAY BITS, 6" CONTINUOUS FLIGHT AUGER, 8" HOLLOW AUGERS, HARD FACED FINGER BITS, TUNG.-CARBIDE INSERTS, CASING, W/ ADVANCER, TRICONE * STEEL TEETH, TRICONE * TUNG.-CARB., CORE BIT</p> <p>HAMMER TYPE: AUTOMATIC, MANUAL</p> <p>CORE SIZE: B, N, H</p> <p>HAND TOOLS: POST HOLE DIGGER, HAND AUGER, SOUNDING ROD, VANE SHEAR TEST</p>										<p>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</p>										<p>VERY THICKLY BEDDED &gt; 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 &lt; 0.008 FEET</p>									



STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY  
GOVERNOR

LYNDO TIPPETT  
SECRETARY

March 8, 2007

STATE PROJECT: 32815.1.1 (B-3019)  
F. A. PROJECT: BRZ-1517(1)  
COUNTY: Polk

DESCRIPTION: Bridge No. 19 on SR-1517 over Pacolet River

SUBJECT: Geotechnical Report – Foundation Investigation

**Project Description**

This investigation was undertaken to determine the subsurface conditions at this site. The project is located in south-central Polk County, approximately 2.0 miles southwest of Columbus.

The proposed replacement structure will consist of a single span, 85.0 feet in length. The skew is to be 100 degrees.

The investigation was conducted using a CME-550 with an automatic drive hammer. The borings were drilled with -N- casing and advancer. Standard Penetration Tests were performed at intervals of 5.0 feet, or when necessary. Soil samples were collected and submitted for testing of quality.

**Physiography and Geology**

The project is located in the moderately rolling terrain of the Inner Piedmont Belt. The rocks underlying the project are labeled CZpg on the Geologic Map of North Carolina (1985). These rocks are described as “massive to foliated biotite-quartz-plagioclase gneiss ... In Polk County (they are) segregated into bands of light colored quartzofeldspathic rocks alternating with coarse-grained biotite rich bands.”

MAILING ADDRESS:  
NC DEPARTMENT OF TRANSPORTATION  
GEOTECHNICAL UNIT  
1589 MAIL SERVICE CENTER  
RALEIGH NC 27699-1589

TELEPHONE: 919-250-4088  
FAX: 919-250-4237

WEBSITE: WWW.DOH.DOT.STATE.NC.US

LOCATION:  
CENTURY CENTER COMPLEX  
BUILDING B  
1020 BIRCH RIDGE DRIVE  
RALEIGH NC 27610

3/10

The stratigraphic sequence across the project area is alluvium, saprolite, weathered rock and crystalline rock. The alluvium is a 12.0' to 18.0' sequence of downward coarsening silty sands and gravel with a predominately gravel basal layer. The saprolite is a 5.0' to 7.0' layer of dense to very dense silty sand. The exception is in the boring for EB2-B. Here the saprolite is 12.0 feet of very stiff to hard sandy silt. The weathered rock horizon is thicker left of centerline than to the right. On the left, it is 10.0' to 12.0' ; on the right, it is 3.0' to 5.0' .Crystalline rock was encountered in each of the four borings.

**Groundwater**

Because of numerous horses in and around the project area, three of the four borings were filled immediately after drilling (FIAD). The fourth, EB1-A, had static groundwater at 7.9 feet (elevation 851.0). This is less than a foot above the water surface elevation shown in the Hydraulic Design Report (as measured in February 2004).

