

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

STRUCTURE
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 33419.1.1 (B-4054) F.A. PROJ. BRZ-1517(3)
 COUNTY CALDWELL
 PROJECT DESCRIPTION BRIDGE NO. 334 ON SR-1517 OVER YADKIN RIVER

SITE DESCRIPTION _____

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CAUTION NOTICE

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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

T B DANIEL

C J COFFEY

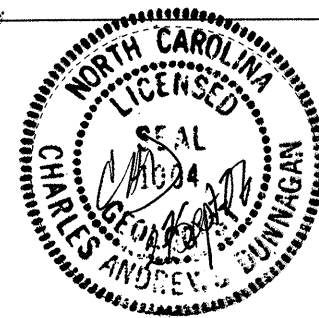
R D CHILDERS

INVESTIGATED BY C A DUNNAGAN

CHECKED BY W D FRYE, Jr

SUBMITTED BY W D FRYE, Jr

DATE SEPTEMBER 2006



C. A. Dunnagan

PROJECT: 33419.1.1 ID: B-4054

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

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE: <i>VERY STIFF, GRANULY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGH PLASTIC, A-7-6</i>	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED) GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES. ANGULARITY OF GRAINS THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	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: WEATHERED ROCK (WR) NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED. 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. 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. 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.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (ROQ) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SROQ) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER. BENCH MARK: BM# 1- RAILROAD SPIKE IN 15' OAK, 75' LEFT OF -BY- STA 7+83 ELEVATION: 1266.58 FT.
SOIL LEGEND AND AASHTO CLASSIFICATION	MINERALOGICAL COMPOSITION	WEATHERING	
GENERAL CLASS. GRANULAR MATERIALS (<= 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE. VERY SLIGHT (V SLI.) ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY, ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE. SLIGHT (SLI.) ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH, OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS. MODERATE (MOD.) SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK. MODERATELY SEVERE (MOD. SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i> SEVERE (SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT, SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. <i>IF TESTED, YIELDS SPT N VALUES > 100 BPF</i> VERY SEVERE (V SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. <i>IF TESTED, YIELDS SPT N VALUES < 100 BPF</i> COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.	
COMPRESSIONIBILITY	PERCENTAGE OF MATERIAL	GROUND WATER	
SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50	ORGANIC MATERIAL GRANULAR SOILS SILT - CLAY SOILS OTHER MATERIAL TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% LITTLE ORGANIC MATTER 3 - 10% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC >10% >20% HIGHLY 35% AND ABOVE	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	
TEXTURE OR GRAIN SIZE	MISCELLANEOUS SYMBOLS	ROCK HARDNESS	
U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270 4.76 2.00 0.42 0.25 0.075 0.053	ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY DIP & DIP DIRECTION OF ROCK STRUCTURES SOUNDING ROD	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 GROOVED 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.	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SROQ) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
CONSISTENCY OR DENSENESS	ABBREVIATIONS	FRACTURE SPACING	BEDDING
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)	AR - AUGER REFUSAL BT - BORING TERMINATED CL - CLAY CPT - CONE PENETRATION TEST CSE - COARSE DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST e - VOID RATIO F - FINE FOSS. - FOSSILIFEROUS FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS HI. - HIGHLY MED. - MEDIUM MICA - MICACEOUS MOD. - MODERATELY NP - NON PLASTIC ORG. - ORGANIC PMT - PRESSUREMETER TEST SAP. - SAPROLITIC SD. - SAND, SANDY SL. - SILT, SILTY SLI. - SLIGHTLY TCR - TRICONE REFUSAL w - MOISTURE CONTENT v - VERY VST - VANE SHEAR TEST WEA. - WEATHERED γ - UNIT WEIGHT γ _d - DRY UNIT WEIGHT occ. - OCCASIONAL	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
GENERALY GRANULAR MATERIAL (NON-COHESIVE) VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE GENERALY SILT-CLAY MATERIAL (COHESIVE) VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	AR - AUGER REFUSAL BT - BORING TERMINATED CL - CLAY CPT - CONE PENETRATION TEST CSE - COARSE DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST e - VOID RATIO F - FINE FOSS. - FOSSILIFEROUS FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS HI. - HIGHLY MED. - MEDIUM MICA - MICACEOUS MOD. - MODERATELY NP - NON PLASTIC ORG. - ORGANIC PMT - PRESSUREMETER TEST SAP. - SAPROLITIC SD. - SAND, SANDY SL. - SILT, SILTY SLI. - SLIGHTLY TCR - TRICONE REFUSAL w - MOISTURE CONTENT v - VERY VST - VANE SHEAR TEST WEA. - WEATHERED γ - UNIT WEIGHT γ _d - DRY UNIT WEIGHT occ. - OCCASIONAL	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 GROOVED 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.	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SROQ) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
SOIL MOISTURE - CORRELATION OF TERMS	EQUIPMENT USED ON SUBJECT PROJECT	INDURATION	
SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION	DRILL UNITS: MOBILE B-____ BK-51 CME-45C CME-550 PORTABLE HOIST 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 HAMMER TYPE: [X] AUTOMATIC [] MANUAL CORE SIZE: [] B [X] NXYL [] H HAND TOOLS: [] POST HOLE DIGGER [] HAND AUGER [] SOUNDING ROD [] VANE SHEAR TEST	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.	
PLASTICITY			
NONPLASTIC LOW PLASTICITY MED. PLASTICITY HIGH PLASTICITY			
COLOR			
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.			



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

September 25, 2006

STATE PROJECT: 33419.1.1 (B-4054)
F. A. PROJECT: BRZ-1517(3)
COUNTY: Caldwell

DESCRIPTION: Bridge No. 334 on SR-1517 over Yadkin River

SUBJECT: Geotechnical Report – Foundation Investigation

Introduction

This project is located in central Caldwell County, approximately seven miles north of Lenoir. The existing low-flow bridge is to be replaced with a triple-span structure 120 feet long (skew = 70°).

The subsurface investigation was conducted using a CME-550 and -N- casing with advancer. Standard Penetration Tests were performed at intervals of 5.0 feet with an auto-hammer. Rock core was retrieved from the interior bents with -NXWL- equipment. Soil samples were collected and submitted for testing of quality. Two rock core samples were submitted for testing of Unit Weight, Compressive Strength (Qu), Young's Modulus (E) and Split Tensile Strength.

Geology and Rock Characteristics

The crystalline rock recovered by coring are members of the Henderson Gneiss (Chg). The rock type is cataclastic granodiorite gneiss. The cataclasis is due to its location near the Brevard Fault Zone.

A majority of the rock cores show some degree of weathering. This is generally in the moderate to slightly weathered range. They are generally slightly to moderately fractured. The boring for B1-A encountered a zone of weathered rock (of gneiss) grading to saprolite between 27.0 feet and 34.5 feet. Above this is moderately weathered crystalline rock (gneiss); below is very slightly weathered to fresh crystalline rock (gneiss).

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GEOTECHNICAL UNIT
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RALEIGH NC 27699-1589

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

Contaminated Soils

Contamination by petroleum products was found in borings at the locations listed below. The GeoEnvironmental Section of the Geotechnical Engineering Unit has been notified.

<u>Boring</u>	<u>-L- Station</u>
EB1-A	11+80.5, 15.0' LT
EB1-A (2)	11+63, 37.0' LT
B1-A	12+05, 15.0' LT

Foundation Materials

End Bent One

A concrete slab on top of fill is present for most of the left half of this bent. The fill is made of silty sand and gravel. From the surface at EB1-B, and below the fill, is alluvium. This horizon consists of silty sand and gravel. Saprolite across this bent consists of silty sand. Weathered rock (of gneiss) was encountered in the boring for EB1-B at 9.5 feet (elevation 1237.3).

Static groundwater was measured in EB1-A(2) at 7.4 feet (elevation 1240.9); in EB1-B at 7.2 feet (elevation 1239.6).

