

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

STRUCTURE
SUBSURFACE INVESTIGATION

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PROJ. REFERENCE NO. B-4033 F.A. PROJ. BRSTP-112 (1)
 COUNTY BUNCOMBE
 PROJECT DESCRIPTION BRIDGE NO. 85 ON NC 112 OVER HOMINY CREEK

SITE DESCRIPTION _____

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 UN-PLACED TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION, AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

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

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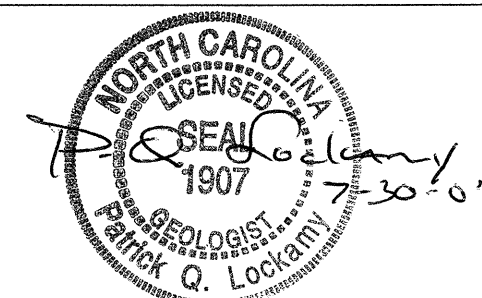
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CHECKED BY W.D. FRYE

SUBMITTED BY W.D. FRYE

DATE 7/30/07



PROJECT: 33400.1.1 ID: B-4033

DRAWN BY: J.T. WILLIAMS

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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. B-4033	SHEET NO. 2
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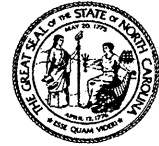
SUBSURFACE INVESTIGATION

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 (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. EXAMPLES: <i>VERY STIFF, GRAY, SILTY 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 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) CRYSTALLINE ROCK (CR) NON-CRYSTALLINE ROCK (NCR) COASTAL PLAIN SEDIMENTARY ROCK (CP)		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 SURFACES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH 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 (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.					
SOIL LEGEND AND AASHTO CLASSIFICATION		MINERALOGICAL COMPOSITION		WEATHERING		ROCK HARDNESS					
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 SLL) 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. 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. 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 SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50 PERCENTAGE OF MATERIAL ORGANIC MATERIAL GRANULAR SOILS SILT-CLAY SOILS OTHER MATERIAL TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC >10% >20% HIGHLY 35% AND ABOVE		WEATHERING FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE. VERY SLIGHT (V SLL) 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. 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. 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.		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.	
CONSISTENCY OR DENSENESS		GROUND WATER		MISCELLANEOUS SYMBOLS		ROCK HARDNESS					
PI OF A-7-5 SUBGROUP IS <= LL - 30 ; PI OF A-7-6 SUBGROUP IS >= LL - 30		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		ROADWAY EMBANKMENT (RED) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY DIP & DIP DIRECTION OF ROCK STRUCTURES SOUNDING ROD		SPT REFUSAL AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION SPT N-VALUE SPT REFUSAL					
TEXTURE OR GRAIN SIZE		ABBREVIATIONS		EQUIPMENT USED ON SUBJECT PROJECT		FRACTURE SPACING					
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		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. - MICA MOD. - MODERATELY NP - NON PLASTIC ORG. - ORGANIC PMT - PRESSUREMETER TEST SAP. - SAPROLITIC SD. - SAND, SANDY SL. - SILT, SILTY SLL. - SLIGHTLY TCR - TRICONE REFUSAL W - MOISTURE CONTENT V - VERY VST - VANE SHEAR TEST WEA. - WEATHERED W - UNIT WEIGHT W _s - DRY UNIT WEIGHT		DRILL UNITS: <input type="checkbox"/> MOBILE B- <input type="checkbox"/> BK-51 <input type="checkbox"/> CME-45C <input checked="" type="checkbox"/> CME-550 <input type="checkbox"/> PORTABLE HOIST		IERM 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					
SOIL MOISTURE - CORRELATION OF TERMS		EQUIPMENT USED ON SUBJECT PROJECT		FRACTURE SPACING		BEDDING					
SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION LL - LIQUID LIMIT - SATURATED - (SAT.) USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE PL - PLASTIC LIMIT - WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE OM - OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE SL - SHRINKAGE LIMIT - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE		ADVANCING TOOLS: <input type="checkbox"/> CLAY BITS <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER <input type="checkbox"/> 8" HOLLOW AUGERS <input type="checkbox"/> HARD FACED FINGER BITS <input type="checkbox"/> TUNG-CARBIDE INSERTS <input checked="" type="checkbox"/> CASING <input checked="" type="checkbox"/> W/ ADVANCER <input checked="" type="checkbox"/> TRICONE * STEEL TEETH <input type="checkbox"/> TRICONE * TUNG-CARB. <input type="checkbox"/> CORE BIT		IERM 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		BEDDING 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					
PLASTICITY		EQUIPMENT USED ON SUBJECT PROJECT		FRACTURE SPACING		BEDDING					
PLASTICITY INDEX (PI) DRY STRENGTH 0-5 VERY LOW 6-15 SLIGHT 16-25 MEDIUM 26 OR MORE HIGH		HAMMER TYPE: <input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL CORE SIZE: <input type="checkbox"/> B- <input checked="" type="checkbox"/> N XLW <input type="checkbox"/> H- HAND TOOLS: <input type="checkbox"/> POST HOLE DIGGER <input type="checkbox"/> HAND AUGER <input type="checkbox"/> SOUNDING ROD <input type="checkbox"/> VANE SHEAR TEST		IERM 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		BEDDING 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					
COLOR		EQUIPMENT USED ON SUBJECT PROJECT		FRACTURE SPACING		BEDDING					
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.		INDURATION 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.		IERM 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		BEDDING 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					

BENCH MARK: 8" SPIKE IN BASE OF OAK TREE -L- STA. 28+65 26 RT
ELEVATION: 2082.06 FT.

NOTES:
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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

July 30, 2007

STATE PROJECT: 33400.1.1 (B-4033)
F. A. PROJECT: BRSTP-112(1)
COUNTY: Buncombe

DESCRIPTION: Bridge No. 85 on NC-112 over Hominy Creek

SUBJECT: Geotechnical Report – Foundation Investigation

Introduction

This project is located near the western city limits of Asheville on Hominy Creek just upstream of the Enka plant on NC-112 or (Sand Hill Road). An existing two-lane concrete bridge built in 1929 is proposed to be replaced by a five-lane, three span prestressed concrete girder bridge. Bents are 42, 50 and 50 feet in length and 89.6 feet wide with an 80° skew. The grade point and Line -L- are 6 feet right of the center of the proposed bridge. Bridge identity is -L- Station 26+53.00.

The surface investigation was conducted using CME-550 drill machines. Eleven SPT borings were made utilizing N-casing with advancer; five of those borings on interior bents were cored. Fifteen soil samples were taken. A boring was not made at the proposed B2-A location where access is limited.

Physiography and Materials

Hominy Creek occupies a linear, structurally controlled valley. It is a large creek with nearly 80 square miles of headwaters upstream of this project where elevations can exceed 5,200 feet. This section of Hominy valley swells or broadens downstream of the bridge site. Alluvium of different ages and elevations is present. Terrace material was encountered in borings at End Bent Two. Rounded quartz gravel and cobbles indicative of terraces are visible on the ground surface and in ditch cuts beyond End Bent Two. Recent alluvium, up to 19 feet deep, was encountered in

the eight other borings. It has a slightly clay enriched upper horizon which coarsens downwards to basal sand and gravel with cobbles. Weathering of parent material (gneiss) has developed a rather uniform subsurface of silty to sandy saprolite (with trace mica) grading to weathered rock interlayered with saprolite all over somewhat weathered crystalline rock that becomes hard and fresh with depth.

Geology and Rock Characteristics

Sparse exposures of bedrock occur in the vicinity of this bridge and rock observed in the creek bed is mostly rounded quartz. The description of rock at this site is based entirely upon retrieved rock core. Bedrock (crystalline rock) is of three distinct metamorphic textures made predominantly of layered gneiss with approximately 20 percent massive granoblastic felsic gneiss and a smaller amount of metagreywacke gneiss. Fresh crystalline rock occurs at a slightly higher elevation on the north side (Bent Two) side of the creek.

Upper portions of crystalline rock exhibit variable weathering especially along foliation of micaceous layers within the layered gneiss. Weathered rock layers are within the upper portions of crystalline rock where recovery varies from 35 to 88 percent. At depth, crystalline rock is nearly uniformly hard and fresh with high RQD and few natural breaks. Foliation tends to be 40 to 70 degrees with variations. Breaks tend to be along foliation. Pyrite (iron sulfide) flowers are visible in breaks along chloritic foliation.

Groundwater

At this time during a summer dry period, groundwater is present across the site at elevations 2048 to 2050 feet.

In Closing

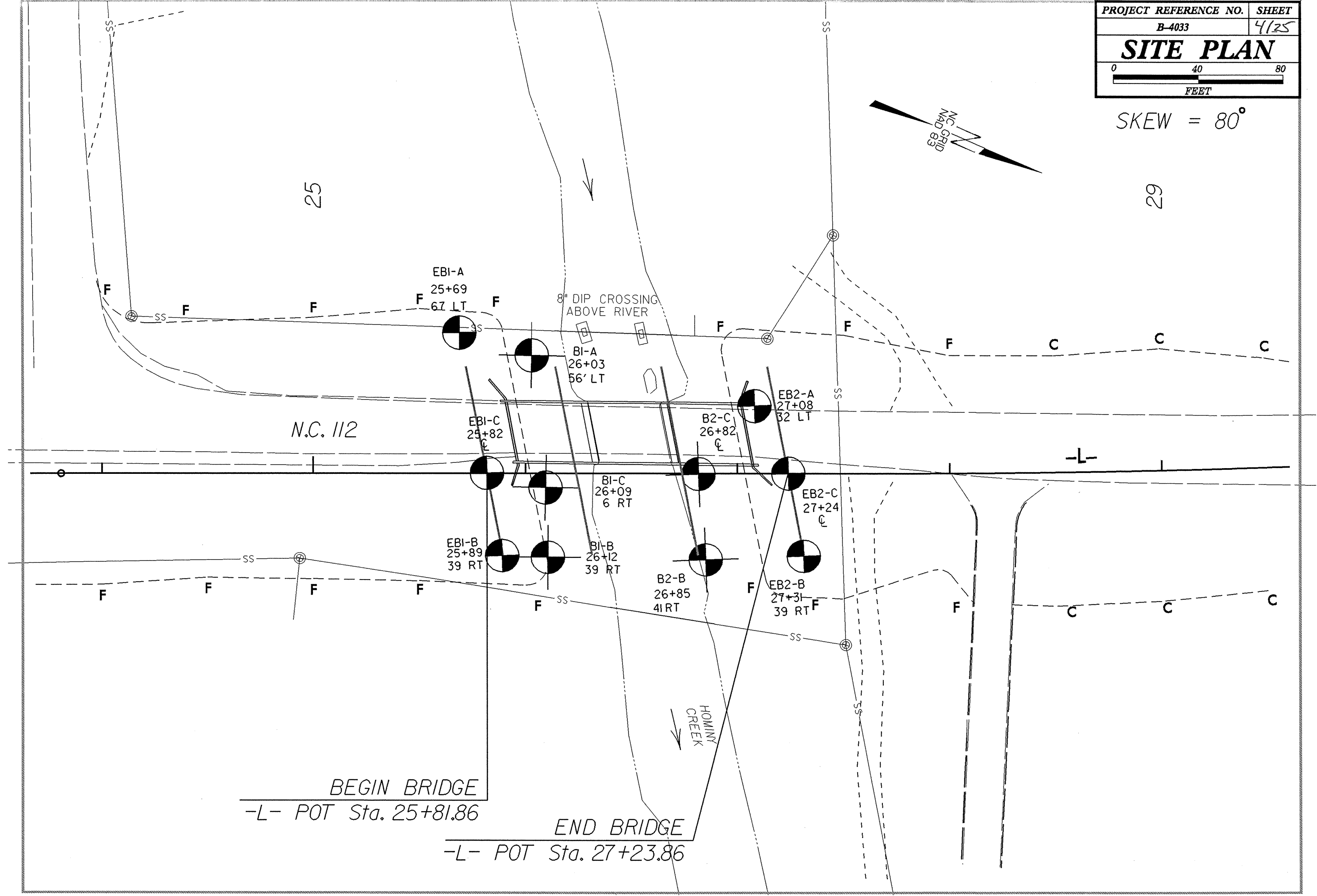
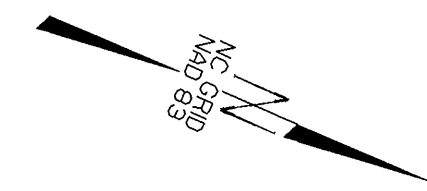
This geotechnical foundation investigation is based on the Bridge Survey and Hydraulic Design Report dated 11/09/05. If any significant changes are made to the design or location of the proposed bridge, the subsurface information will have to reviewed and modified as necessary.