**Comments**

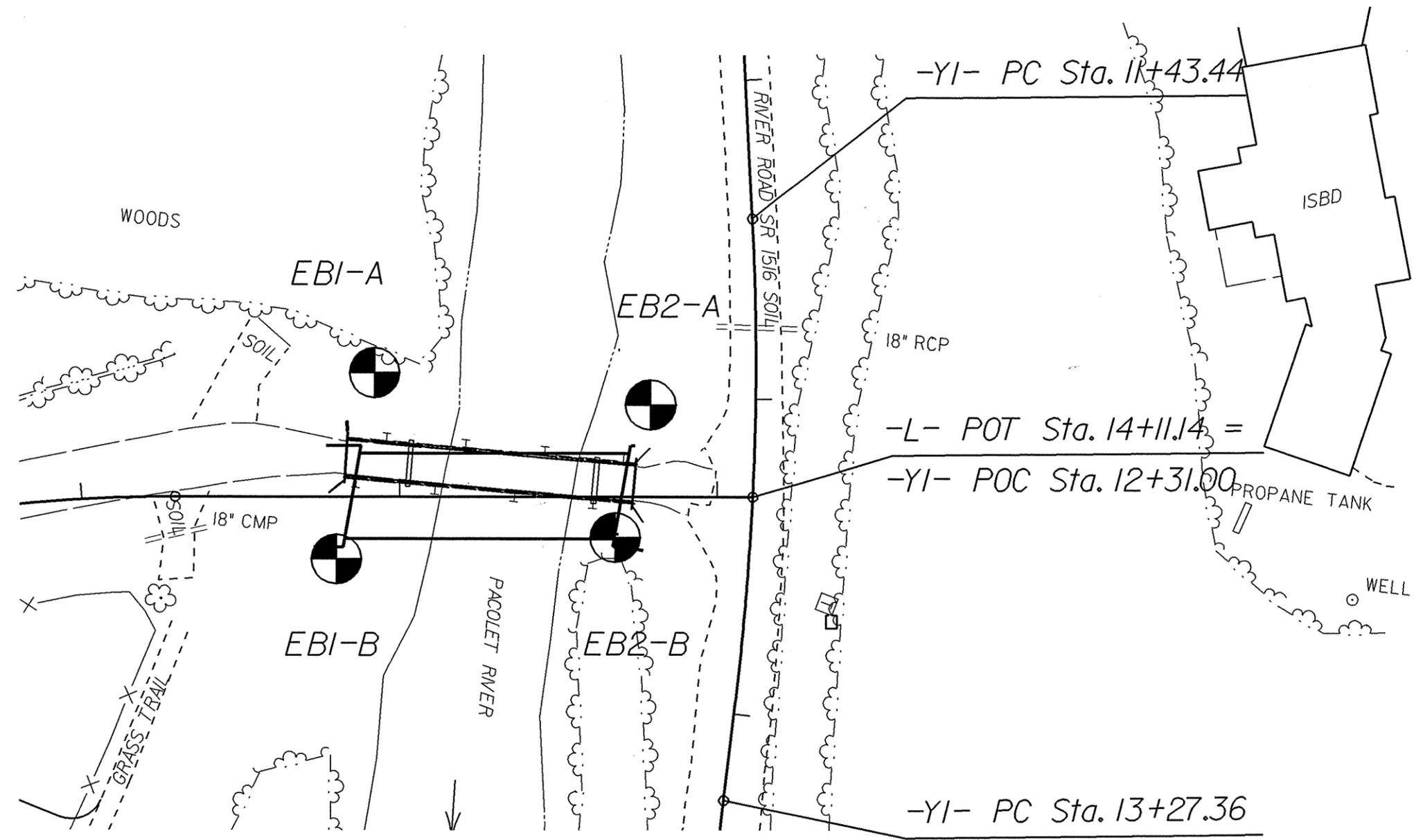
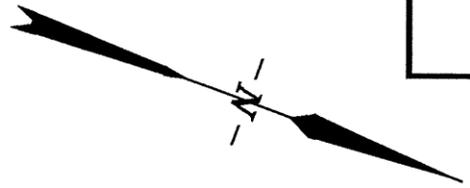
This subsurface investigation was based on the Bridge Survey and Hydraulic Design Report (October 2006) and the Preliminary General Drawing (November 2006). If any significant changes are made in the design or location of the proposed structure, the subsurface information will have to be reviewed and modified as necessary.