Interior Bent One

A minor amount of silty sand fill is present at B1-A. Otherwise, alluvium is present from the surface. Here it is composed of silty sand and sandy silt with a basal gravel layer. Underlying the alluvium is silty sand saprolite. In B1-A, weathered rock (of gneiss) was first encountered at 12.0 feet (elevation 1235.9) with an interlayer of saprolite from 16.5 feet (elevation 1247.9) to 22.0 feet (elevation 1225.9). Weathered rock (of gneiss) picks up at this depth and grades to crystalline rock (gneiss) by 24.2 feet (elevation 1223.7). Coring was begun at this elevation and terminated at 42.5 feet (elevation 1205.4). The Recoveries ranged from 0 to 94 percent (56 percent average); the RQD's were from 0 to 90 percent (44 percent average). In B1-B, weathered rock (of gneiss) was encountered at 18.5 (elevation 1226.8) and grades to crystalline rock (gneiss) by 25.8 feet (elevation 1219.5). Coring was begun at 26.1 feet (elevation 1219.2) and terminated at 38.5 feet (elevation 1206.8). The Recoveries were from 86 to 88 percent (91 percent average). The RQD's were from 42 to 76 percent (56 percent average).

Static groundwater was measured in B1-A at 7.2 feet (1240.7).

Interior Bent Two

Fill material was encountered in the boring for B2-B. This is comprised of 2.5 feet of silty sand. The alluvium across this location is 4.0 to 8.0 feet of silty sand with gravel, cobbles and boulders.

Saprolite was not encountered in B2-B, but in B2-A it is a layer of sandy silt 16.0 feet thick. The saprolite grades to crystalline rock (gneiss) by 23.8 feet (elevation 1220.1). Coring was begun in B2-A at 26.7 feet (elevation 1217.2) and terminated at 38.5 feet (elevation 1205.4). The Recoveries were from 17 to 90 percent (50 percent average); the RQD's were from 0 to 72 percent (31 percent average). In B2-B, the alluvium rests upon weathered rock (of gneiss) at 6.5 feet (elevation 1236.4). This grades to crystalline rock (gneiss) by 21.4 feet (elevation 1221.5). Coring was begun at 21.6 feet (elevation 1221.3) and terminated at 38.3 feet (elevation 1204.6). The Recoveries were from 82 to 100 percent (92 percent average) and the RQD's were from 36 to 100 percent (73 percent average).

Static groundwater was measured in B2-A at 4.8 feet (elevation 1239.1).

End Bent Two

Alluvium was encountered at the surface in both borings for this bent. It consists of silty sand with a trace amount of boulders. Saprolite was also found in each boring. This horizon consists of 8.0 to 16.0 feet of silty sand and sandy silt. In the boring for EB2-A, weathered rock (of gneiss) was encountered at 24.0 feet (elevation 1221.4). In the boring for EB2-B, weathered rock (of gneiss) was encountered at 17.3 feet (elevation 1227.9). Both borings were terminated in weathered rock (of gneiss).

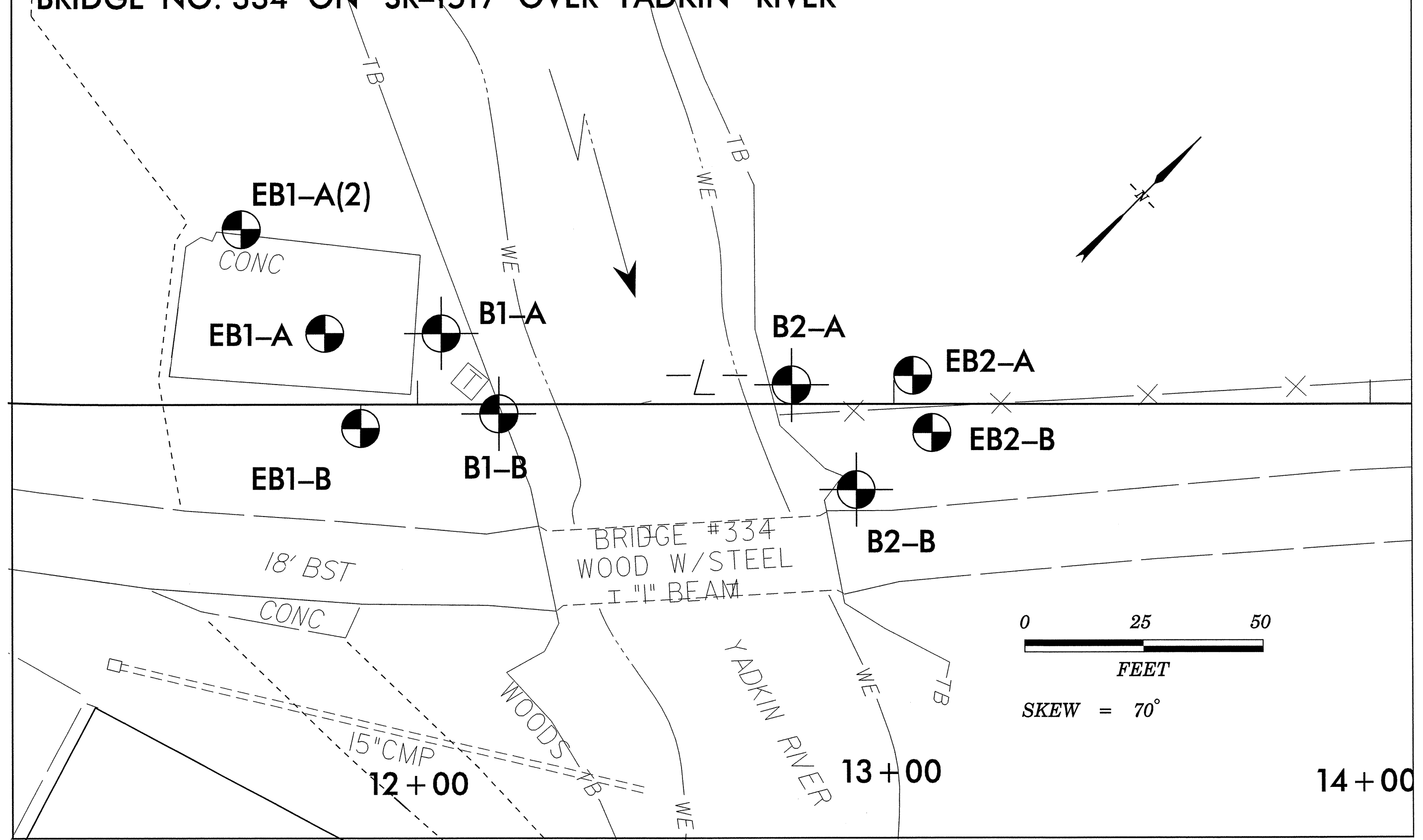
Static groundwater was measured at EB2-A at 6.3 feet (elevation 1239.1). In EB2-B, it was at 5.0 feet (elevation 1240.2).