Respectfully Submitted,

PQ Lockamy, PG

PROJECT REFERENCE NO.	SHEET
B-4033	4/25
SITE PLAN	
FEET	

SKEW = 80°



N.C. 112

8" DIP CROSSING ABOVE RIVER

HOMINY CREEK

BEGIN BRIDGE
-L- POT Sta. 25+81.86

END BRIDGE
-L- POT Sta. 27+23.86

EBI-A
25+69
67 LT

BI-A
26+03
56' LT

EB2-A
27+08
32 LT

EBI-C
25+82

B2-C
26+82

BI-C
26+09
6 RT

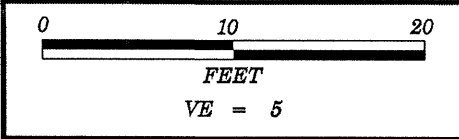
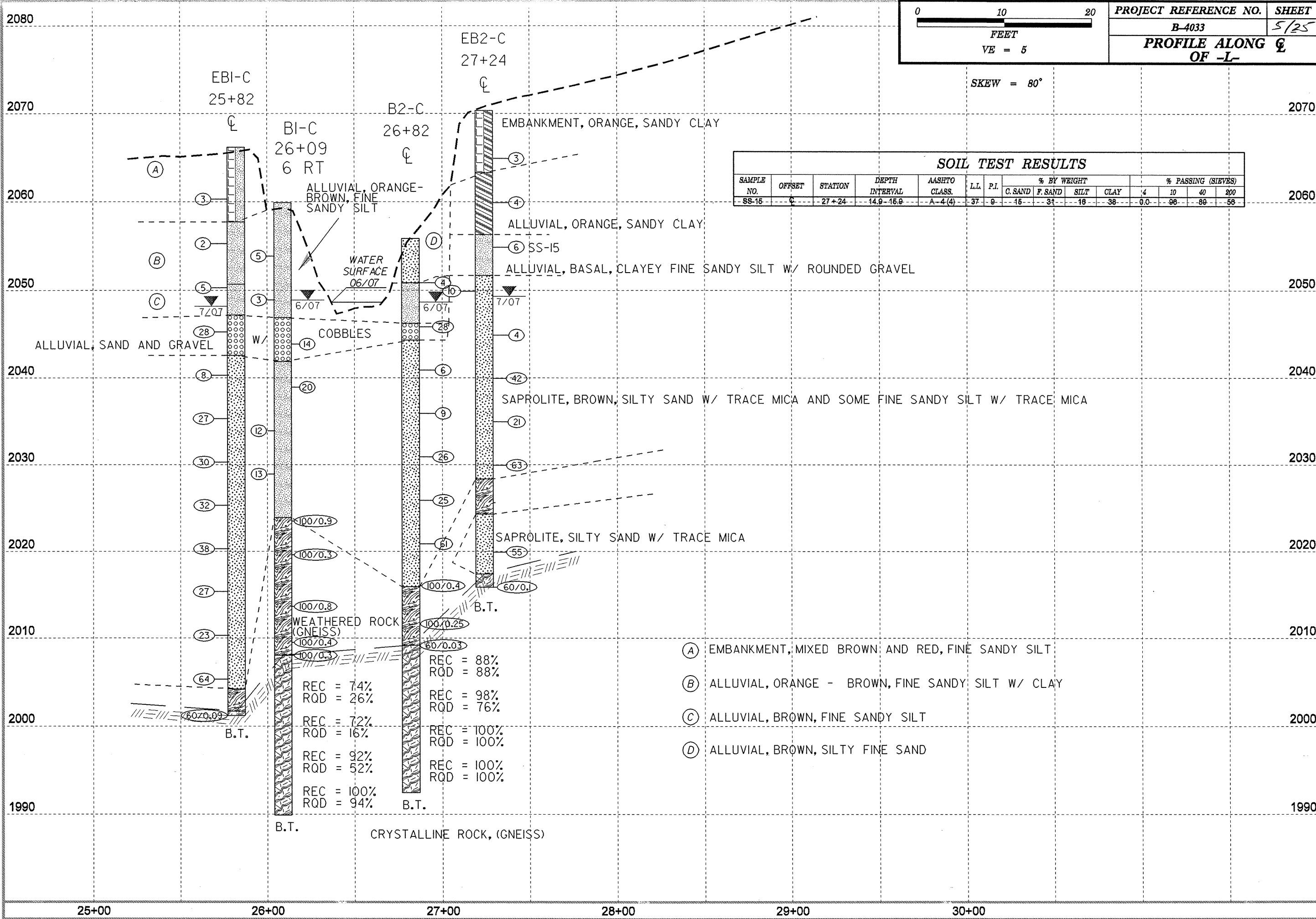
EB2-C
27+24

EBI-B
25+89
39 RT

BI-B
26+12
39 RT

B2-B
26+85
41 RT

EB2-B
27+31
39 RT



PROJECT REFERENCE NO. B-4033
 SHEET 5/25
 PROFILE ALONG CL OF -L-

SKEW = 80°

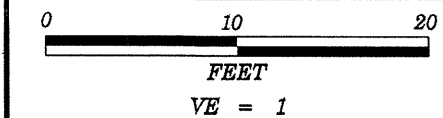
SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			
							C. SAND	F. SAND	SILT	CLAY	4	10	40	200
SS-15	C	27+24	14.9-16.9	A-4(4)	37	9	16	31	18	38	0.0	98	89	58

REC = 74%	REC = 88%
RQD = 26%	RQD = 88%
REC = 72%	REC = 98%
RQD = 16%	RQD = 76%
REC = 92%	REC = 100%
RQD = 52%	RQD = 100%
REC = 100%	REC = 100%
RQD = 94%	RQD = 100%

- (A) EMBANKMENT, MIXED BROWN AND RED, FINE SANDY SILT
- (B) ALLUVIAL, ORANGE - BROWN, FINE SANDY SILT W/ CLAY
- (C) ALLUVIAL, BROWN, FINE SANDY SILT
- (D) ALLUVIAL, BROWN, SILTY FINE SAND

2080



PROJECT REFERENCE NO.	SHEET
B-4033	6/25
SECTION THRU EBI	

2070

2070

EBI-A
25+69
67 LT

EBI-C
25+82

EBI+B
25+89
39 RT

SKEW = 80°

2060

2060

EMBANKMENT, MIXED BROWN AND RED, FINE SANDY SILT

5

ALLUVIAL, ORANGE - BROWN, FINE SANDY SILT W/ CLAY

3

ALLUVIAL, ORANGE - BROWN, FINE SANDY SILT W/ CLAY

4 SS-9

2050

2050

7/07

ALLUVIAL, BROWN, FINE SANDY SILT

5

ALLUVIAL, BROWN, FINE SANDY SILT

4 SS-10

26

ALLUVIAL, BROWN SAND W/ GRAVEL AND COBBLES

28

ALLUVIAL, BROWN SAND W/ GRAVELS AND COBBLES

28 SS-II

2040

2040

5

SAPROLITE, BROWN SAND W/ TRACE MICA AND FINE SANDY SILT LAYERS

8

SAPROLITE, BROWN SAND W/ TRACE MICA AND FINE SANDY SILT LAYERS

18 SS-12

21

2030

2030

29

26

2020

2020

93

2010

2010

82

B.T.

WEATHERED ROCK, (GNEISS)

27

WEATHERED ROCK, (GNEISS)

59 SS-14

2000

2000

CHRYSSTALLINE ROCK, (GNEISS)

B.T.

B.T.
F.I.A.D.

1990

1990

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			
							C. SAND	F. SAND	SILT	CLAY	4	10	40	200
SS-9	39 RT	25 + 89	5.2 - 6.2	A - 4 (3)	36	NP	20	32	20	28	0.0	98	90	51
SS-10	39 RT	25 + 89	10.3 - 11.3	A - 4 - 2	29	NP	6	58	20	16	0.0	100	100	46
SS-11	39 RT	25 + 89	15.3 - 16.3	A - 1 - 6 (0)	23	NP	42	40	12	6	33.0	48	38	12
SS-12	39 RT	25 + 89	20.3 - 21.3	A - 2 - 4 (0)	25	NP	52	28	16	4	0.0	98	64	24
SS-13	39 RT	25 + 89	30.3 - 31.3	A - 2 - 4 (0)	32	NP	39	41	16	4	0.0	93	70	28
SS-14	39 RT	25 + 89	45.3 - 46.3	A - 2 - 4 (0)	23	NP	28	61	9	4	0.0	100	91	21

-L-

80 70 60 50 40 30 20 10 0 10 20 30 40 50

2080

2070

2060

2050

2040

2030

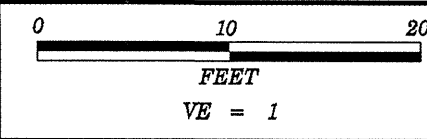
2020

2010

2000

1990

SOIL TEST RESULTS														
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			
							C. SAND	F. SAND	SILT	CLAY	4	10	40	200
SS-1	56 LT	26+03	3.8 - 4.8	A-4(1)	31	NP	18	41	29	12	0.0	83	78	38
SS-2	56 LT	26+03	11.8 - 12.8	A-1-a(0)	24	NP	42	38	14	8	40.5	32	27	9
SS-3	56 LT	26+03	13.8 - 14.8	A-4(7)	36	NP	3	49	42	8	0.0	100	99	72
SS-4	56 LT	26+03	18.8 - 19.8	A-4(6)	36	NP	6	47	43	4	0.0	100	99	83
SS-5	56 LT	26+03	23.8 - 24.8	A-4(8)	35	NP	3	50	41	6	0.0	100	99	87
SS-6	56 LT	26+03	28.8 - 29.8	A-2-4(0)	32	NP	37	38	15	12	0.0	96	72	32
SS-7	56 LT	26+03	33.8 - 34.8	A-4(5)	31	NP	18	38	38	8	0.0	98	87	58
SS-8	56 LT	26+03	43.8 - 44.8	A-4(1)	27	NP	20	50	28	2	0.0	100	97	42



PROJECT REFERENCE NO. B-4033
 SHEET 7/25
 SECTION THRU B1

SKEW = 80°

BI-A
 26+03
 56 LT

BI-C
 26+09
 6 RT

BI-B
 26+12
 39 RT

SS-1
 SS-2 (51)
 SS-3 (39)

(5)
 (3)
 (14)

(3)
 (27)

(9) SS-4
 (44) SS-5
 SS-6 (24)
 SS-7 (23)

(20)
 (12)
 (15)
 (160/0.9)
 (100/0.3)

(11)
 (89)
 (29)
 (28)
 (100/0.9)
 (100/0.3)

(51) SS-8
 REC = 58%
 RQD = 26%
 REC = 96%
 RQD = 56%
 REC = 100%
 RQD = 70%
 REC = 98%
 RQD = 80%

REC = 72%
 RQD = 16%
 REC = 92%
 RQD = 52%
 REC = 100%
 RQD = 94%

REC = 76%
 RQD = 44%
 REC = 70%
 RQD = 22%
 REC = 58%
 RQD = 22%
 REC = 96%
 RQD = 88%

REC = 85%
 RQD = 64%

ALLUVIAL, BROWN SAND

ALLUVIAL, ORANGE-BROWN FINE SANDY SILT

ALLUVIAL, SAND AND GRAVEL W/ OCCASSIONAL COBBLE

SAPROLITE, BROWN FINE SANDY SILT W/ TRACE MICA AND SILTY SAND LAYERS

WEATHERED ROCK, (GNEISS) W/ OCCASSIONAL LAYERS OF SAPROLITIC FINE SANDY SILT

WEATHERED ROCK, (GNEISS)

CRYSTALLINE ROCK, (GNEISS)

CRYSTALLINE ROCK (GNEISS)

B.T.