Respectfully Submitted,

Charles A. Dunnagan, LG  
Project Geological Engineer

BRIDGE NO. 19 ON SR-1517 OVER PACOLET RIVER

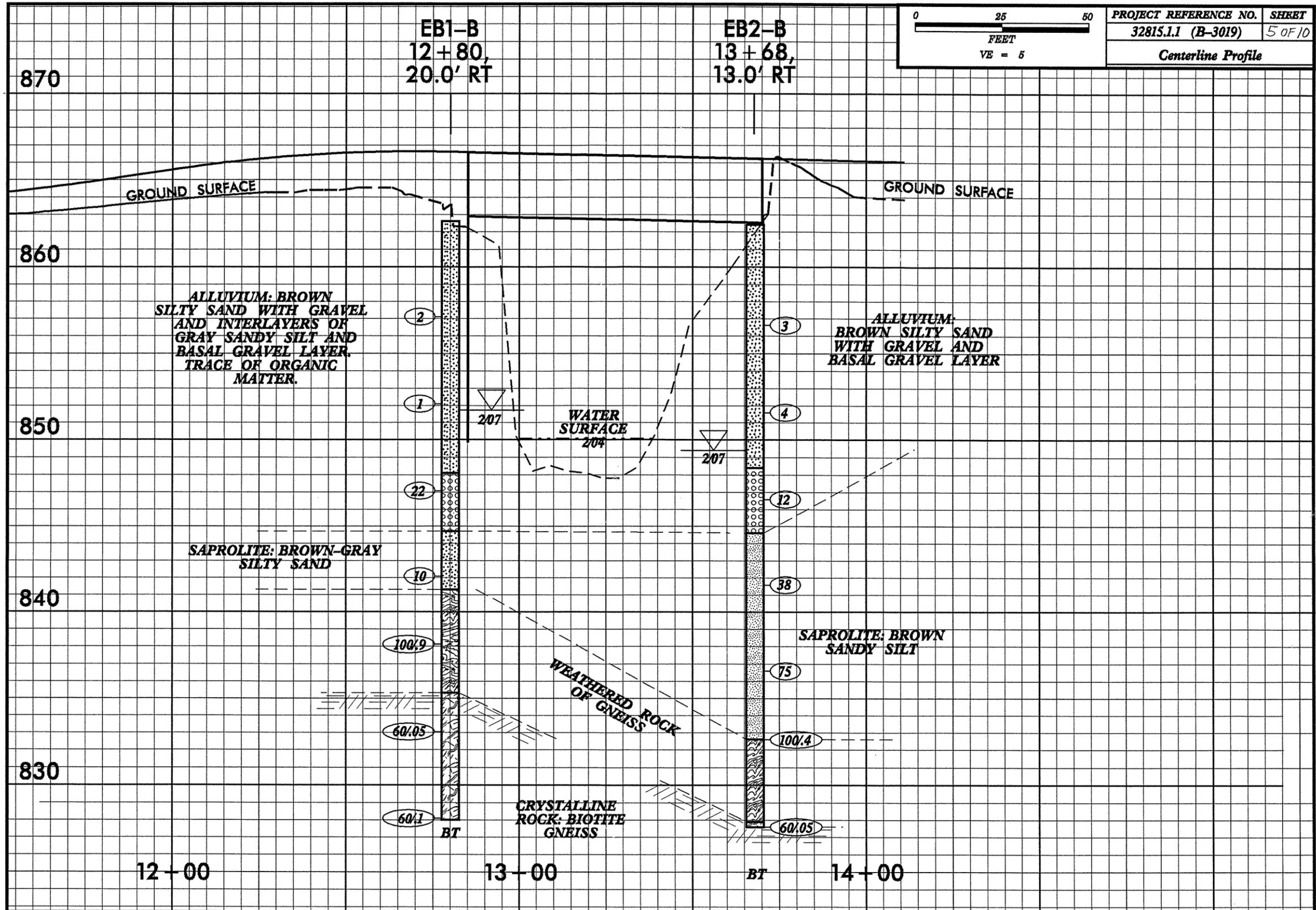
0 25 50 FEET SKEW=100°	PROJECT REFERENCE NO.	SHEET
	32815.1.1 (B-3019)	4 OF 10
PLAN VIEW		