Respectfully Submitted,



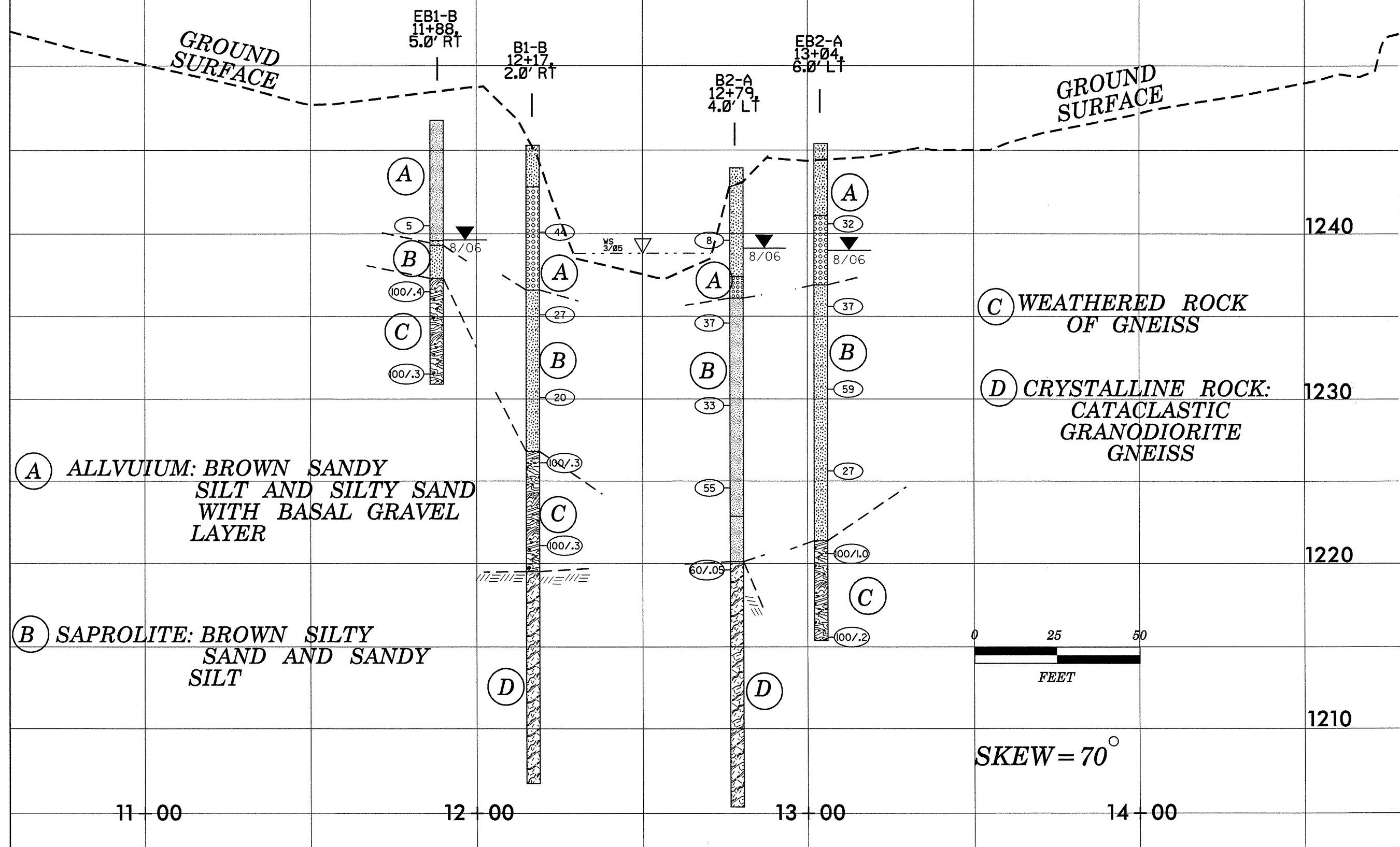
Charles A. Dunhagan, LG
Project Geological Engineer