B.T.

B.T.

70 60 50 40 30 20 10 0 10 20 30 40 50 60

2080

2070

2060

2050

2040

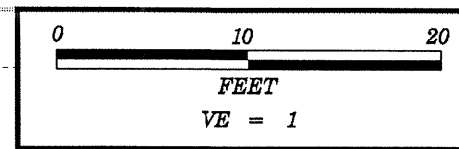
2030

2020

2010

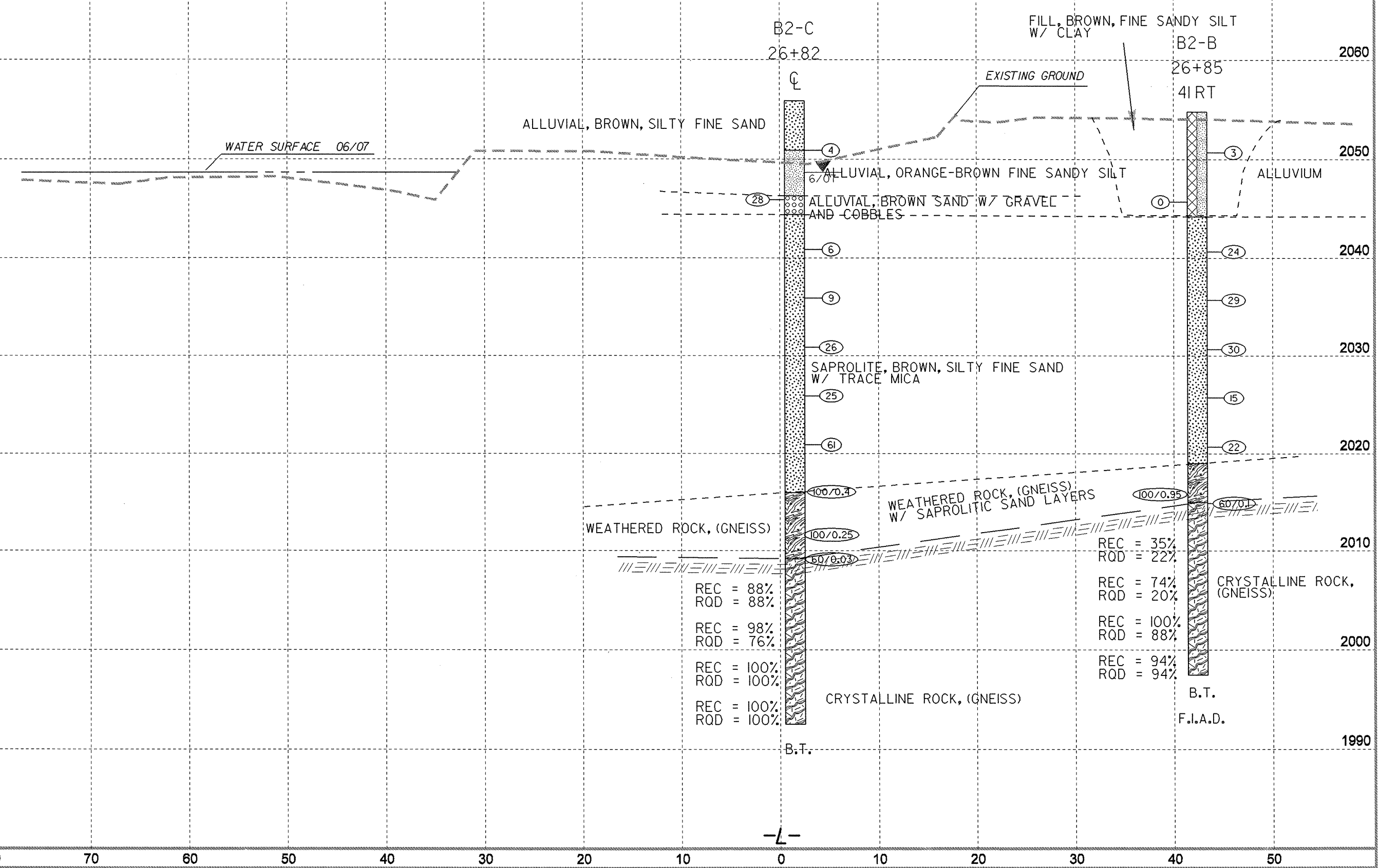
2000

1990



PROJECT REFERENCE NO.	SHEET
B-4033	8/25
SECTION THRU B2	

SKEW = 80°



REC = 88%
RQD = 88%

REC = 98%
RQD = 76%

REC = 100%
RQD = 100%

REC = 100%
RQD = 100%

REC = 35%
RQD = 22%

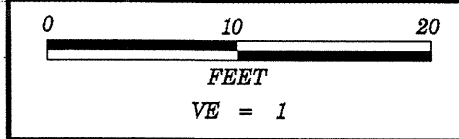
REC = 74%
RQD = 20%

REC = 100%
RQD = 88%

REC = 94%
RQD = 94%

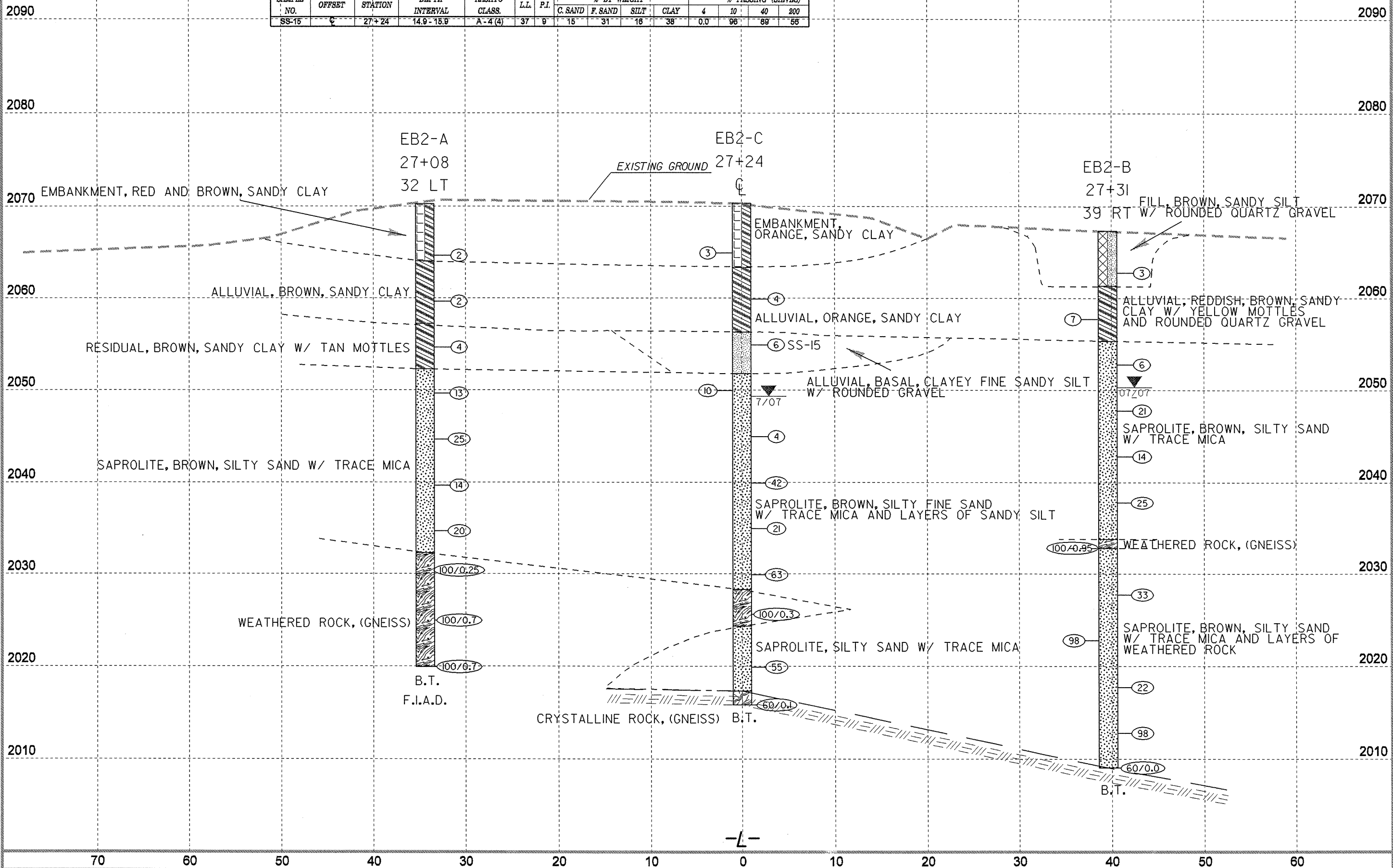
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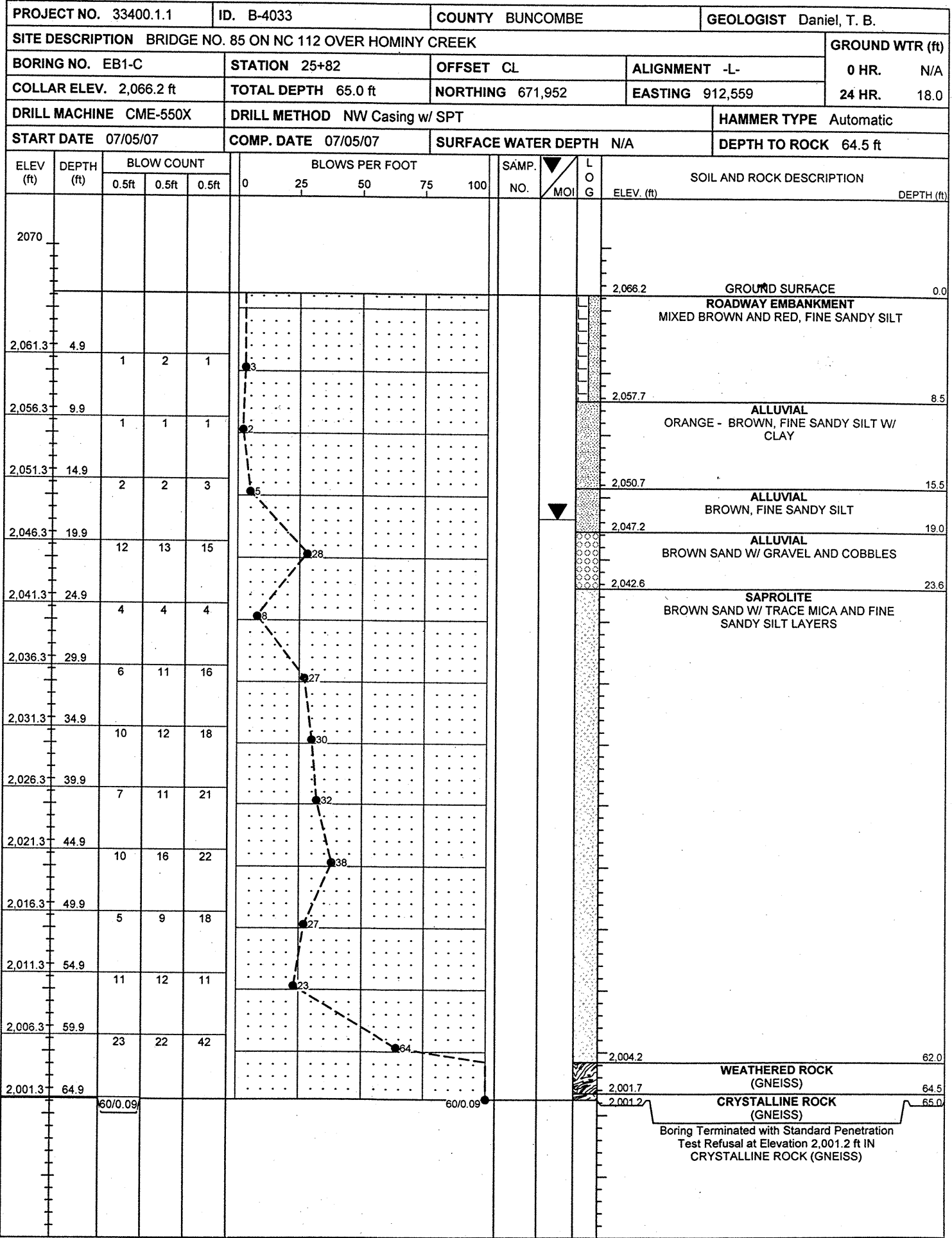
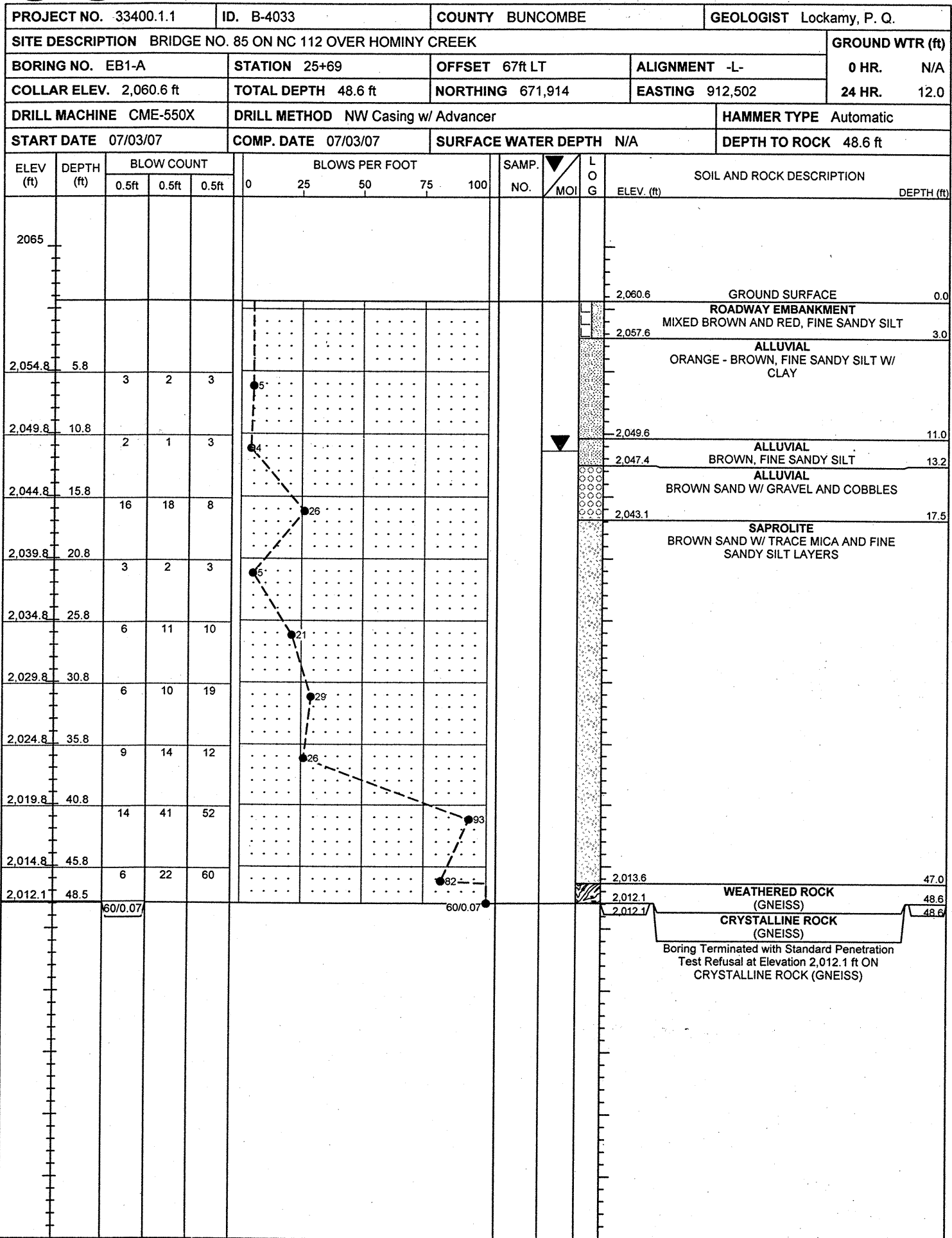
80 70 60 50 40 30 20 10 0 10 20 30 40 50



SOIL TEST RESULTS														
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			
							C. SAND	F. SAND	SILT	CLAY	4	10	40	200
SS-15	0	27+24	14.9-15.9	A-4 (4)	37	9	15	31	18	38	0.0	96	89	56

SKEW = 80°





NCDOT BORE SINGLE B-4033.GPJ NC_DOT.GDT 07/25/07

NCDOT BORE SINGLE B-4033.GPJ NC_DOT.GDT 07/25/07

PROJECT NO. 33400.1.1		ID. B-4033		COUNTY BUNCOMBE		GEOLOGIST Daniel, T. B.									
SITE DESCRIPTION BRIDGE NO. 85 ON NC 112 OVER HOMINY CREEK							GROUND WTR (ft)								
BORING NO. B1-A		STATION 26+03		OFFSET 56ft LT		ALIGNMENT -L-									
COLLAR ELEV. 2,057.5 ft		TOTAL DEPTH 66.7 ft		NORTHING 671,950		EASTING 912,499									
DRILL MACHINE CME-550X		DRILL METHOD NW Casing w/ SPT Core		HAMMER TYPE Automatic											