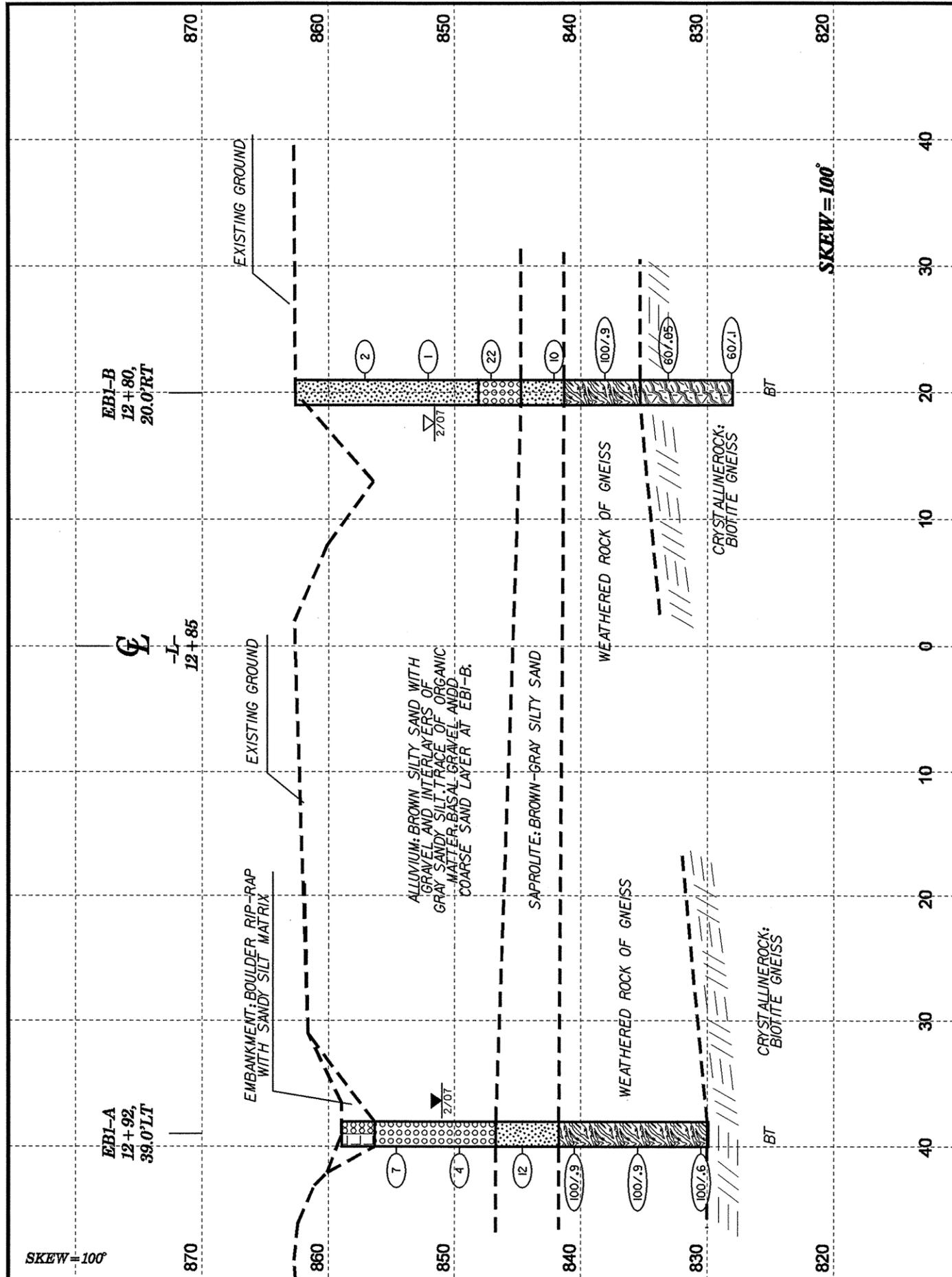


12+00

13+00

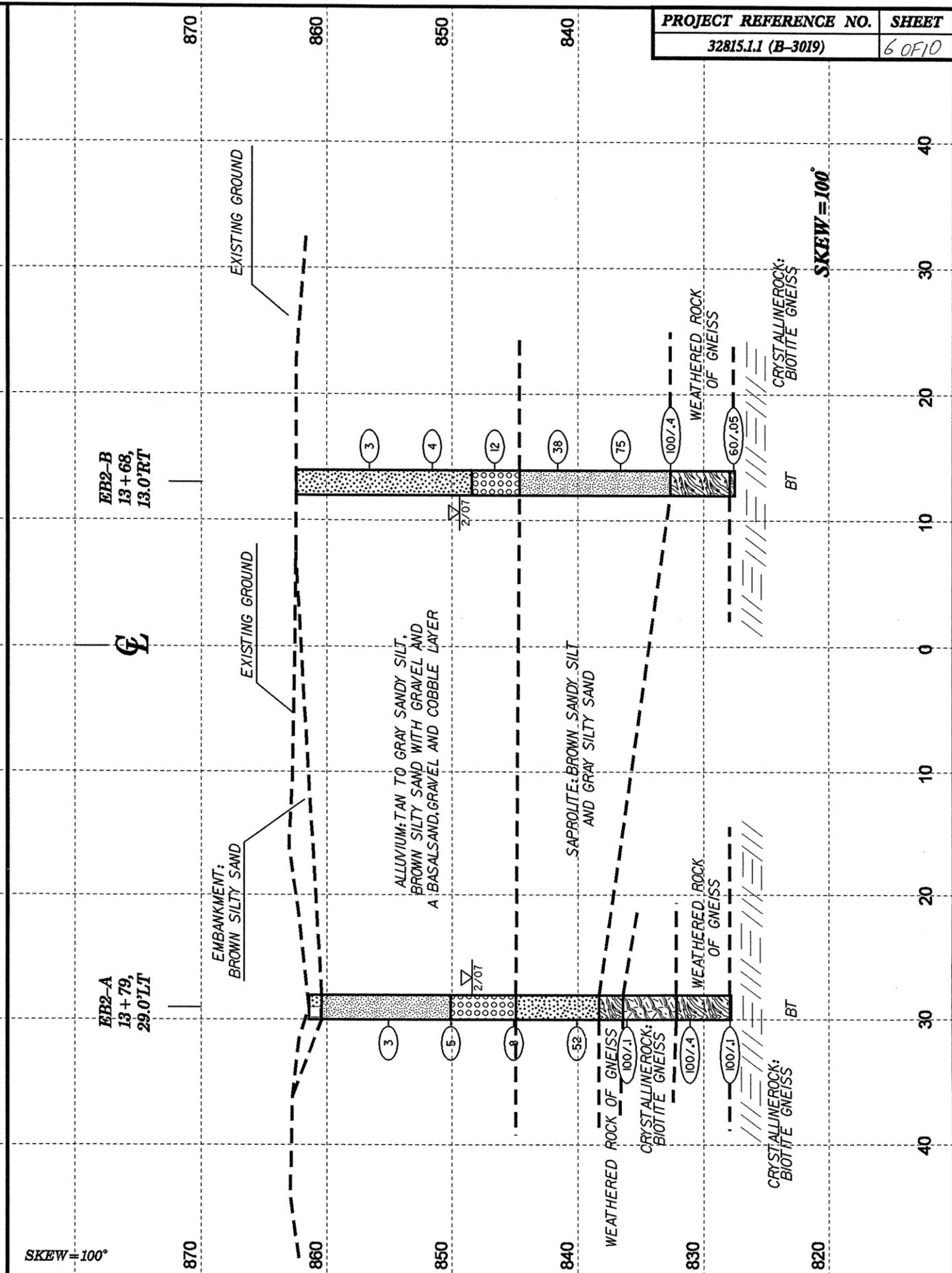
14+00





**CROSS SECTION THROUGH END BENT ONE**

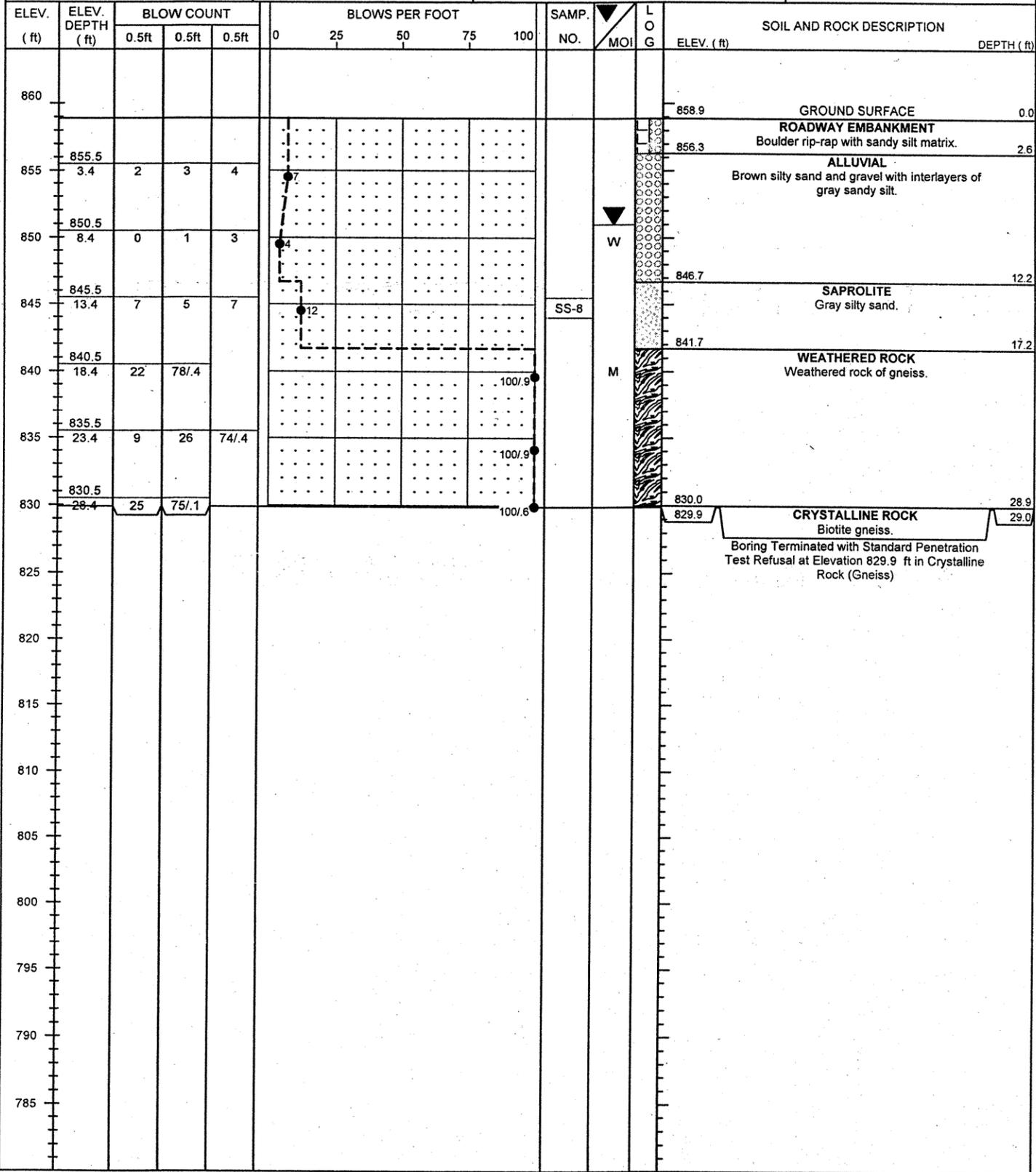
HORIZ. SCALE 0 10 20 (FEET) VE = 1



**CROSS SECTION THROUGH END BENT TWO**

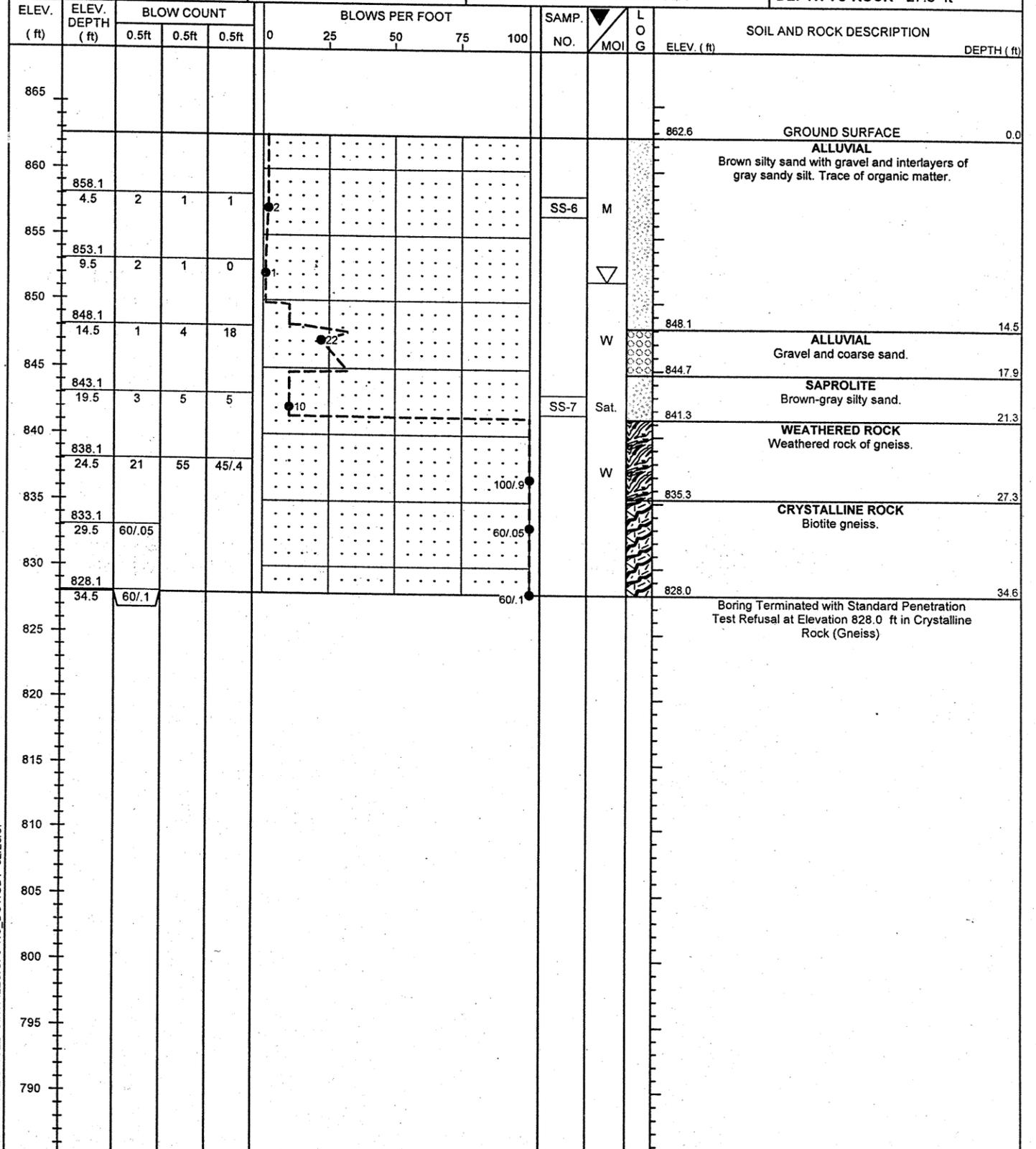
HORIZ. SCALE 0 10 20 (FEET) VE = 1

PROJECT NO. 32815.1.1	ID. B-3019	COUNTY Polk	GEOLOGIST Hager, M. M.