BRIDGE NO. 334 ON SR-1517 OVER YADKIN RIVER



PROFILE ALONG CENTERLINE -L-

STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
33419.1.1 (B-4054)	5	21



1240

(C) WEATHERED ROCK OF GNEISS

1230

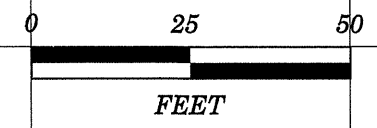
(D) CRYSTALLINE ROCK: CATACLASTIC GRANODIORITE GNEISS

1220

1210

(A) ALLUVIUM: BROWN SANDY SILT AND SILTY SAND WITH BASAL GRAVEL LAYER

(B) SAPROLITE: BROWN SILTY SAND AND SANDY SILT



SKEW = 70°

11 00

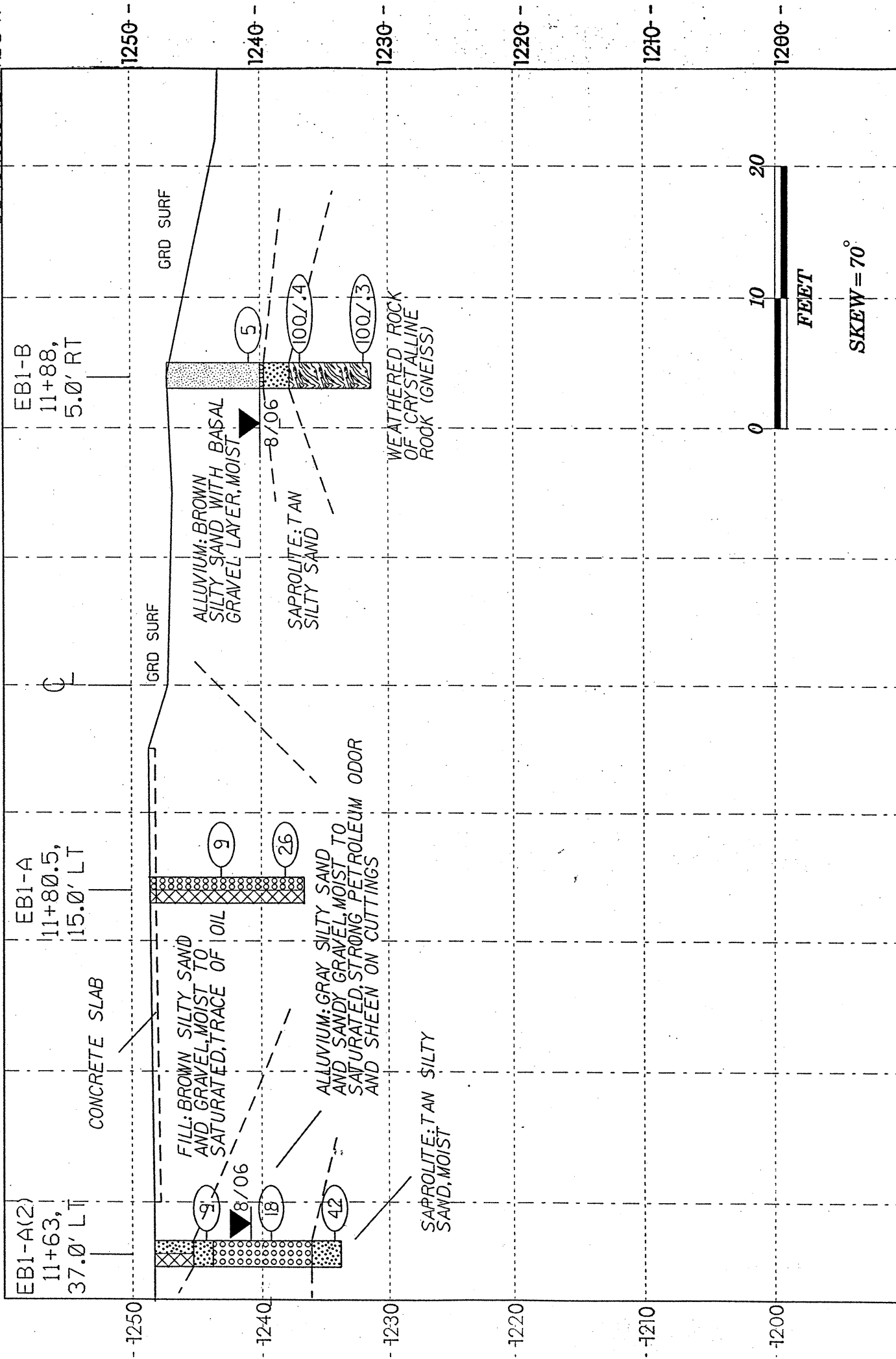
12 00

13 00

14 00

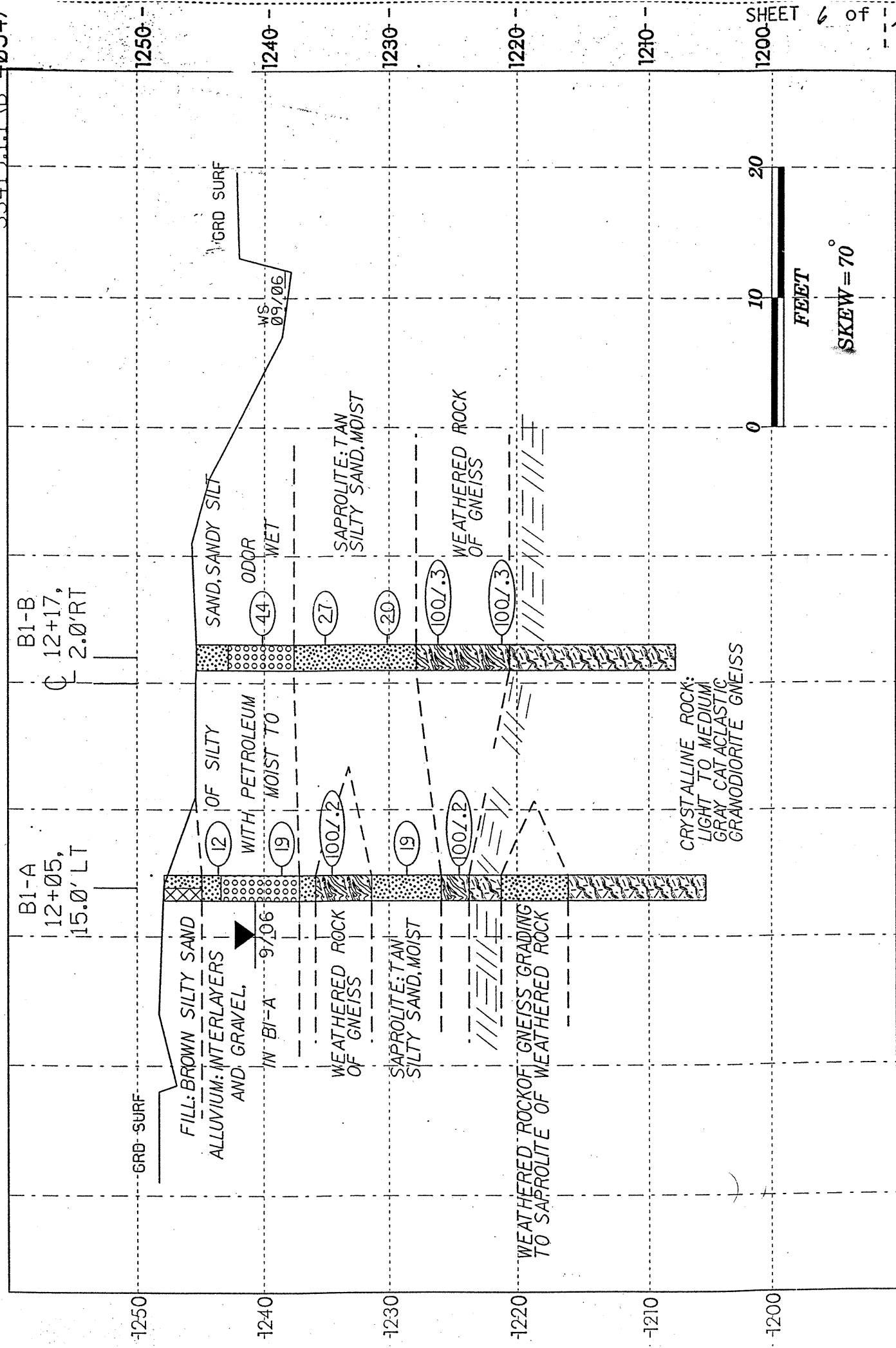
CROSS SECTION THROUGH END BENT ONE

BRIDGE NO. 334,
33419.1.1 (B-4054)



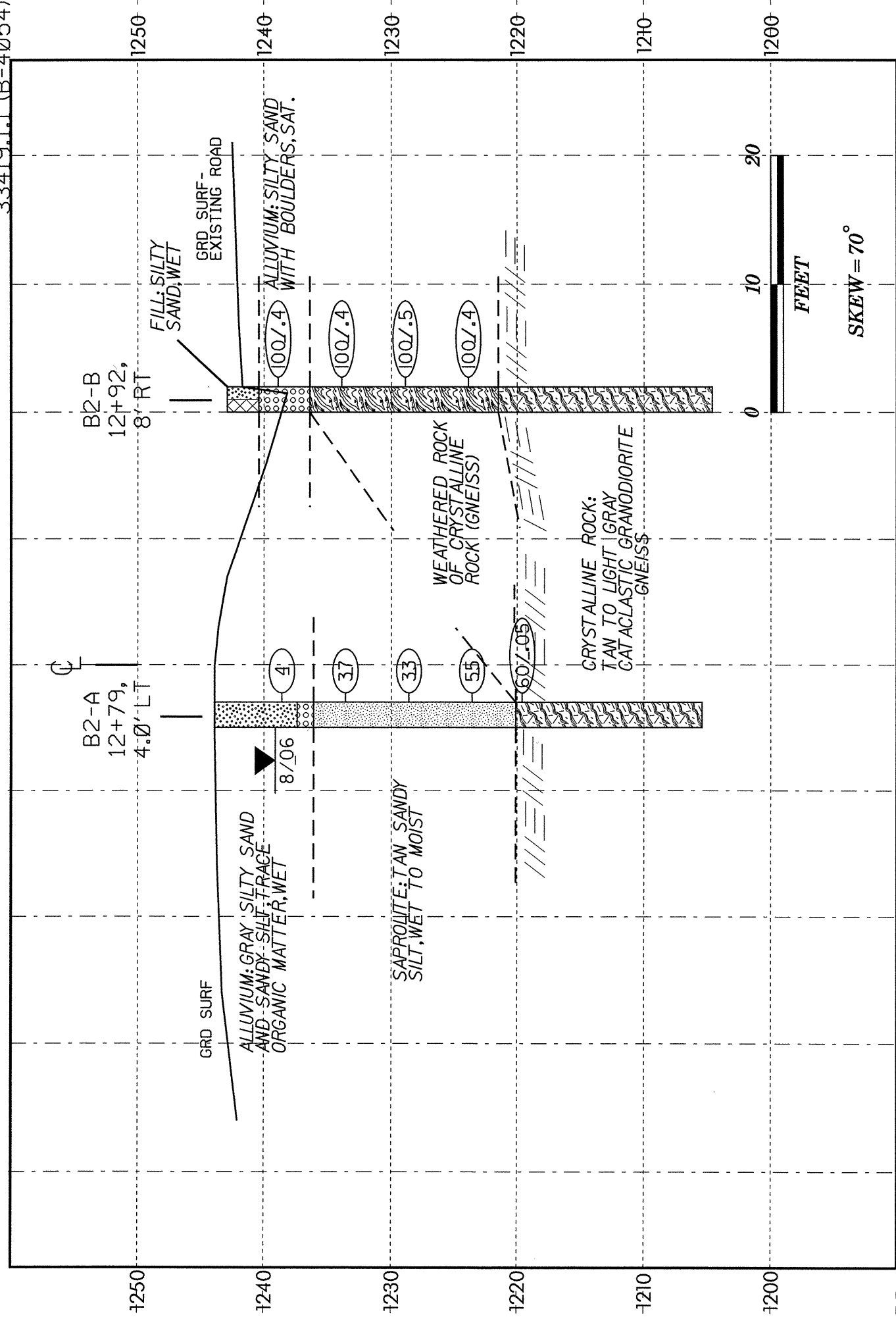
CROSS SECTION THROUGH INTERIOR BENT ONE

BRIDGE NO. 334,
33419.1.1 (B-4054)



