

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

STRUCTURE
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 33830.1.1 F.A. PROJ. BRZ-1001 (28)
 COUNTY WILKES
 PROJECT DESCRIPTION BRIDGE NO. 34 ON SR 1001 (BRUSHY MOUNTAIN ROAD) OVER ROCKY CREEK
 SITE DESCRIPTION _____

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CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1919 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

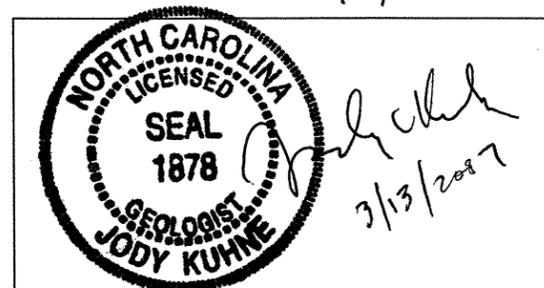
GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND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

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

PROJECT: 33830.1.1 ID: B-4675

PERSONNEL
M. M. HAGER
D. O. CHEEK
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INVESTIGATED BY J. C. KUHNE
 CHECKED BY W. D. FRYE
 SUBMITTED BY W. D. FRYE
 DATE 3/13/2007



DRAWN BY: J. T. WILLIAMS

NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IS IT 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 (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, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, MOD. 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. 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 60 BLOWS PER FOOT 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 60 BLOWS PER FOOT. 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 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 - 5% 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 PIECES 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	ABBREVIATIONS	EQUIPMENT USED ON SUBJECT PROJECT	
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)	AR - AUGER REFUSAL HI. - HIGHLY BT - BORING TERMINATED MED. - MEDIUM CL - CLAY MIC. - MICACEOUS CPT - CONE PENETRATION TEST MOD. - MODERATELY CSE. - COARSE NP - NON PLASTIC DMT - DILATOMETER TEST ORG. - ORGANIC DPT - DYNAMIC PENETRATION TEST PMT - PRESSUREMETER TEST e - VOID RATIO SAP. - SAPROLITIC F - FINE SD. - SAND, SANDY FOSS. - FOSSILIFEROUS SL. - SILT, SILTY FRAC. - FRACTURED, FRACTURES SLI. - SLIGHTLY FRAGS. - FRAGMENTS TCR - TRICONE REFUSAL	DRILL UNITS: MOBILE B- BK-51 CME-45C CME-550 PORTABLE HOIST ADVANCING TOOLS: CLAY BITS 6" CONTINUOUS FLIGHT AUGER 6" HOLLOW AUGERS HARD FACED FINGER BITS TUNG-CARBIDE INSERTS CASING w/ ADVANCER TRICONE *STEEL TEETH TRICONE *TUNG-CARB. CORE BIT HAMMER TYPE: AUTOMATIC MANUAL CORE SIZE: B N H HAND TOOLS: POST HOLE DIGGER HAND AUGER SOUNDING ROD VANE SHEAR TEST	
SOIL MOISTURE - CORRELATION OF TERMS	FRACATURE 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 SHRINKAGE LIMIT - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE SL - - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	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	
PLASTICITY	INDURATION	NOTES:	
NONPLASTIC PLASTICITY INDEX (PI) DRY STRENGTH VERY LOW 0-5 SLIGHT 6-15 MEDIUM 16-25 HIGH 26 OR MORE	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.	BENCH MARK: -BL-5, 31' LT OF -L- STA 12+49.73, BL STA, 11+51.11 ELEVATION: 1210.86 FT.	
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

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Lyndo Tippett
SECRETARY

17 October, 2006

STATE PROJECT: 33830.1.1, B-4675
COUNTY: Wilkes
DESCRIPTION: Bridge No. 34 on SR 1001 over Rocky Creek
SUBJECT: Geotechnical Report – Foundation Investigation

Introduction

This is a 92 feet long single span replacement and realignment of the existing structure. According to the Hydraulics Report the skew is 105°. The investigation borings were advanced using a CME 550 ATV rig using NW casing and advancer. Standard Penetration Tests (SPT) were performed at intervals of 5.0 feet using an automatic drop hammer. Soil samples were submitted for testing of quality.