SITE DESCRIPTION Bridge No. 19 on SR-1517 over Pacolet River			GROUND WTR (ft)
BORING NO. EB1-A	STATION 12+92	OFFSET 39 ft LT	ALIGNMENT -L-
COLLAR ELEV. 858.9 ft	TOTAL DEPTH 29.0 ft	NORTHING 548,727	EASTING 1,050,094
DRILL MACHINE CME-550	DRILL METHOD NW Casing w/ SPT	HAMMER TYPE Automatic	
START DATE 02/22/07	COMP. DATE 02/22/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 28.9 ft



NCDOT BORE SINGLE GINTFILES.GPJ NC\_DOT.GDT 02/26/07

PROJECT NO. 32815.1.1	ID. B-3019	COUNTY Polk	GEOLOGIST Hager, M. M.
SITE DESCRIPTION Bridge No. 19 on SR-1517 over Pacolet River			GROUND WTR (ft)
BORING NO. EB1-B	STATION 12+80	OFFSET 20 ft RT	ALIGNMENT -L-
COLLAR ELEV. 862.6 ft	TOTAL DEPTH 34.6 ft	NORTHING 548,737	EASTING 1,050,156
DRILL MACHINE CME-550	DRILL METHOD NW Casing w/ SPT	HAMMER TYPE Automatic	
START DATE 02/22/07	COMP. DATE 02/22/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 27.3 ft