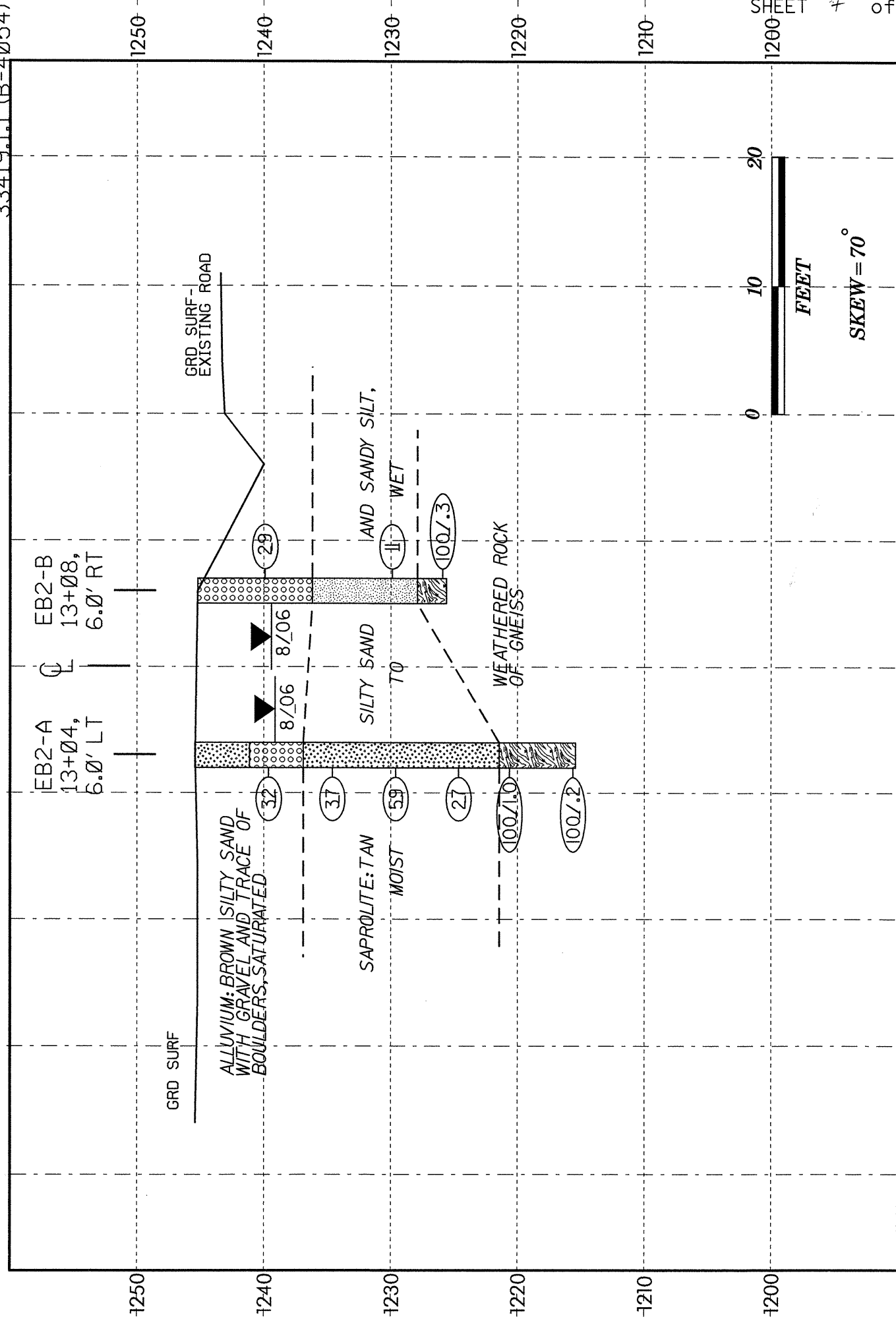
CROSS SECTION THROUGH INTERIOR BENT TWO

BRIDGE NO. 334,
33419.1.1 (B-4054)



CROSS SECTION THROUGH END BENT TWO

BRIDGE NO. 334,
33419.1.1 (B-4054)



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33419.1.1		ID B-4054		COUNTY CALDWELL		GEOLOGIST T B DANIEL									
SITE DESCRIPTION BRIDGE NO. 334 ON SR-1517 OVER YADKIN RIVER							GND WATER								
BORING NO EB1-A		NORTHING 827503.00		EASTING 1239135.00		0 HR N/A									
ALIGNMENT -L-		BORING LOCATION 11+80.500		OFFSET 15.00ft LT		24 HR N/A									
COLLAR ELEV 1248.60ft		TOTAL DEPTH 12.00ft		START DATE 8/29/06		COMPLETION DATE 08/29/06									
DRILL MACHINE CME 550			DRILL METHOD WASH BORING			HAMMER TYPE AUTOMATIC									
SURFACE WATER DEPTH			DEPTH TO ROCK N/A			Log EB1-A, Page 1 of 1									
ELEV	DEPTH	BLOW CT			PEN (ft)	BLOWS PER FOOT					SAMPLE NO	LOG MOI	LOG	SOIL AND ROCK DESCRIPTION	
		6in	6in	6in		0	25	50	75	100					
1248.60															
	4.50	0	1	8	1.0										CONCRETE PAD.
	9.50	19	12	14	1.0										FILL: BROWN SILTY SAND AND GRAVEL WITH BOULDERS. OIL IN RETURN DRILLING FLUID. WET TO SATURATED.
															BORING TERMINATED IN FIL AT APPROXIMATE ELEVATION 1236.6, DUE TO MECHANICAL FAILURE.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33419.1.1		ID B-4054		COUNTY CALDWELL		GEOLOGIST T B DANIEL									
SITE DESCRIPTION BRIDGE NO. 334 ON SR-1517 OVER YADKIN RIVER							GND WATER								
BORING NO EB1-A(2)		NORTHING 827510.00		EASTING 1239108.00		0 HR 6.50ft									
ALIGNMENT -L-		BORING LOCATION 11+63.000		OFFSET 37.00ft LT		24 HR 7.40ft									
COLLAR ELEV 1248.30ft		TOTAL DEPTH 14.50ft		START DATE 9/06/06		COMPLETION DATE 09/06/06									
DRILL MACHINE CME 550			DRILL METHOD H.S. AUGERS			HAMMER TYPE AUTOMATIC									
SURFACE WATER DEPTH			DEPTH TO ROCK N/A			Log EB1-A(2), Page 1 of 1									
ELEV	DEPTH	BLOW CT			PEN (ft)	BLOWS PER FOOT					SAMPLE NO	LOG MOI	LOG	SOIL AND ROCK DESCRIPTION	
		6in	6in	6in		0	25	50	75	100					
1248.30															
	3.00	3	4	5	1.0										FILL: BROWN SILTY SAND, MOIST.
	8.00	3	6	12	1.0										ALLUVIUM: BROWN AND GRAY SILTY SAND, MOIST.
	13.00	18	20	22	1.0										ALLUVIUM: GRAVEL AND BOULDERS.
															ALLUVIUM: GRAY SILTY SAND WITH GRAVEL. STRONG PETROLEUM ODOR AND SHEEN, SATURATED.
															SAPROLITE: TAN SILTY SAND, MOIST.
															BORING TERMINATED AT ELEV 1233.8 IN SAPROLITE OF CATACLASTIC GRANODIORITE.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33419.1.1		ID B-4054		COUNTY CALDWELL		GEOLOGIST T B DANIEL						
SITE DESCRIPTION BRIDGE NO. 334 ON SR-1517 OVER YADKIN RIVER						GND WATER						
BORING NO B1-A		NORTHING 827517.00		EASTING 1239155.00		0 HR 7.50ft						
ALIGNMENT -L-		BORING LOCATION 12+05.000		OFFSET 15.00ft LT		24 HR 7.20ft						
COLLAR ELEV 1247.90ft		TOTAL DEPTH 42.50ft		START DATE 8/31/06		COMPLETION DATE 09/03/06						
DRILL MACHINE CME 550			DRILL METHOD H.S. AUGERS			HAMMER TYPE AUTOMATIC						
SURFACE WATER DEPTH			DEPTH TO ROCK N/A			Log B1-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			
1247.90												Ground Surface
	3.20	2	2	10	1.0							FILL: BROWN SILTY SAND.
	8.20	18	10	9	1.0							ALLUVIUM: BROWN SILTY SAND WITH INTERLAYERS OF SANDY SILT, MOIST.
	13.20	100			0.2							ALLUVIUM: INTERLAYERS OF SILTY SAND AND GRAVEL, WET WITH PETROLEUM ODOR.
	18.20	42	13	6	1.0							SAPROLITE: TAN SILTY SAND. WEATHERED ROCK OF GNEISS.
	23.20	100			0.2							SAPROLITE: TAN SILTY SAND, MOIST.
												WEATHERED ROCK OF GNEISS
												CORE 1: 24.2'-26.7' REC=72% RQD=48%
												CORE 2: 26.7'-31.7' REC=6% RQD=0%
												CORE 3: 31.7'-36.7' REC=44% RQD=44%
												CORE 4: 36.7'-41.7' REC=94% RQD=90%
												CORE 5: 41.7'-42.5' REC= 63% RQD=38%
												BORING TERMINATED AT ELEV. 1205.4 IN CATACLASTIC GRANODIORITE GNEISS.