START DATE 06/22/07		COMP. DATE 06/22/07		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 48.2 ft									
ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
		0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2060													2,057.5	GROUND SURFACE	0.0
2,054.2	3.3	3	2	3							SS-1		2,048.2	ALLUVIAL BROWN, FINE SANDY SILT	9.3
2,049.2	8.3	2	8	21									2,044.7	ALLUVIAL BROWN SAND	12.8
2,046.4	11.1	17	29	22							SS-2		2,044.7	SAPROLITE BROWN FINE SANDY SILT W/ TRACE MICA	
2,044.2	13.3	5	26	13							SS-3				
2,039.2	18.3	4	5	4							SS-4				
2,034.2	23.3	8	19	25							SS-5		2,031.5	SAPROLITE BROWN SAND W/ TRACE MICA	26.0
2,029.2	28.3	10	12	12							SS-6		2,025.5	SAPROLITE BROWN FINE SANDY SILT W/ TRACE MICA	32.0
2,024.2	33.3	9	12	11							SS-7		2,019.5	WEATHERED ROCK (GNEISS) W/ LAYERS OF SAPROLITIC SILTY SAND	38.0
2,019.2	38.3	50	50/0.3										2,017.5	SAPROLITE BROWN FINE SANDY SILT W/ TRACE MICA	40.0
2,014.2	43.3	24	14	37							SS-8		2,011.4	WEATHERED ROCK (GNEISS) W/ LAYERS OF SAPROLITIC FINE SAND SILTY	46.1
2,009.2	48.3	60/0.01											2,009.3	CRYSTALLINE ROCK (GNEISS) TOTAL REC = 89% TOTAL RQD = 58%	48.2
													1,990.8	Boring Terminated at Elevation 1,990.8 ft IN CRYSTALLINE ROCK (GNEISS)	66.7

CORE BORING REPORT

PROJECT: 33400.1.1 I. D. NO: B-4033 BORING NO: B1-A GEOLOGIST: TB Daniel
 DESCRIPTION: BRIDGE No. 85 ON NC-112 OVER HOMINY CREEK 56 LT -L- STA. 26+03
 COUNTY: Buncombe COLLAR ELEVATION: 2057.5 FT. TOTAL DEPTH: 66.7 FT.