NCDOT BORE SINGLE GINTFILES.GPJ NC\_DOT.GDT 02/26/07

PROJECT NO. 32815.1.1		ID. B-3019		COUNTY Polk		GEOLOGIST Hager, M. M.									
SITE DESCRIPTION Bridge No. 19 on SR-1517 over Pacolet River															
BORING NO. EB2-A		STATION 13+79		OFFSET 29ft LT		ALIGNMENT -L-									
COLLAR ELEV. 861.4 ft		TOTAL DEPTH 33.6 ft		NORTHING 548,812		EASTING 1,050,073									
DRILL MACHINE CME-550		DRILL METHOD NW Casing w/ SPT		HAMMER TYPE Automatic											
START DATE 02/21/07		COMP. DATE 02/21/07		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 25.0 ft									
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
		0.5ft	0.5ft	0.5ft	0	25	50	75	100						
865															
														861.4	GROUND SURFACE
														860.4	ROADWAY EMBANKMENT
															Brown silty sand.
															ALLUVIAL
															Tan to gray sandy silt.
856.1	5.3	1	2	1							SS-4	M			
851.1	10.3	2	3	2											
846.1	15.3	4	4	4											
841.1	20.3	15	23	29							SS-5				
836.1	25.3	100/1													
831.1	30.3	100/4													
827.9	33.5	100/1													
														838.3	WEATHERED ROCK
														836.4	Weathered rock of gneiss.
														832.1	CRYSTALLINE ROCK
															Biotite gneiss.
														827.9	WEATHERED ROCK
														827.8	Weathered rock of gneiss.
														827.9	CRYSTALLINE ROCK
														827.8	Biotite gneiss.
															Boring Terminated with Standard Penetration Test Refusal at Elevation 827.8 ft in Crystalline Rock (Gneiss)

PROJECT NO. 32815.1.1		ID. B-3019		COUNTY Polk		GEOLOGIST Hager, M. M.									
SITE DESCRIPTION Bridge No. 19 on SR-1517 over Pacolet River															
BORING NO. EB2-B		STATION 13+68		OFFSET 13 ft RT		ALIGNMENT -L-									
COLLAR ELEV. 862.4 ft		TOTAL DEPTH 34.9 ft		NORTHING 548,816		EASTING 1,050,116									
DRILL MACHINE CME-550		DRILL METHOD NW Casing w/ SPT		HAMMER TYPE Automatic											
START DATE 02/20/07		COMP. DATE 02/20/07		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 34.5 ft									
ELEV. (ft)	ELEV. DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
		0.5ft	0.5ft	0.5ft	0	25	50	75	100						
865															
														862.4	GROUND SURFACE
															ALLUVIAL
															Brown silty sand with gravel
857.6	4.8	1	2	1							SS-1	M			
852.6	9.8	1	2	2											
847.6	14.8	2	5	7											
842.6	19.8	14	18	20							SS-2	Sat.			
837.6	24.8	43	39	36											
832.6	29.8	100/4									SS-3				
827.6	34.8	60/05													
														848.4	ALLUVIAL
															Brown sand and gravel
														844.6	SAPROLITE
															Brown sandy silt
														832.6	WEATHERED ROCK
															Weathered rock of gneiss
														827.9	CRYSTALLINE ROCK
														827.6	Biotite gneiss
															Boring Terminated with Standard Penetration Test Refusal at Elevation 827.5 ft in Crystalline Rock (Gneiss)

NCDOT BORE SINGLE GINTFILES.GPJ NC\_DOT.GDT 09/06/07

NCDOT BORE SINGLE GINTFILES.GPJ NC\_DOT.GDT 02/28/07

JCS  
**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION**  
**DIVISION OF HIGHWAYS-MATERIALS AND TESTS UNIT**  
**SOILS TEST REPORT-SOILS LABORATORY**

T.I.P. ID #: B-3019

REPORT ON SAMPLES OF: Soils for Quality

PROJECT:	32815.1.1	COUNTY:	Polk	Owner:	NCDOT
DATE SAMPLED:	2.20.07	DATE RECEIVED:	2.21.07	DATE REPORTED:	2.26.07
SAMPLED FROM:	Bridge	SAMPLED BY:	C. A. Dunnagan		
SUBMITTED BY:	W. D. Frye	2002	STANDARD SPECIFICATION		
LABORATORY:	Asheville				

**TEST RESULTS**

Project Sample No.	SS-1	SS-2	SS-3				
Lab Sample No. A	154600	154601	154602				
HiCAMS Sample #	--	--	--				
Retained #4 Sieve %	0.0	5.8	0.0				
Passing #10 Sieve %	99	83	100				
Passing #40 Sieve %	98	46	91				
Passing #200 Sieve %	34	4	36				