CORE BORING REPORT							DATE
PROJECT: 33419.1.1		I. D. NO: B-4054		BORING NO: B1-A		GEOLOGIST: C A Dunnagan	
DESCRIPTION: Bridge No. 334 on SR-1517 over Yadkin River							
COUNTY: Caldwell		COLLAR ELEVATION: 1247.9 FT.		TOTAL DEPTH: 42.5 FT.			
ELEV. (FEET)	DEPTH (FEET)	DRILL RATE MIN/5FT.	RUN (FEET)	REC. FEET %	RQD. FEET %	SAMP. #	FIELD CLASSIFICATION AND REMARKS
1223.7	24.2		2.5	1.8	1.2		Tan cataclastic granodiorite gneiss. Moderately weathered. Hard. a) 2 Joints @ 60°. b) 2 Joints @ 30°.
				72	48		
1221.2	26.7						27.0ft
1221.2	26.7		5.0	0.3	0.0		
			10	6	0		Weathered rock of gneiss grading to saprolite.
1216.2	31.7						
1216.2	31.7		5.0	2.2	2.2		34.5ft
			15	44	44		
1211.2	36.7						Light gray cataclastic granodiorite gneiss. Very slightly weathered to fresh. Hard to very hard.
1211.2	36.7		5.0	4.7	4.5		
			13	94	90		a) 2 Joints @ 60°.
1206.2	41.7						
1206.2	41.7		0.8	0.5	0.3		
			?	63	38		
1205.4	42.5						
CORING TERMINATED AT ELEVATION 1205.4 FT.							
DRILLER: C J Coffey		CORE SIZE: NXWL		EQUIPMENT: CME-550			

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

11 OF 21

PROJECT NO 33419.1.1		ID B-4054		COUNTY CALDWELL		GEOLOGIST T B DANIEL								
SITE DESCRIPTION BRIDGE NO. 334 ON SR-1517 OVER YADKIN RIVER							GND WATER							
BORING NO B1-B		NORTHING 827510.00		EASTING 11239174.00		0 HR N/A								
ALIGNMENT -L-		BORING LOCATION 12+17.000		OFFSET 2.00ft RT		24 HR N/A								
COLLAR ELEV 1245.30ft		TOTAL DEPTH 38.50ft		START DATE 8/24/06		COMPLETION DATE 08/29/06								
DRILL MACHINE CME-550			DRILL METHOD SPT CORE BORING			HAMMER TYPE AUTOMATIC								
SURFACE WATER DEPTH			DEPTH TO ROCK N/A			Log B1-B, Page 1 of 1								
ELEV	DEPTH	BLOW CT			PEN (ft)	BLOWS PER FOOT					SAMPLE NO	LOG	SOIL AND ROCK DESCRIPTION	
		6in	6in	6in		0	25	50	75	100				
1245.30														Ground Surface
1240.00	4.20	28	32	12	1.0									ALLUVIUM: BROWN SILTY SAND.
														ALLUVIUM: INTERLAYERS OF SILTY SAND AND GRAVEL, SATURATED.
	9.20	11	13	14	1.0									SAPROLITE: TAN SILTY SAND, WET.
1230.00	14.20	7	8	12	1.0									
	19.20	100			0.3									WEATHERED ROCK OF GNEISS.
1220.00	24.20	9	5	95	0.3									
														CORE 1: 26.1'-28.5' REC=88% RQD=42%
														CORE 2: 28.5'-33.5' REC=86% RQD=50%
														CORE 3: 33.5'-38.5' REC=100% RQD=76%
														BORING TERMINATED AT ELEV 1206.8 IN CATACLASTIC GRANODIORITE GNEISS.

SHEET 1 OF 1

DATE 29-Aug-06

CORE BORING REPORT

PROJECT: 33419.1.1 I. D. NO: B-4054 BORING NO: B1-B GEOLOGIST: C A Dunnagan
 DESCRIPTION: Bridge No. 334 on SR-1517 over Yadkin River
 COUNTY: Caldwell COLLAR ELEVATION: 1245.3 FT. TOTAL DEPTH: 38.5 FT.

ELEV. (FEET)	DEPTH (FEET)	DRILL RATE MIN./FT.	RUN (FEET)	REC. FEET %	RQD. FEET %	SAMP. #	FIELD CLASSIFICATION AND REMARKS
1219.2	26.1			2.1	1.0	RS-2	Tan cataclastic granodiorite gneiss. Hard. Moderately weathered. Mn and Fe stains on joint surfaces. Moderately to slightly fractured. a) Joints @ 10°. b) Joints @ 60°. c) Partings along foliation @ 30°.
			2.4	88	42		
1216.8	28.5						
1216.8	28.5			4.3	2.5		
			5.0	86	50		
1211.8	33.5						
1211.8	33.5			5.0	3.8		
			5.0	100	76		
1206.8	38.5						

CORING TERMINATED AT ELEVATION 1206.8 FT.

DRILLER: R D Childers CORE SIZE: NXWL EQUIPMENT: CME-550

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33419.1.1		ID B-4054		COUNTY CALDWELL		GEOLOGIST T B DANIEL								
SITE DESCRIPTION BRIDGE NO. 334 ON SR-1517 OVER YADKIN RIVER						GND WATER								
BORING NO B2-A		NORTHING 827552.00		EASTING 1239221.00		0 HR N/A								
ALIGNMENT -L-		BORING LOCATION 12+79.000		OFFSET 4.00ft LT		24 HR 4.80ft								
COLLAR ELEV 1243.95ft		TOTAL DEPTH 38.50ft		START DATE 8/23/06		COMPLETION DATE 08/23/06								
DRILL MACHINE CME 550			DRILL METHOD SPT CORE BORING			HAMMER TYPE AUTOMATIC								
SURFACE WATER DEPTH			DEPTH TO ROCK N/A			Log B2-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				
1243.95														Ground Surface
1240.00	4.30	2	4	4	1.0	8						SS-3	W	ALLUVIUM: GRAY SILTY SAND AND SANDY SILT, TRACE ORGANIC MATTER. WET.
	9.30	14	18	19	1.0		37							ALLUVIUM: COBBLES AND BOULDERS.
	14.30	4	10	23	1.0		33							SAPROLITE: TAN SANDY SILT, WET TO MOIST.
	19.30	18	27	28	1.0							SS-4	M	
	24.30	60			0.1									CRYSTALLINE ROCK (GNEISS)
														CORE 1: 26.7'-28.5' REC=17% RQD=0%
														CORE 2: 28.5'-33.5' REC=42% RQD=22%
														CORE 3: 22.5'-38.5' REC=90% RQD=72%
														RS-1
														BORING TERMINATED AT ELEV. 1205.5 IN CATACLASTIC GRANODIORITE GNEISS.