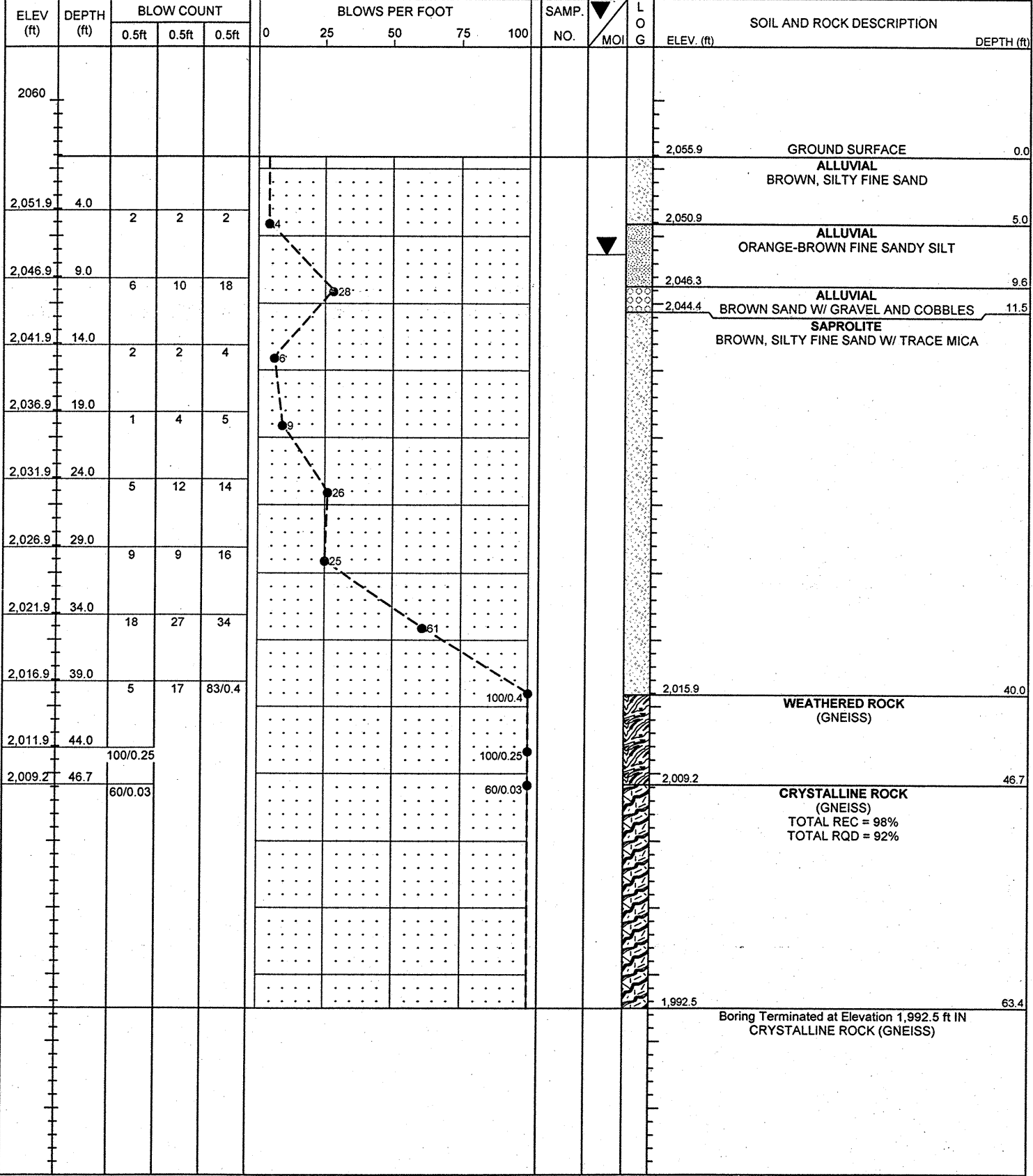
ELEV. (FEET)	DEPTH (FEET)	TIME FOR CORING (FEET)	RUN (FEET)	REC. FEET %	RQD. FEET %	SAMP. #	FIELD CLASSIFICATION AND REMARKS
2099.2	48.3	10 MIN		2.5	1.1		FINELY LAYERED GRANOBlastic FELsIC GNEISS WITH QUARTZ VEIN. VERY SLIGHT TO MODERATELY SEVERE WEATHERING. VERY HARD TO MEDIUM HARD. FOLIATION 40° TO 50°. BREAKS STAINED WITH FE AND MN OXIDES.
			4.3	58	26		
2004.9	52.6	13 MIN		4.8	2.8		FINELY LAYERED GRANOBlastic FELsIC GNEISS. VERY SLIGHT TO MODERATELY SEVERE WEATHERING. GENERALLY HARD TO MODERATELY HARD. BREAKS ON MICACEOUS FOLIATION AT 50° TO 70°
			5.0	96	56		
1999.9	57.6						FINELY LAYERED GRANOBlastic FELsIC GNEISS. VERY SLIGHT TO MODERATE WEATHERING. GENERALLY HARD TO MODERATELY HARD. BREAKS SLIGHTLY STAINED.
1999.9	57.6	13 MIN		5.0	3.5		
			5.0	100	70		
1994.9	62.6						FINELY LAYERED GRANOBlastic FELsIC GNEISS. VERY SLIGHT TO SLIGHT WEATHERING. GENERALLY HARD TO MODERATELY HARD. BREAKS SLIGHTLY STAINED.
1994.9	62.6	11 MIN		4.1	3.3		
			4.1	100	80		
1990.8	66.7						

CORING TERMINATED AT ELEVATION 1990.8 FT.

DRILLER: DO CHEEK CORE SIZE: NWD-4 EQUIPMENT: CME-550

NCDOT BORE SINGLE B-4033.GPJ NC_DOT.GDT 07/26/07

PROJECT NO. 33400.1.1	ID. B-4033	COUNTY BUNCOMBE	GEOLOGIST Daniel, T. B.
SITE DESCRIPTION BRIDGE NO. 85 ON NC 112 OVER HOMINY CREEK			GROUND WTR (ft)
BORING NO. B2-C	STATION 26+82	OFFSET CL	ALIGNMENT -L-
COLLAR ELEV. 2,055.9 ft	TOTAL DEPTH 63.4 ft	NORTHING 672,044	EASTING 912,520
DRILL MACHINE CME-550X	DRILL METHOD NW Casing w/ SPT Core	HAMMER TYPE Automatic	
START DATE 06/25/07	COMP. DATE 06/26/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 46.7 ft



CORE BORING REPORT

PROJECT: 33400.1.1 I. D. NO: B-4033 BORING NO: B2-C GEOLOGIST: TB Daniel
 DESCRIPTION: BRIDGE No. 85 ON NC-112 OVER HOMINY CREEK 26+82 -L- CL
 COUNTY: Buncombe COLLAR ELEVATION: 2055.9 FT. TOTAL DEPTH: 63.4 FT.

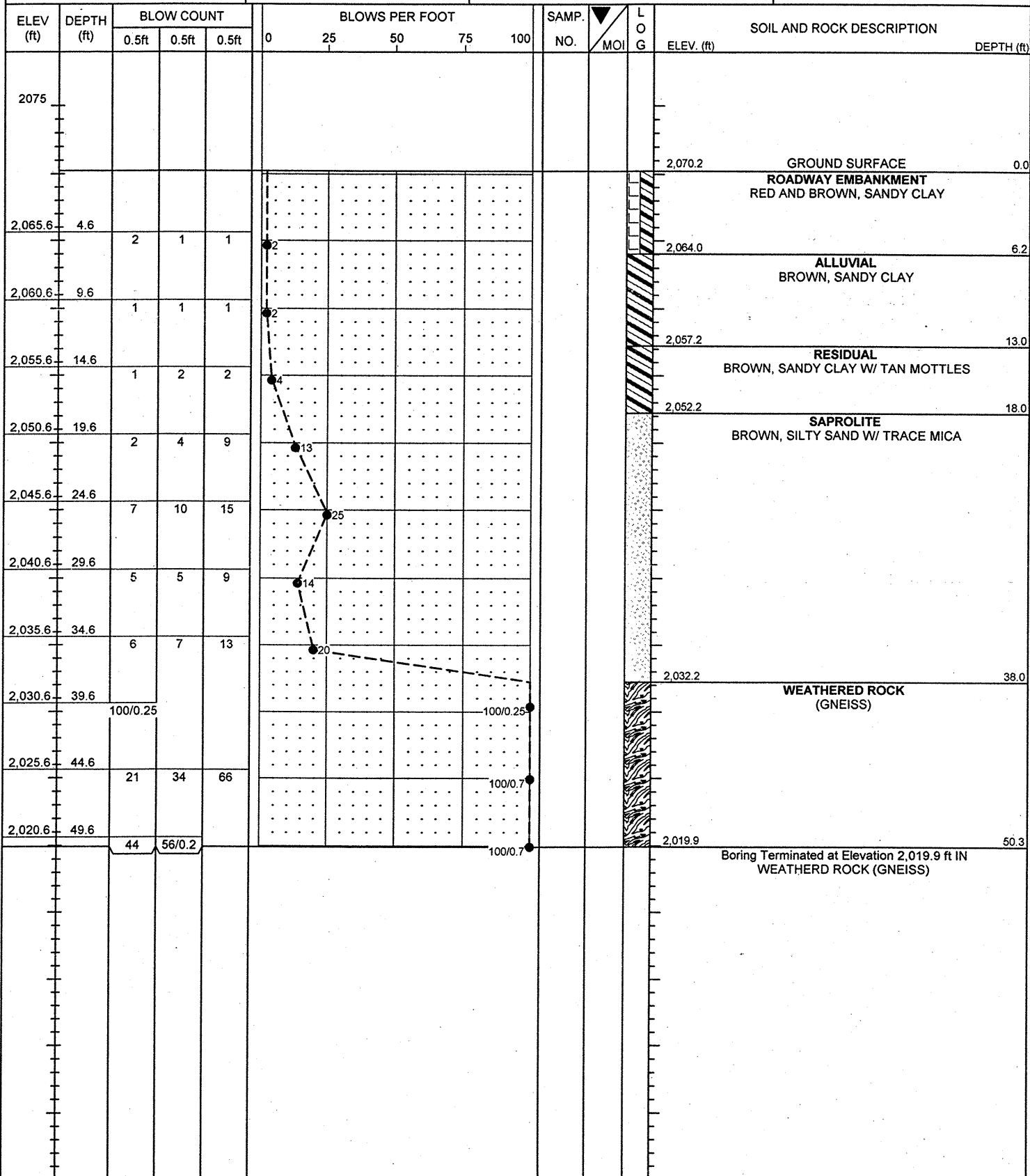
ELEV. (FEET)	DEPTH (FEET)	TIME FOR CORING (FEET)	RUN (FEET)	REC. FEET %	RQD. FEET %	SAMP. #	FIELD CLASSIFICATION AND REMARKS
2099.2	46.7			1.5	1.5		HARD AND FRESH LAYERED GNEISS TO MASSIVE GNEISS WITH 0.2 FEET OF MOD. WEATHERED AND MOD. HARD LAYERED GNEISS. FOLIATION 0° TO 20°.
			1.7	88	88		
2007.5	48.4			4.9	3.8		HARD AND FRESH LAYERED AND METAGREYWACKE GNEISS WITH 1.1 FEET OF MOD. WEATHERED AND MOD HARD LAYERED GNEISS. FOLIATION 10° TO 65°.
2007.5	48.4		5.0	98	76		
2002.5	53.4			5.0	5.0		VERY HARD AND FRESH METAGREYWACKE GNEISS WITH SOME LAYERED GNEISS. FOLIATION 10° TO 65°.
2002.5	53.4		5.0	100	100		
1997.5	58.4			5.0	5.0		VERY HARD AND FRESH METAGREYWACKE GNEISS. FOLIATION 10° TO 45°. PYRITE FLOWERS ON BREAKS.
1997.5	58.4		5.0	100	100		
1992.5	63.4						

CORING TERMINATED AT ELEVATION 1992.5 FT.