Foundation Materials

End Bent One

EB-1 will be constructed on level flood plain with minor fill from the existing roadway. Alluvium exists in corner borings EB-1A and B to elevation 1197.0. The alluvium is medium dense sand with gravels. The alluvium lies over med. dense silty sand saprolite to approximate elevation 1170.0' and becomes very dense, grading into weathered rock at elevation 1155 – 1158. EB1-A terminated at elevation 1155.67 in weathered rock. EB1-B terminated in rock by SPT refusal at elevation 1147.38.

End Bent Two

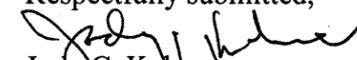
EB-2 will be constructed on existing embankment on the left side and changes to colluvial material and fill on the right. Saprolite exists at elevations 1194 – 1198 and quickly grades from loose to dense. Weathering profile is fairly short with earth materials reaching bearing strength at elevation 1161 in EB2-A and 1163 in EB-2B.

Groundwater

Water levels in EB-1 were noted in boring EB1-A at elevation 1198. EB1-B was filled in after drilling, however, water levels should be consistent across the bent in the alluvial material.

Water levels at EB-2 were consistent across the bent from elevation 1198 – 1196.

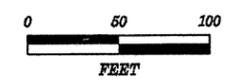
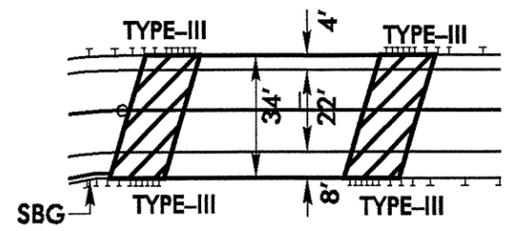
Respectfully submitted,


Jody C. Kuhse

8/17/99
 REVISIONS
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PROJECT REFERENCE NO. B-4675	SHEET NO. 4 OF 10
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