CORE BORING REPORT

PROJECT: 33419.1.1 I. D. NO: B-4054 BORING NO: B2-A GEOLOGIST: C A Dunnagan
 DESCRIPTION: Bridge No. 334 on SR-1517 over Yadkin River
 COUNTY: Caldwell COLLAR ELEVATION: 1243.9 FT. TOTAL DEPTH: 38.5 FT.

ELEV. (FEET)	DEPTH (FEET)	DRILL RATE MIN./FT.	RUN (FEET)	REC. FEET %	RQD. FEET %	SAMP. #	FIELD CLASSIFICATION AND REMARKS
1217.2	26.7		1.8	0.3	0.0		
1215.4	28.5			17	0		
1215.4	28.5		5.0	2.1	1.1		Tan cataclastic granodiorite gneiss. Moderately severely weathered. Medium to moderately hard. Slightly to moderately fractured.
1210.4	33.5			42	22		a) Joints @ 10°. b) Parts along foliation @ 30°.
1210.4	33.5		5.0	4.5	3.6		
1205.4	38.5			90	72	RS-1	
							Light tan cataclastic granodiorite gneiss. Moderately to slightly weathered. Hard.
							a) 2 joints @ 10°.

CORING TERMINATED AT ELEVATION 1205.4 FT.

DRILLER: C J Coffey CORE SIZE: NXWL EQUIPMENT: CME-550

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

13 OF 21

PROJECT NO 33419.1.1		ID B-4054		COUNTY CALDWELL		GEOLOGIST T B DANIEL						
SITE DESCRIPTION BRIDGE NO. 334 ON SR-1517 OVER YADKIN RIVER							GND WATER					
BORING NO B2-B		NORTHING 827550.00		EASTING 1239238.00		0 HR N/A						
ALIGNMENT -L-		BORING LOCATION 12+92.000		OFFSET 8.00ft RT		24 HR N/A						
COLLAR ELEV 1242.90ft		TOTAL DEPTH 38.30ft		START DATE 9/06/06		COMPLETION DATE 09/07/06						
DRILL MACHINE CME 550			DRILL METHOD SPT CORE BORING			HAMMER TYPE AUTOMATIC						
SURFACE WATER DEPTH			DEPTH TO ROCK N/A			Log B2-B, Page 1 of 1						
ELEV	DEPTH	BLOW CT			PEN (ft)	BLOWS PER FOOT				SAMPLE NO	LOG MOI	SOIL AND ROCK DESCRIPTION
		6in	6in	6in		0	25	50	75			
1242.90												Ground Surface
1240.00	4.00	100			0.4							FILL: SILTY SAND, WET
												ALLUVIUM: SILTY SAND WITH BOULDERS, SATURATED.
	9.00	38	62		0.4							WEATHERED ROCK OF GNEISS.
1230.00	14.00	18	42	58	0.5							
	19.00	70	30		0.4							
1220.00												CORE 1: 21.6'-23.3' REC=94% RQD=71%
												CORE 2: 23.3'-27.9' REC=100% RQD=100%
												CORE 3: 27.9'-33.3' REC=93% RQD=85%
												CORE 4: 33.3'-38.3' REC=82% RQD=36%
1210.00												
1204.60												BORING TERMINATED AT ELEV 1204.6 IN CATACLASTIC GRANODIORITE GNEISS.

SHEET 1 OF 1

DATE 8-Sep-06

CORE BORING REPORT

PROJECT: 33419.1.1 I. D. NO: B-4054 BORING NO: B2-B GEOLOGIST: C A Dunnagan
 DESCRIPTION: Bridge No. 334 on SR-1517 over Yadkin River
 COUNTY: Caldwell COLLAR ELEVATION: 1242.9 FT. TOTAL DEPTH: 38.3 FT.

ELEV. (FEET)	DEPTH (FEET)	DRILL RATE MIN./5FT.	RUN (FEET)	REC. FEET %	RQD. FEET %	SAMP. #	FIELD CLASSIFICATION AND REMARKS
1221.3	21.6			1.6	1.2		Tan to light gray cataclastic granodiorite gneiss. Hard to very hard. Moderately to slightly weathered. Slightly fractured. Severely weathered, medium hard, moderately fractured zone from 33.3ft to 35.0ft. a) 5 Joints @ 70°. b) 4 Joints @ 30°. c) 2 Joints @ 45°.
		5	1.7	94	71		
1219.6	23.3			4.6	4.6		
1219.6	23.3			100	100		
		7	4.6				
1215.0	27.9			5.0	4.6		
1215.0	27.9			93	85		
		8	5.4				
1209.6	33.3			4.1	1.8		
1209.6	33.3			82	36		
		10	5.0				
1204.6	38.3						

CORING TERMINATED AT ELEVATION 1204.6 FT.

DRILLER: C J Coffey CORE SIZE: NXWL EQUIPMENT: CME-550

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33419.1.1		ID B-4054		COUNTY CALDWELL		GEOLOGIST T B DANIEL								
SITE DESCRIPTION BRIDGE NO. 334 ON SR-1517 OVER YADKIN RIVER							GND WATER							
BORING NO EB2-A		NORTHING 827568.00		EASTING 1239240.00		0 HR 6.40ft	24 HR 6.30ft							
ALIGNMENT -L-		BORING LOCATION 13+04.000		OFFSET 6.00ft LT										
COLLAR ELEV 1245.40ft		TOTAL DEPTH 30.00ft		START DATE 8/23/06		COMPLETION DATE 08/24/06								
DRILL MACHINE CME 550			DRILL METHOD WASH BORING			HAMMER TYPE AUTOMATIC								
SURFACE WATER DEPTH			DEPTH TO ROCK N/A			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				
1245.40														Ground Surface
1240.00	4.80	18	19	13	1.0									ALLUVIUM: BROWN SILTY SAND.
	9.80	15	19	18	1.0									ALLUVIUM: BROWN SAND AND GRAVEL, SATURATED.
	14.80	22	32	27	1.0									SAPROLITE: TAN SILTY SAND, WET.
1230.00	19.80	8	15	12	1.0									
	24.80	38	65		1.0									WEATHERED ROCK OF GNEISS.
1215.40	29.80	100			0.2									BORING TERMINATED AT ELEV. 1215.4 IN WEATHERED ROCK OF CATACLASTIC GRANODIORITE GNEISS.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33419.1.1		ID B-4054		COUNTY CALDWELL		GEOLOGIST T B DANIEL								
SITE DESCRIPTION BRIDGE NO. 334 ON SR-1517 OVER YADKIN RIVER							GND WATER							
BORING NO EB2-B		NORTHING 827561.00		EASTING 1239250.00		0 HR N/A	24 HR 5.00ft							
ALIGNMENT -L-		BORING LOCATION 13+08.000		OFFSET 6.00ft RT										
COLLAR ELEV 1245.20ft		TOTAL DEPTH 19.60ft		START DATE 8/22/06		COMPLETION DATE 08/23/06								
DRILL MACHINE CME 550			DRILL METHOD WASH BORING			HAMMER TYPE AUTOMATIC								
SURFACE WATER DEPTH			DEPTH TO ROCK N/A			Log EB2-B, Page 1 of 1								
ELEV	DEPTH	BLOW CT			PEN (ft)	BLOWS PER FOOT					SAMPLE NO	LOG	SOIL AND ROCK DESCRIPTION	
		6in	6in	6in		0	25	50	75	100				
1245.20														Ground Surface
1240.00	4.30	12	20	9	1.0									ALLUVIUM: GRAY SILTY SAND AND GRAVEL WITH TRACE OF BOULDERS, SATURATED.
	14.30	8	6	5	1.0									SAPROLITE: TAN SANDY SILT, MOIST.
1230.00	19.30	100			0.3									WEATHERED ROCK OF GNEISS.
														BORING TERMINATED AT ELEV. 1225.6 IN WEATHERED ROCK OF CATACLASTIC GRANODIORITE GNEISS.