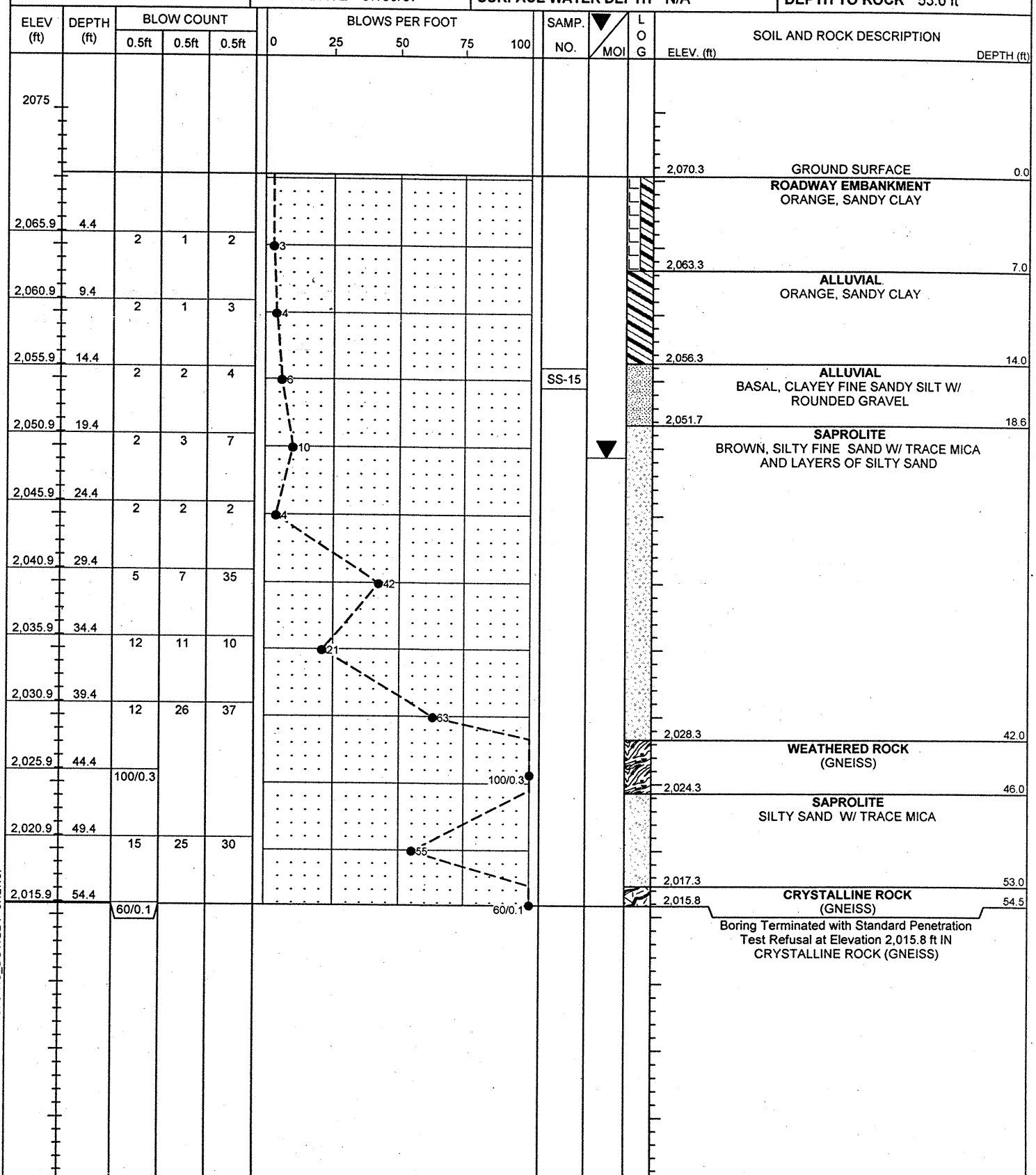
DRILLER: GK ROSE CORE SIZE: NWD-4 EQUIPMENT: CME-550

NCDOT BORE SINGLE B-4033.GPJ NC_DOT.GDT 07/25/07

PROJECT NO. 33400.1.1	ID. B-4033	COUNTY BUNCOMBE	GEOLOGIST Lockamy, P. Q.
SITE DESCRIPTION BRIDGE NO. 85 ON NC 112 OVER HOMINY CREEK			GROUND WTR (ft)
BORING NO. EB2-A	STATION 27+08	OFFSET 32ft LT	ALIGNMENT -L-
COLLAR ELEV. 2,070.2 ft	TOTAL DEPTH 50.3 ft	NORTHING 672,056	EASTING 912,480
DRILL MACHINE CME-550X	DRILL METHOD NW Casing w/ SPT	HAMMER TYPE Automatic	
START DATE 07/10/07	COMP. DATE 07/10/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A



PROJECT NO. 33400.1.1	ID. B-4033	COUNTY BUNCOMBE	GEOLOGIST Lockamy, P. Q.
SITE DESCRIPTION BRIDGE NO. 85 ON NC 112 OVER HOMINY CREEK			GROUND WTR (ft)
BORING NO. EB2-C	STATION 27+24	OFFSET CL	ALIGNMENT -L-
COLLAR ELEV. 2,070.3 ft	TOTAL DEPTH 54.5 ft	NORTHING 672,083	EASTING 912,503
DRILL MACHINE CME-550X	DRILL METHOD NW Casing w/ Advancer	HAMMER TYPE Automatic	
START DATE 07/09/07	COMP. DATE 07/09/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 53.0 ft



NCDOT BORE SINGLE B-4033.GPJ NC_DOT.GDT 07/25/07

NCDOT BORE SINGLE B-4033.GPJ NC_DOT.GDT 07/27/07



PROJECT NO. 33400.1.1		ID. B-4033		COUNTY BUNCOMBE		GEOLOGIST Lockamy, P. Q.								
SITE DESCRIPTION BRIDGE NO. 85 ON NC 112 OVER HOMINY CREEK							GROUND WTR (ft)							
BORING NO. EB2-B		STATION 27+31		OFFSET 39ft RT		ALIGNMENT -L-								
COLLAR ELEV. 2,067.4 ft		TOTAL DEPTH 58.3 ft		NORTHING 672,105		EASTING 912,536								
DRILL MACHINE CME-550X		DRILL METHOD NW Casing w/ SPT				HAMMER TYPE Automatic								
START DATE 07/02/07		COMP. DATE 07/02/07		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 58.3 ft								
ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
		0.5ft	0.5ft	0.5ft	0	25	50	75	100					ELEV. (ft)
2070													GROUND SURFACE	0.0
2,063.8	3.6	2	2	1									ARTIFICIAL FILL BROWN, SANDY SILT W/ ROUNDED QUARTZ GRAVEL	
2,058.8	8.6	2	3	4									ALLUVIAL REDDISH, BROWN, SANDY CLAY W/ YELLOW MOTTLES AND ROUNDED QUARTZ GRAVEL	6.0
2,053.8	13.6	2	3	3									SAPROLITE BROWN, SILTY SAND W/ TRACE MICA	12.0
2,048.8	18.6	6	7	14										
2,043.8	23.6	7	7	7										
2,038.8	28.6	12	11	14										
2,033.8	33.6	12	88/0.45										WEATHERED ROCK (GNEISS)	33.6
2,028.8	38.6	13	20	13									SAPROLITE BROWN, SILTY SAND W/ TRACE MICA AND LAYERS OF WEATHERED ROCK	34.6
2,023.8	43.6	30	54	44										
2,018.8	48.6	3	11	11										
2,013.8	53.6	24	26	72										
2,009.1	58.3												CRYSTALLINE ROCK (GNEISS)	58.3
		60/0.0											Boring Terminated with Standard Penetration Test Refusal at Elevation 2,009.1 ft ON CRYSTALLINE ROCK (GNEISS)	

NCDOT BORE SINGLE B-4033.GPJ NC_DOT_GDT_07/27/07

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

M&T 503E

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 DIVISION OF HIGHWAYS-MATERIALS AND TESTS UNIT
 SOILS TEST REPORT-SOILS LABORATORY

T.I.P. ID #: --

REPORT ON SAMPLES OF: Soils for Quality

PROJECT:	33400.1.1	COUNTY:	Buncombe	Owner:	NCDOT
DATE SAMPLED:	6.22.07	DATE RECEIVED:	6.26.07	DATE REPORTED:	6.28.07
SAMPLED FROM:	B1-A	SAMPLED BY:	P. Q. Lockamy		
SUBMITTED BY:	W. D. Frye	2002	STANDARD SPECIFICATION		
LABORATORY:	Asheville				

TEST RESULTS

Project Sample No.	SS-1	SS-2	SS-3	SS-4	SS-5	SS-6	SS-7	SS-8
Lab Sample No. A	155508	155509	155510	155511	155512	155513	155514	155515
HiCAMS Sample #	--	--	--	--	--	--	--	--
Retained #4 Sieve %	0.0	40.5	0.0	0.0	0.0	0.0	0.0	0.0
Passing #10 Sieve %	83	32	100	100	100	96	98	100
Passing #40 Sieve %	76	27	99	99	99	72	87	97
Passing #200 Sieve %	39	9	72	63	67	32	59	42

MINUS #10 FRACTION

Soil Mortar - 100%								
Coarse Sand -Ret. #60	18	42	3	6	3	37	18	20
Fine Sand - Ret. #270	41	36	49	47	50	36	36	50
Silt 0.05-0.005 mm %	29	14	42	43	41	15	38	28
Clay < 0.005 mm %	12	8	6	4	6	12	8	2
Passing # 40 Sieve %	--	--	--	--	--	--	--	--
Passing # 200 Sieve %	--	--	--	--	--	--	--	--

Liquid Limit	31	24	36	36	35	32	31	27
Plastic Index	NP	NP	NP	NP	NP	NP	NP	NP
AASHTO Classification	A-4 (1)	A-1-a (0)	A-4 (7)	A-4 (5)	A-4 (6)	A-2-4 (0)	A-4 (5)	A-4 (1)
Quantity								
Texture								
Station	26+03	26+03	26+03	26+03	26+03	26+03	26+03	26+03
Hole No.								
Depth (ft) From:	3.8	11.6	13.8	18.8	23.8	28.8	33.8	43.8
To:	4.8	12.6	14.8	19.8	24.8	29.8	34.8	44.8

Remarks:
 A-155508 - 155515

CC:
 P. Q. Lockamy
 File

SOILS ENGINEER:

T.I.P. ID #: B-4033

REPORT ON SAMPLES OF: Soils for Quality

PROJECT:	33400.1.1	COUNTY:	Buncombe	Owner:	NCDOT
DATE SAMPLED:	7.3.07	DATE RECEIVED:	7.9.07	DATE REPORTED:	7.13.07
SAMPLED FROM:	EB1-B	SAMPLED BY:	P. Q. Lockamy		
SUBMITTED BY:	W. D. Frye	2002	STANDARD SPECIFICATION		
LABORATORY:	Asheville				

TEST RESULTS

Project Sample No.	SS-9	SS-10	SS-11	SS-12	SS-13	SS-14	SS-15
Lab Sample No. A	155601	155602	155603	155604	155605	155606	155620
HiCAMS Sample #	--	--	--	--	--	--	--
Retained #4 Sieve %	0.0	0.0	33.0	0.0	0.0	0.0	0.0
Passing #10 Sieve %	98	100	48	98	93	100	96
Passing #40 Sieve %	90	100	36	64	70	91	89
Passing #200 Sieve %	51	46	12	24	28	21	56

MINUS #10 FRACTION

Soil Mortar - 100%								
Coarse Sand -Ret. #60	20	6	42	52	39	26	15	
Fine Sand - Ret. #270	32	58	40	28	41	61	31	
Silt 0.05-0.005 mm %	20	20	12	16	16	9	16	
Clay < 0.005 mm %	28	16	6	4	4	4	38	
Passing # 40 Sieve %	--	--	--	--	--	--	--	
Passing # 200 Sieve %	--	--	--	--	--	--	--	

Liquid Limit	36	29	23	25	32	23	37
Plastic Index	NP	NP	NP	NP	NP	NP	9
AASHTO Classification	A-4 (3)	A-4 (2)	A-1-b (0)	A-2-4 (0)	A-2-4 (0)	A-2-4 (0)	A-4 (4)
Quantity							
Texture							
Station	25+89	25+89	25+89	25+89	25+89	25+89	27+24
Hole No.							
Depth (ft) From:	5.2	10.3	15.3	20.3	30.3	45.3	14.9
To:	6.2	11.3	16.3	21.3	31.3	46.3	15.9

Remarks:
 A-155601 - 155606 & 155620

CC:
 P. Q. Lockamy
 File

SOILS ENGINEER:



**FIELD
SCOUR REPORT**

WBS: 33400.1.1 TIP: B-4033 COUNTY: Buncombe

DESCRIPTION(1): Bridge no. 85 on NC-112 over Hominy Creek

EXISTING BRIDGE

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

Bridge No.: 85 Length: 112 Total Bents: 4 Bents in Channel: 2 Bents in Floodplain: 2
Foundation Type: not visible

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: None

Interior Bents: Scour hole upstream end north interior bent, smaller scour hole upstera south interior bent.