SKETCH SHOWING BRIDGE / PAVEMENT RELATIONSHIP



SKEW = 105 DEGREES

*** DESIGN EXCEPTION REQUIRED TO REDUCE DESIGN SPEED FROM 80 MPH TO LESS THAN 15 MPH**



BEGIN PROJECT B-4675
 -L- PCSta. 10+50.00
 -L- POTSta. 10+00.00

-BL-4 7+17.74 PINC

-BL-3 5+00.00 POT

N 86° 46' 03.8" E

N 46° 59' 58.9" E

BEGIN BRIDGE
 -L- POTSta. 12+47.90

-L- PTSta. 12+40.56

BEGIN APPROACH
 -L- POTSta. 12+33.90

-BL- 5 11+51.11 PINC =
 -L- STA 12+53.21 30.99' LT

-L- PCSta. 11+21.80

EB1-A
 12+52 10' LT

EB2-A
 13+38 27' LT

EB1-B
 12+40 19' RT

EB2-B
 13+43 11' RT

-L- PCSta. 14+25.90

END APPROACH SLAB
 -L- POTSta. 13+54.90

END BRIDGE
 -L- POTSta. 13+40.90

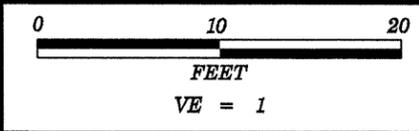
END PROJECT B-4675
 -L- PTSta. 15+52.96

-BL- 6 16+48.12 POT

NOTES:
 1) SEE SHEET 5 FOR -L- PROFILE
 2) ALL DRIVEWAY RADII ARE 10' UNLESS OTHERWISE SHOWN

B-4675, 33830.1.1

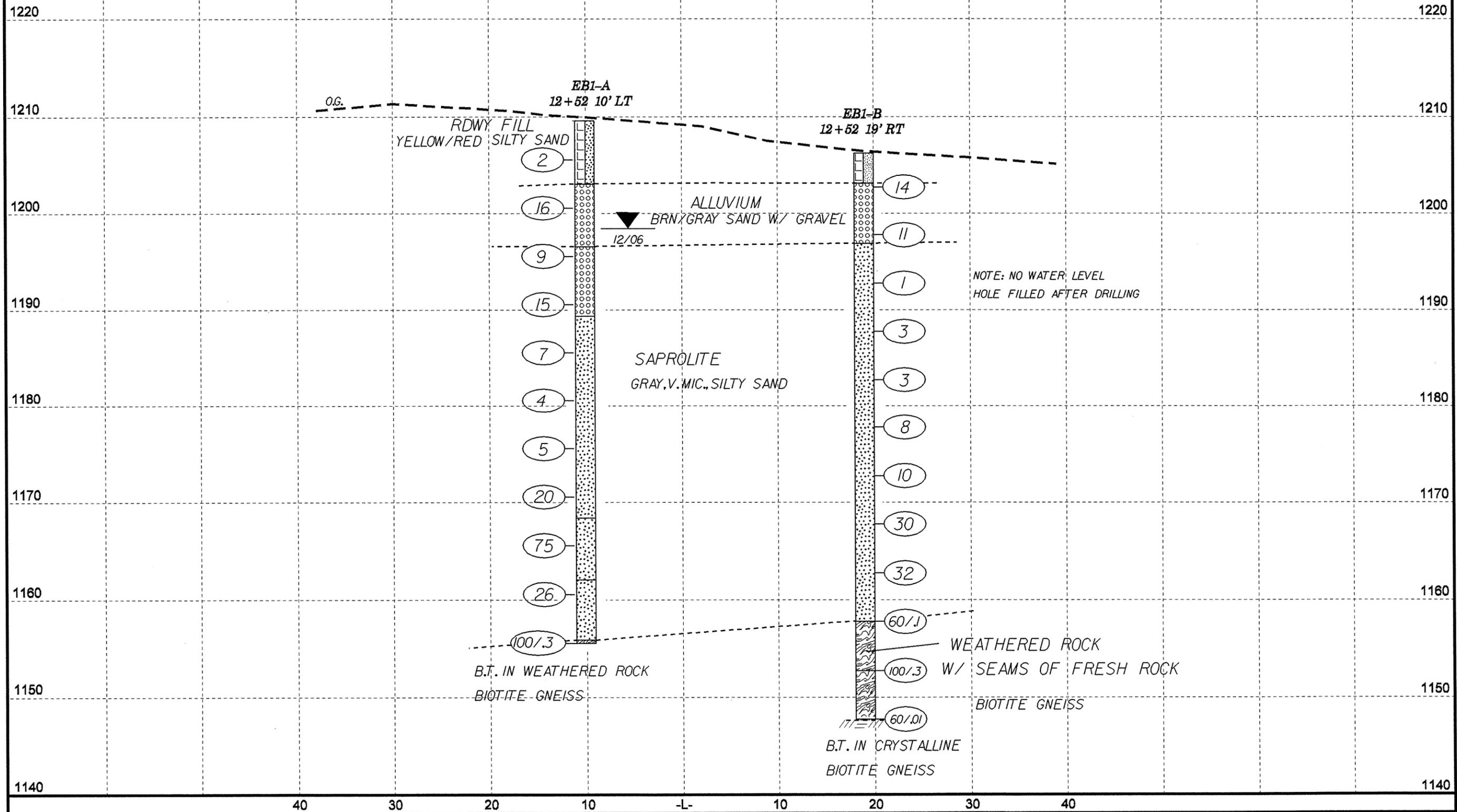
BRIDGE NO. 34 ON SR 1001 OVER ROCKY CREEK