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

M&T 503E

T.I.P. ID #: B-4054

REPORT ON SAMPLES OF: Soils for Quality

PROJECT:	33419.1.1	COUNTY:	Caldwell	Owner:	--
DATE SAMPLED:	8.22.06	DATE RECEIVED:	8.25.06	DATE REPORTED:	8.29.06
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	SS-4				
Lab Sample No. A	153475	153476	153477	153478				
HiCAMS Sample #	--	--	--	--				
Retained #4 Sieve %	0.0	0.0	0.0	0.0				
Passing #10 Sieve %	39	98	85	99				
Passing #40 Sieve %	28	83	72	80				
Passing #200 Sieve %	17	37	20	36				

MINUS #10 FRACTION

Soil Mortar - 100%								
Coarse Sand -Ret. #60	36	26	31	31				
Fine Sand - Ret. #270	26	48	52	43				
Silt 0.05-0.005 mm %	34	24	17	24				
Clay < 0.005 mm %	4	2	0	2				
Passing # 40 Sieve %	--	--	--	--				
Passing # 200 Sieve %	--	--	--	--				

Liquid Limit	32	35	26	32				
Plastic Index	NP	NP	NP	NP				
AASHTO Classification	A-1-b (0)	A-4 (0)	A-2-4 (0)	A-4 (0)				
Quantity								
Texture								
Station	13+08	13+08	12+78	12+78				
Hole No.								
Depth (ft) From:	4.8	14.8	4.8	19.8				
To:	5.8	15.8	5.8	20.8				

Remarks:

A-153475 - 153478

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

15/21
M&T 503E

T.I.P. ID #: B-4054

REPORT ON SAMPLES OF: Soils for Quality

PROJECT:	33419.1.1	COUNTY:	Caldwell	Owner:	--
DATE SAMPLED:	8.29.06	DATE RECEIVED:	8.29.06	DATE REPORTED:	8.31.06
SAMPLED FROM:	Bridge	SAMPLED BY:	C. A. Dunnagan		
SUBMITTED BY:	W. D. Frye	2002	STANDARD SPECIFICATION		
LABORATORY:	Asheville				

TEST RESULTS

Project Sample No.	SS-5	SS-6						
Lab Sample No. A	153510	153511						
HiCAMS Sample #	--	--						
Retained #4 Sieve %	0.0	0.0						
Passing #10 Sieve %	98	95						
Passing #40 Sieve %	84	88						
Passing #200 Sieve %	38	23						

MINUS #10 FRACTION

Soil Mortar - 100%								
Coarse Sand -Ret. #60	27	23						
Fine Sand - Ret. #270	47	59						
Silt 0.05-0.005 mm %	26	16						
Clay < 0.005 mm %	0	2						
Passing # 40 Sieve %	--	--						
Passing # 200 Sieve %	--	--						

Liquid Limit	28	28						
Plastic Index	NP	NP						
AASHTO Classification	A-4 (1)	A-2-4 (0)						
Quantity								
Texture								
Station	12+18	12+18						
Hole No.								
Depth (ft) From:	5.8	10.8						
To:	6.8	11.8						

Remarks:

A-153510 - 153511

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 #:	B-4054		
REPORT ON SAMPLES OF:	Soils for Quality		
PROJECT:	33419.1.1	COUNTY:	Caldwell
DATE SAMPLED:	9.6.06	DATE RECEIVED:	9.6.06
SAMPLED FROM:	Bridge	SAMPLED BY:	C. A. Dunnagan
SUBMITTED BY:	W. D. Frye	2002	STANDARD SPECIFICATION
LABORATORY:	Asheville		

TEST RESULTS

Project Sample No.	SS-7						
Lab Sample No. A	153591						
HiCAMS Sample #	--						
Retained #4 Sieve %	0.0						
Passing #10 Sieve %	95						
Passing #40 Sieve %	88						
Passing #200 Sieve %	31						

* **MINUS #10 FRACTION**

Soil Mortar - 100%							
Coarse Sand -Ret. #60	18						
Fine Sand - Ret. #270	59						
Silt 0.05-0.005 mm %	23						
Clay < 0.005 mm %	0.0						
Passing # 40 Sieve %	--						
Passing # 200 Sieve %	--						

Liquid Limit	29						
Plastic Index	NP						
AASHTO Classification	A-2-4 (0)						
Quantity							
Texture							
Station	11+63						
Hole No.							
Depth (ft) From:	3.5						
To:	4.5						

Remarks:

A-153591

CC:

C. A. Dunnagan

File

SOILS ENGINEER:



**FIELD
 SCOUR REPORT**

WBS: 33419.1.1 TIP: B-4054 COUNTY: Caldwell

DESCRIPTION(1): Bridge No. 334 on SR-1517 over Yadkin River

EXISTING BRIDGE

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

Bridge No.: 334 Length: 62.0ft Total Bents: 3 Bents in Channel: 1 Bents in Floodplain: 2 Piles
 Foundation Type: _____

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: None noted.

Interior Bents: Minor amount at B1-A.

Channel Bed: None noted.

Channel Bank: Minor amount at EB2-A and EB2-B.

EXISTING SCOUR PROTECTION

Type(3): Concret endbent walls and wingwalls.

Extent(4): Wingwalls extend 5ft to 10ft beyond endbent walls. Endbent walls are width of endbent.

Effectiveness(5): Good.

Obstructions(6): Dam approx. 300ft upstream; boulders up to 5ft in diameter upstream and downstream.

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): Sand, gravel, cobbles and boulders.

Channel Bank Material(8): Silty sand.

Channel Bank Cover(9): EB1: trees and shrubs. EB2: grass.

Floodplain Width(10): EB1: 5ft. EB2 > 100ft.

Floodplain Cover(11): EB1: trees and shrubs. EB2: grass.

Stream is(12): Aggrading _____ Degrading Static _____

Channel Migration Tendency(13): Southwest. Abandoned grease-pit approximately 5ft LB of EB1-A.

Observations and Other Comments: _____

DESIGN SCOUR ELEVATIONS(14)

Feet Meters _____

BENTS

B1-A	B1-B	B2-A	B2-B							
1240.4	1237	1237.2	1236.6							

Comparison of DSE to Hydraulics Unit theoretical scour: _____

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

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

Reported by: *C. Munnagan*

Date: 22 Mar 07



33419.1.1 B-4054
 Caldwell Co.
 Bridge No. 334 on SR-1517 over Yadkin River
 B1-A
 Box 1 of 1



33419.1.1 B-4054
 Caldwell Co.
 Bridge No. 334 on SR-1517 over Yadkin River
 B1-B
 Box 1 of 2



33419.1.1 B-4054
 Caldwell Co.
 Bridge No. 334 on SR-1517 over Yadkin River
 B1-B
 Box 2 of 2



33419.1.1 B-4054
 Caldwell Co.
 Bridge No. 334 on SR-1517 over Yadkin River
 B2-A
 Box 1 of 1



33419.1.1
 Caldwell Co.
 Bridge No. 334 on SR-1517 over Yadkin River
 B2-B
 Box 1 of 2



33419.1.1 B-4054
 Caldwell Co.
 Bridge No. 334 on SR-1517 over Yadkin River
 B2-B
 Box 2 of 2