Channel Bed: Scour around concrete supports for sewer unstream. Mostly silted over creek bed.

Channel Bank: Both banks are nearly vertical up and downstream.
Bank retreat at upstream end of northerd interior bent.

EXISTING SCOUR PROTECTION

Type(3): Concrete abutment and wings. Boulders in scour hole upstream of north interior bent.

Extent(4): Walls from road level down into ground below bridge. Other boulders at buried pipes.

Effectiveness(5): Very Good

Obstructions(6): Concrete footings and piers for serer line supports upstream of bridge.

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): SS-2 alluvial sand

Channel Bank Material(8): SS-1 Alluvial fine sandy silt with clay. This unit has considerable cohesion, especially the upper 5 feet.

Channel Bank Cover(9): Poisen ivy, blackberry, rose, weeds, grasses, vines and some small trees.

Floodplain Width(10): 250 feet upstream to over 1000 feet downstream

Floodplain Cover(11): Grasses and blackberry.

Stream is(12): Aggrading XX Degrading _____ Static _____

Channel Migration Tendency(13): To the north

Observations and Other Comments: Mature gravel is predominantly orange stained rounded quartz.
Concrete burial vault from flood debris under northern end off bridge.

DESIGN SCOUR ELEVATIONS(14)

Feet XX Meters _____

GEU DSE ELEV.	BENTS													
	B1	B2												
	2042	2041												

Comparison of DSE to Hydraulics Unit theoretical scour:
They are similar with the GEU's DSE slightly lower.
The Geotechnical Engineering unit agrees with the Hydraulics Unit theoretical scour.

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

Bed or Bank	BANK	BED								
Sample No.	SS-1	SS-2								
Retained #4	0	40.5								
Passed #10	8.3	32								
Passed #40	76	27								
Passed #200	39	9								
Coarse Sand	18	42								
Fine Sand	41	36								
Silt	29	14								
Clay	12	8								
LL	31	24								
PI	NP	NP								
AASHTO	A-4(1)	A-1-a(0)								
Station	26+03	26+03								
Offset	56 LT	56 LT								
Depth	3.8-4.8	11.6-12.6								

Template Revised 02/07/06

Reported by: P. Q. Lockamy Date: 6/22/2007
PQ LOCKAMY

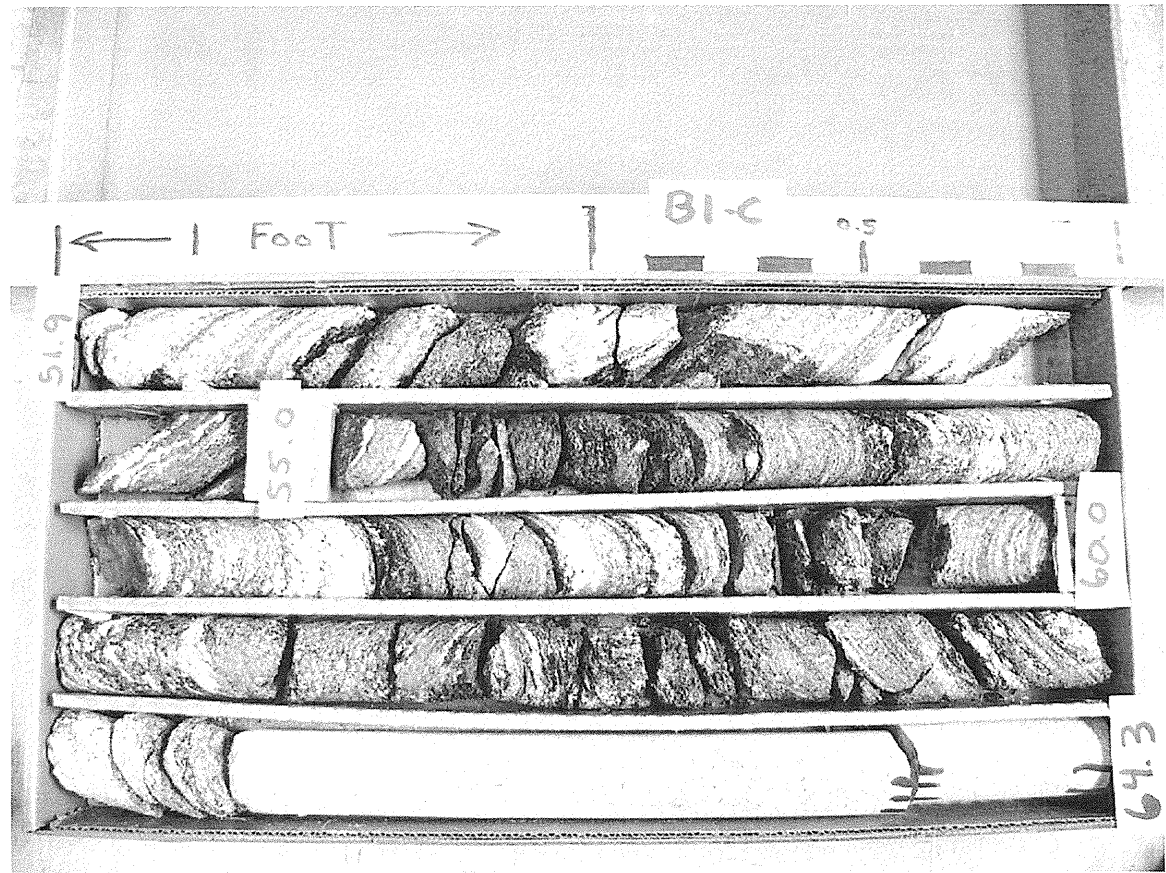
33400.1.1 Buncombe Co. Br. 85 on NC 112 (Sand Hill Rd.) over Hominy Creek



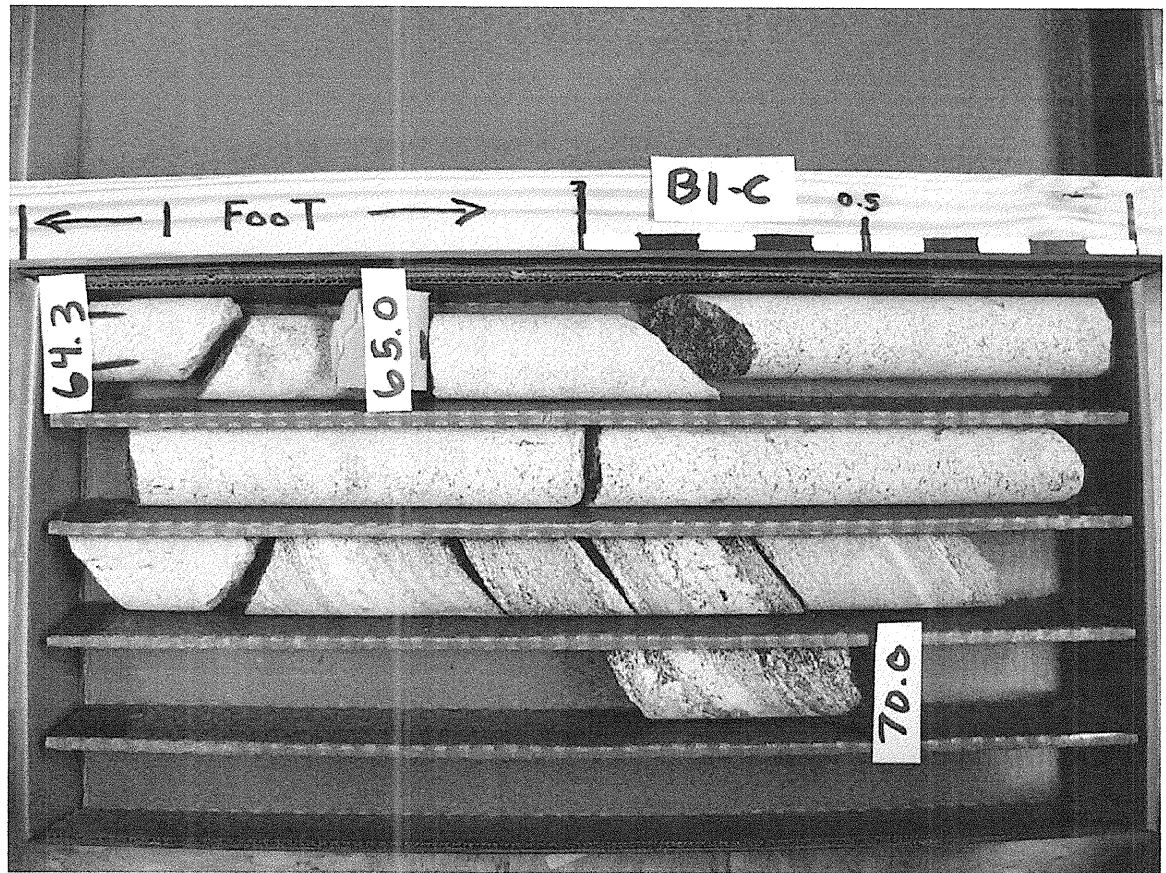
33400.1.1 Buncombe Co. Br. 85 on NC 112 (Sand Hill Rd.) over Hominy Creek