PROJECT REFERENCE NO.	SHEET
B-4675	5 OF 10

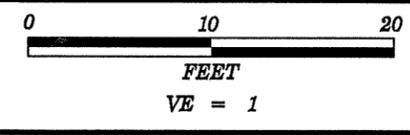
SKEW = 105°

SECTION THROUGH EB-1



B-4675, 33830.1.1

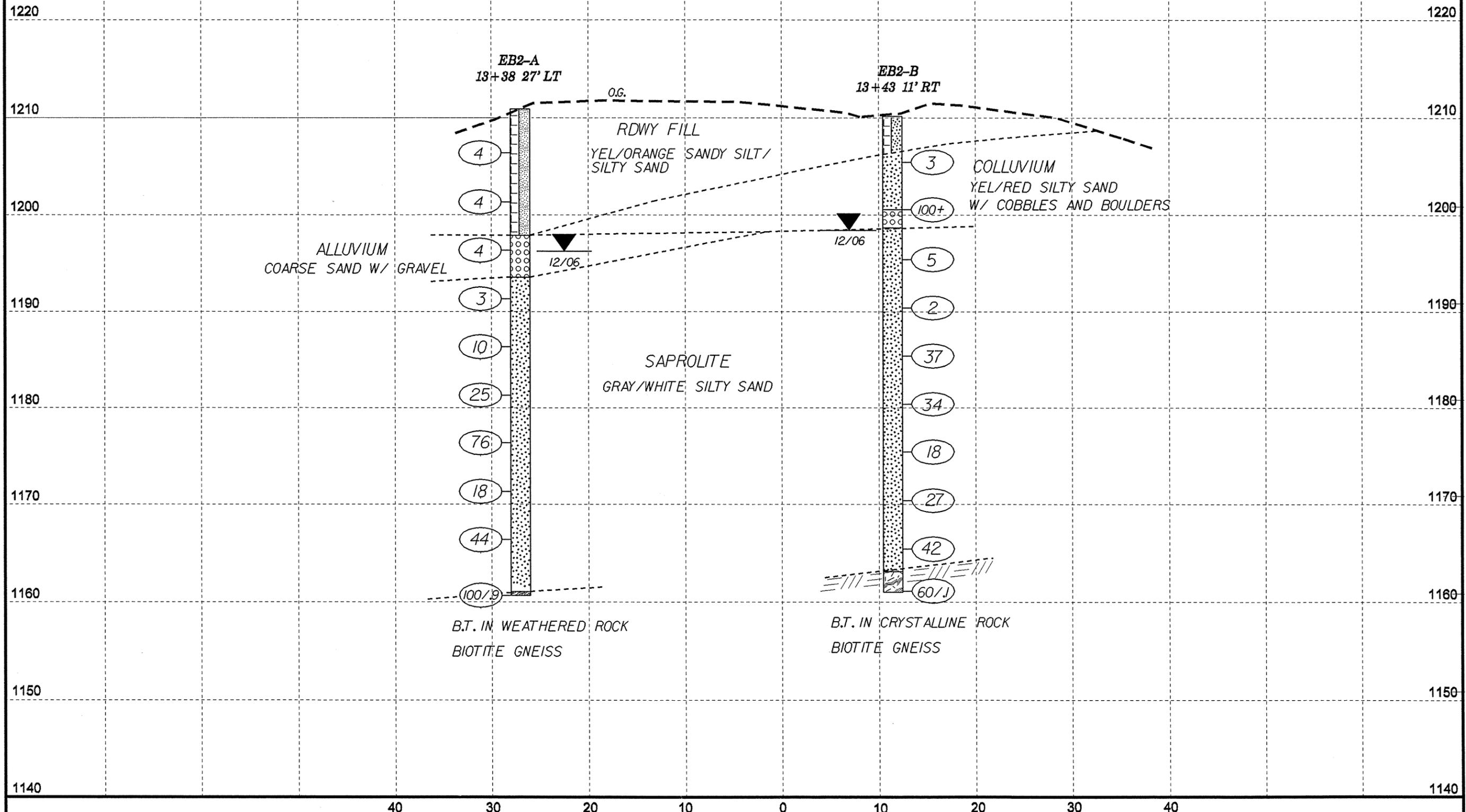
BRIDGE NO. 34 ON SR 1001
OVER ROCKY CREEK