**MINUS #10 FRACTION**

Soil Mortar - 100%							
Coarse Sand -Ret. #60	8	78	23				
Fine Sand - Ret. #270	65	18	52				
Silt 0.05-0.005 mm %	11	2	15				
Clay < 0.005 mm %	16	2	10				
Passing # 40 Sieve %	--	--	--				
Passing # 200 Sieve %	--	--	--				

Liquid Limit	32	22	29				
Plastic Index	NP	NP	NP				
AASHTO Classification	A-2-4 (0)	A-1-b (0)	A-4 (0)				
Quantity							
Texture							
Station	13+68	13+68	13+68				
Hole No.							
Depth (ft) From:	5.3	15.3	20.3				
To:	6.3	16.3	21.3				

Remarks:  
A-154600 - 154602

CC:  
C. A. Dunnagan  
File

SOILS ENGINEER:

JCS  
**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION**  
**DIVISION OF HIGHWAYS-MATERIALS AND TESTS UNIT**  
**SOILS TEST REPORT-SOILS LABORATORY**

T.I.P. ID #: --

REPORT ON SAMPLES OF: Soils for Quality

PROJECT:	32815.1.1	COUNTY:	Polk	Owner:	NCDOT
DATE SAMPLED:	2.21.07	DATE RECEIVED:	2.23.07	DATE REPORTED:	2.28.07
SAMPLED FROM:	Bridge	SAMPLED BY:	C. A. Dunnagan		
SUBMITTED BY:	W. D. Frye	2002	STANDARD SPECIFICATION		
LABORATORY:	Asheville				

**TEST RESULTS**

Project Sample No.	SS-4	SS-5	SS-6	SS-7	SS-8		
Lab Sample No. A	154612	154613	154614	154615	154616		
HiCAMS Sample #	--	--	--	--	--		
Retained #4 Sieve %	0.0	0.0	0.0	0.0	0.0		
Passing #10 Sieve %	100	97	100	99	99		
Passing #40 Sieve %	99	89	97	92	88		
Passing #200 Sieve %	59	27	16	21	22		

**MINUS #10 FRACTION**

Soil Mortar - 100%							
Coarse Sand -Ret. #60	5	24	33	26	29		
Fine Sand - Ret. #270	45	57	56	59	56		
Silt 0.05-0.005 mm %	30	11	3	13	9		
Clay < 0.005 mm %	20	8	8	2	6		
Passing # 40 Sieve %	--	--	--	--	--		
Passing # 200 Sieve %	--	--	--	--	--		

Liquid Limit	34	23	21	23	25		
Plastic Index	NP	NP	NP	NP	NP		
AASHTO Classification	A-4 (5)	A-2-4 (0)	A-2-4 (0)	A-2-4 (0)	A-2-4 (0)		
Quantity							
Texture							
Station	13+79	13+79	13+70	13+70	16+23		
Hole No.							
Depth (ft) From:	5.8	20.8	5.0	20.0	13.9		
To:	6.8	21.8	6.0	21.0	14.9		

Remarks:  
A-154612 - 154616

CC:  
C. A. Dunnagan  
File

SOILS ENGINEER:



**FIELD  
 SCOUR REPORT**

WBS: 32815 TIP: B-3019 COUNTY: Polk

DESCRIPTION(1): Bridge No.19 on SR-1517 over Pacolet River

**EXISTING BRIDGE**

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

Bridge No.: 19 Length: 92ft Total Bents: 4 Bents in Channel: 0 Bents in Floodplain: 4  
 Foundation Type: End bents: piles; interior bents: footings

**EVIDENCE OF SCOUR(2)**

Abutments or End Bent Slopes: None noted.

Interior Bents: None noted.

Channel Bed: None noted.

Channel Bank: Minor amount upstream of EB2.

**EXISTING SCOUR PROTECTION**

Type(3): Boulder rip-rap at bank/water interface.

Extent(4): Width of existing bridge.

Effectiveness(5): OK.

Obstructions(6): \_\_\_\_\_

**INSTRUCTIONS**

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

**DESIGN INFORMATION**

Channel Bed Material(7): Silty sand with gravel.

Channel Bank Material(8): Silty sand with gravel.

Channel Bank Cover(9): Grass with trees.

Floodplain Width(10): EB1 > 200ft; EB2 = 0ft.

Floodplain Cover(11): Grass.

Stream is(12): Aggrading \_\_\_\_\_ Degrading  Static \_\_\_\_\_

Channel Migration Tendency(13): North-northwest.

Observations and Other Comments: \_\_\_\_\_

**DESIGN SCOUR ELEVATIONS(14)**

Feet  Meters \_\_\_\_\_

**BENTS**

EB1	EB2									
843	849.5									

Comparison of DSE to Hydraulics Unit theoretical scour:  
 The DSE is the same as the Hydraulic Unit's 100-year-event theoretical scour.

**SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL**

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

Reported by: C A Dunnagan

Date: 3/5/2007