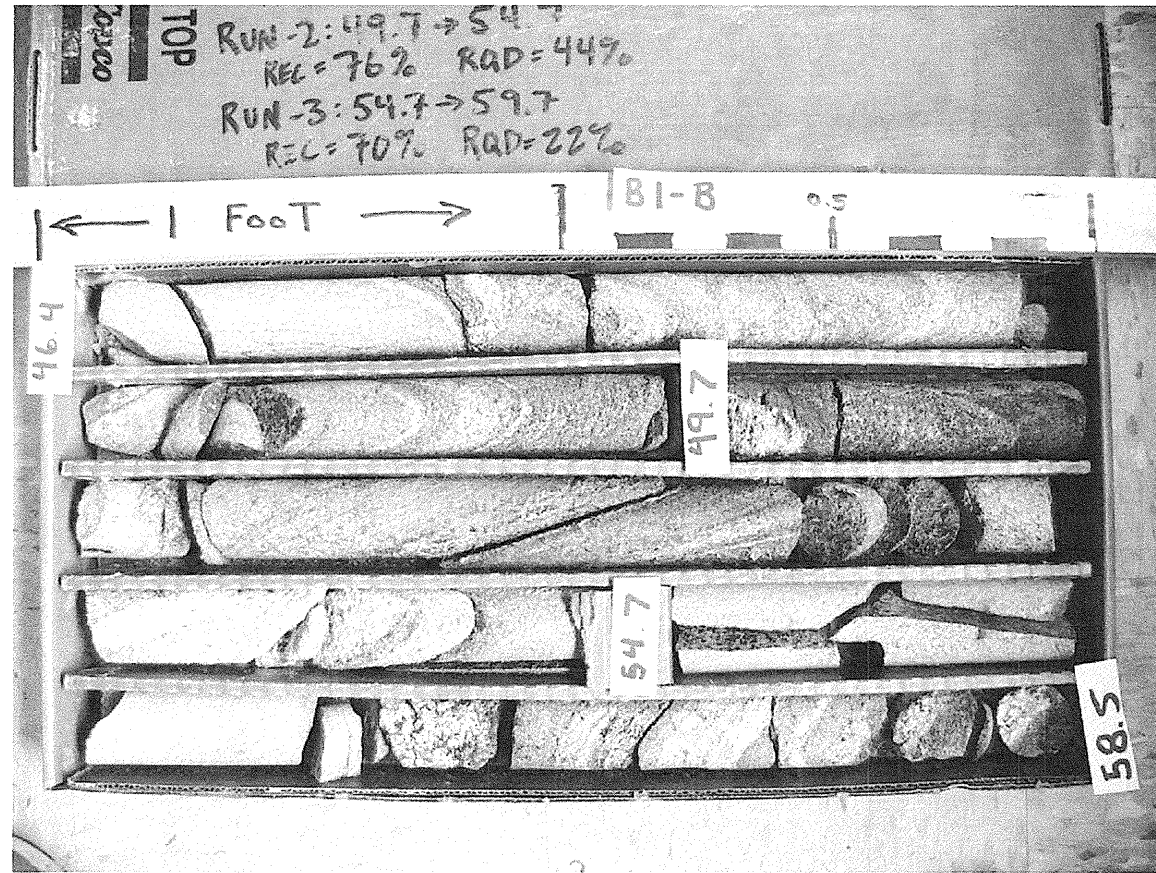
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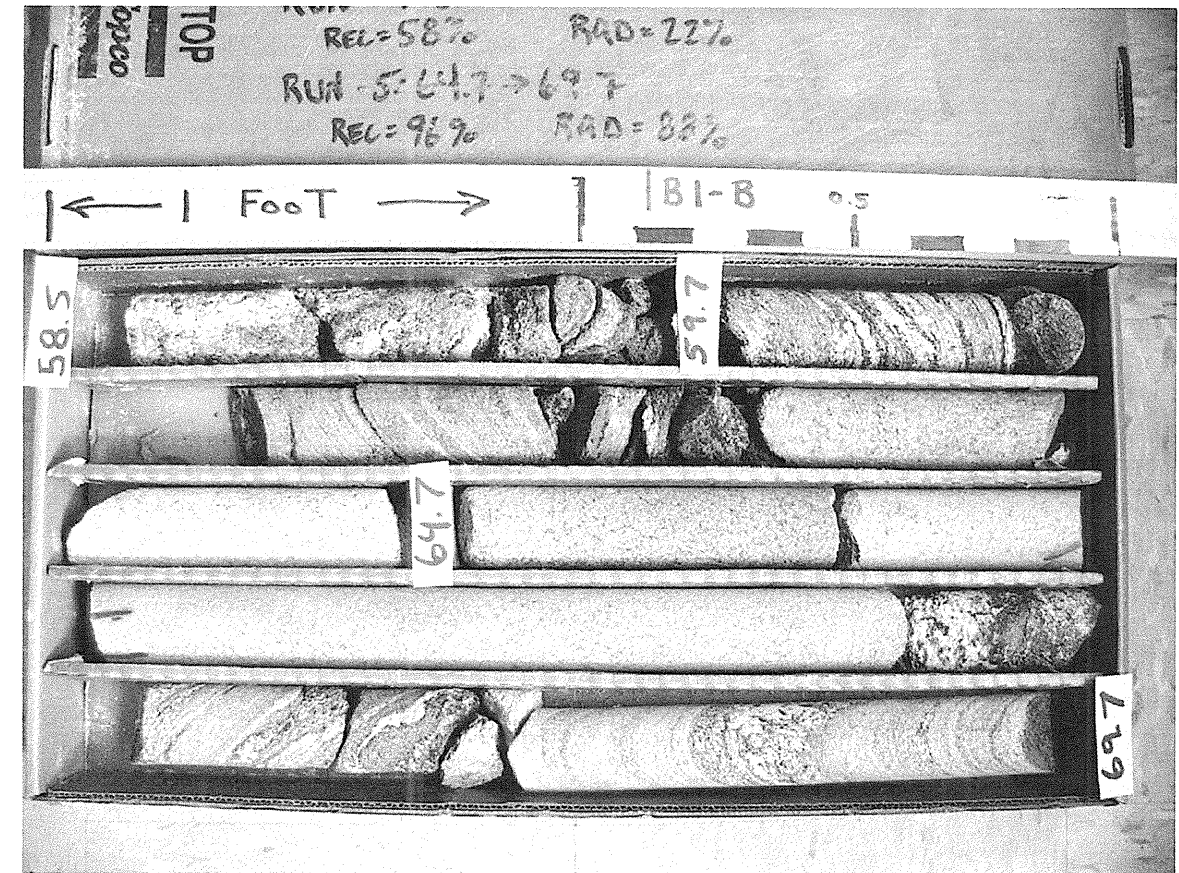
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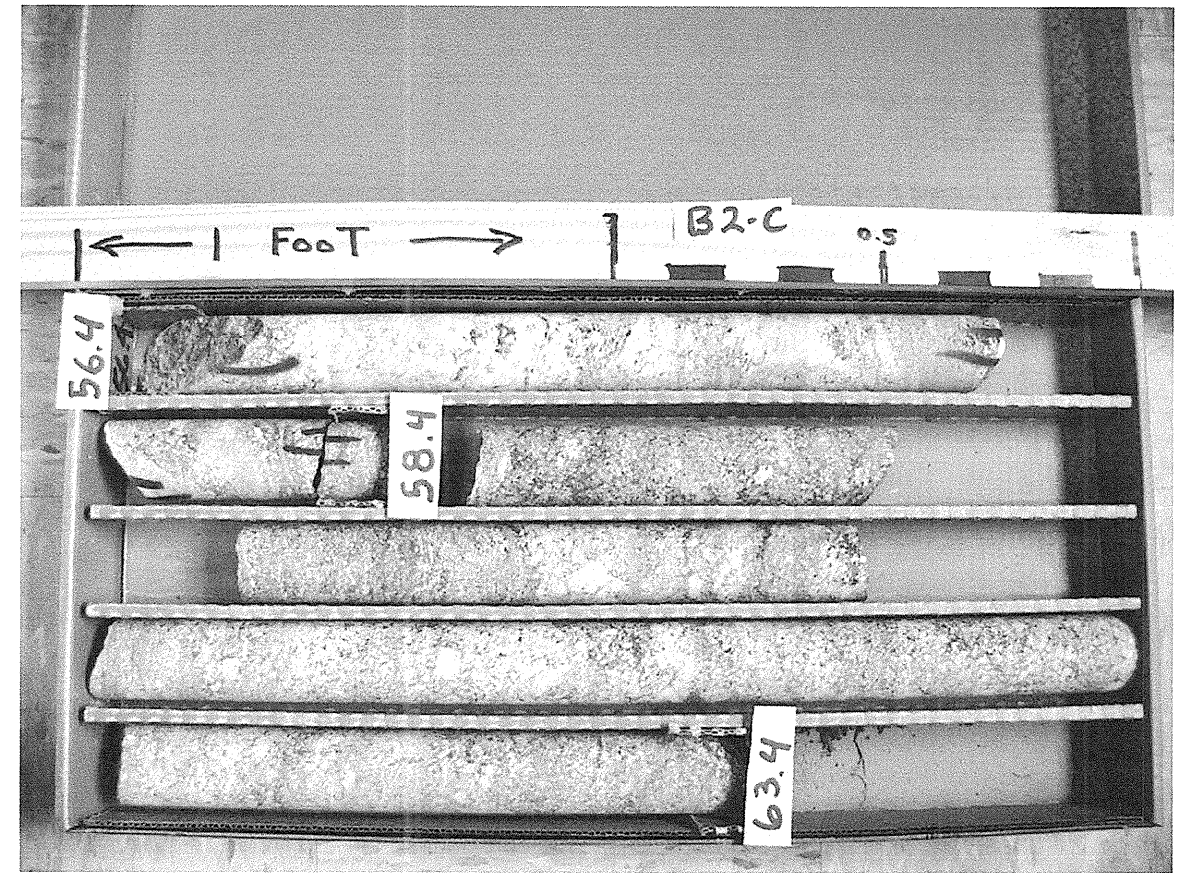
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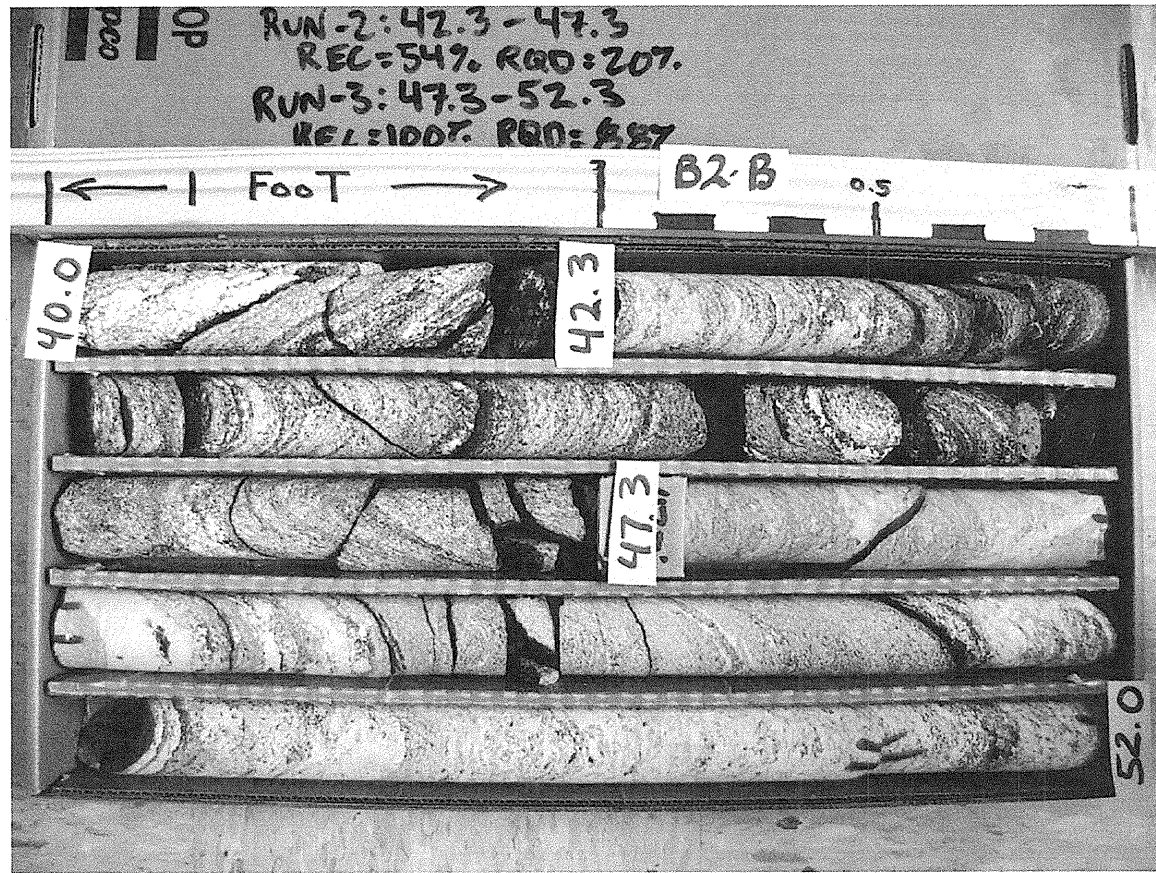
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