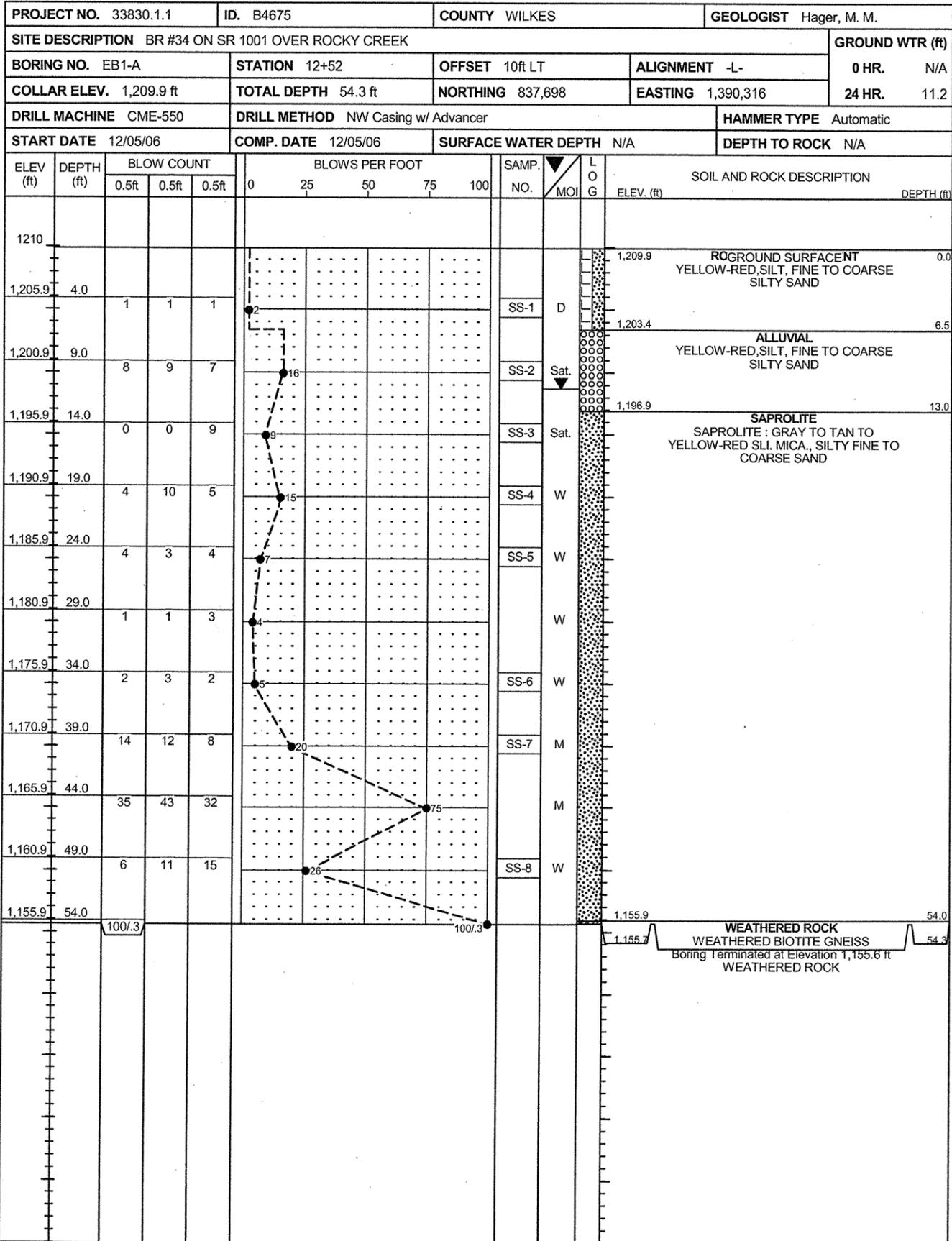


PROJECT REFERENCE NO.	SHEET
B-4675	6 OF 10

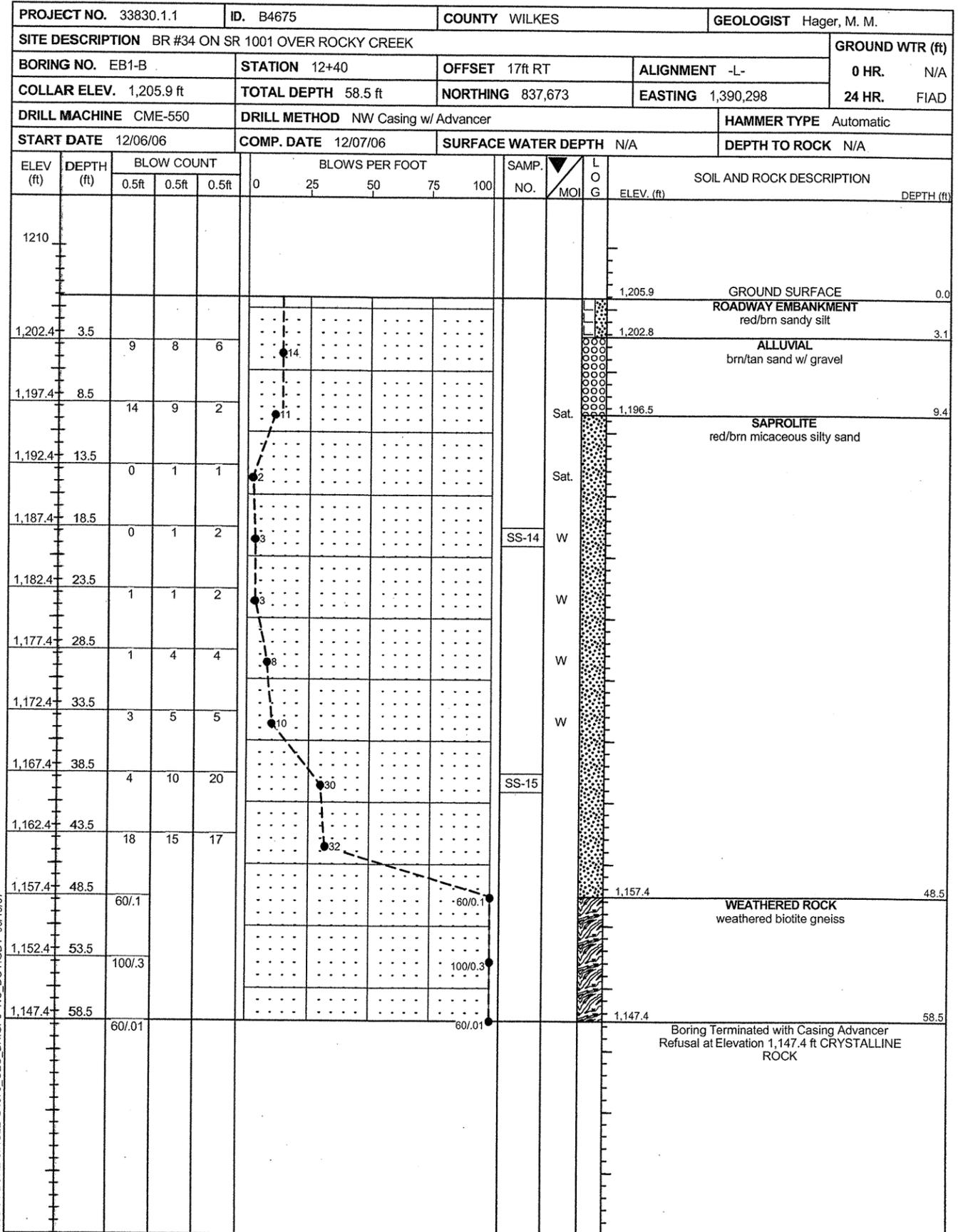
SKIEW = 105°

SECTION THROUGH EB-2





NCDOT BORE SINGLE B4675_GEO_BH.GPJ NC_DOT.GDT 06/19/07



NCDOT BORE SINGLE B4675_GEO_BH.GPJ NC_DOT.GDT 06/19/07

PROJECT NO. 33830.1.1		ID. B4675		COUNTY WILKES		GEOLOGIST Hager, M. M.									
SITE DESCRIPTION BR #34 ON SR 1001 OVER ROCKY CREEK							GROUND WTR (ft)								
BORING NO. EB2-A		STATION 13+38		OFFSET 24ft LT		ALIGNMENT -L-									
COLLAR ELEV. 1,211.3 ft		TOTAL DEPTH 50.2 ft		NORTHING 837,694		EASTING 1,390,403									
DRILL MACHINE CME-550		DRILL METHOD NW Casing w/ Advancer			HAMMER TYPE Automatic										
START DATE 12/05/06		COMP. DATE 12/06/06		SURFACE WATER DEPTH N/A		DEPTH TO ROCK N/A									
ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	L O G ELEV. (ft)	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
		0.5ft	0.5ft	0.5ft	0	25	50	75	100						
1215													1,211.3	GROUND SURFACE	0.0
1,207.5	3.8	2	2	2							SS-16	M		ROADWAY EMBANKMENT YELLOW/RED SANDY SILT	
1,202.5	8.8	2	2	2							SS-9	M			
1,197.5	13.8	4	1	3							Sat.		1,198.3	ALLUVIAL COARSE SAND W/ GRAVEL	13.0
1,192.5	18.8	1	1	2							Sat.		1,194.0	SAPROLITE WHITE/GRAY/BRN SILTY SAND W/ WEATHERED ROCK SEAMS	17.3
1,187.5	23.8	4	5	5							SS-10	W			
1,182.5	28.8	6	8	17								M			
1,177.5	33.8	12	14	62								M			
1,172.5	38.8	5	8	10							SS-11	W			
1,167.5	43.8	8	21	23								M			
1,162.5	48.8	12	14	86/4											
													1,161.5	WEATHERED ROCK WEATHERED BIOTITE GNEISS	49.8
													1,161.1	Boring Terminated with Casing Advancer Refusal at Elevation 1,161.1 ft WEATHERED ROCK	50.2

NCDOT BORE SINGLE B4675_GEO_BH.GPJ_NC_DOT.GDT_06/19/07

PROJECT NO. 33830.1.1		ID. B4675		COUNTY WILKES		GEOLOGIST Hager, M. M.									
SITE DESCRIPTION BR #34 ON SR 1001 OVER ROCKY CREEK							GROUND WTR (ft)								
BORING NO. EB2-B		STATION 13+43		OFFSET 11ft RT		ALIGNMENT -L-									
COLLAR ELEV. 1,210.1 ft		TOTAL DEPTH 49.1 ft		NORTHING 837,659		EASTING 1,390,401									
DRILL MACHINE CME-550		DRILL METHOD NW Casing w/ Advancer			HAMMER TYPE Automatic										
START DATE 12/06/06		COMP. DATE 12/06/06		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 47.0 ft									
ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	L O G ELEV. (ft)	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
		0.5ft	0.5ft	0.5ft	0	25	50	75	100						
1215													1,210.1	GROUND SURFACE	0.0
1,206.1	4.0	2	1	2									1,206.4	ROADWAY EMBANKMENT YELLOW/RED SILTY SAND	3.7
1,201.1	9.0	8	92/4										1,200.5	COLLUVIUM SILTY SAND W/ COBBLES AND BOULDERS	9.6
1,196.1	14.0	2	2	3									1,198.6	COLLUVIUM COBBLES AND BOULDERS	11.5
1,191.1	19.0	1	1	1										SAPROLITE GRAY/TAN SILTY SAND W/ WEATHERED ROCK SEAMS	
1,186.1	24.0	10	18	19											
1,181.1	29.0	8	14	20											
1,176.1	34.0	6	8	10											
1,171.1	39.0	9	10	17											
1,166.1	44.0	5	9	33											
1,161.1	49.0														
													1,163.1	CRYSTALLINE ROCK BIOTITE GNEISS	47.0
													1,161.0	Boring Terminated with Casing Advancer Refusal at Elevation 1,161.0 ft CRYSTALLINE ROCK	49.1

NCDOT BORE SINGLE B4675_GEO_BH.GPJ_NC_DOT.GDT_06/19/07

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

T.I.P. ID #: B-4675

REPORT ON SAMPLES OF: Soils for Quality

PROJECT:	33830.1.1	COUNTY:	Wilkes	Owner:	NCDOT
DATE SAMPLED:	12.5.06	DATE RECEIVED:	12.11.06	DATE REPORTED:	12.20.06
SAMPLED FROM:	Bridge	SAMPLED BY:	J. C. Kuhne		
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	154242	154243	154244	154245	154246	154247	154248	154249
HiCAMS Sample #	--	--	--	--	--	--	--	--
Retained #4 Sieve %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Passing #10 Sieve %	100	61	95	81	100	96	98	100
Passing #40 Sieve %	87	43	79	50	90	85	86	86
Passing #200 Sieve %	16	8	13	13	14	20	17	14

MINUS #10 FRACTION

Soil Mortar - 100%								
Coarse Sand -Ret. #60	37	55	36	55	36	29	37	38
Fine Sand - Ret. #270	49	36	55	33	56	58	53	53
Silt 0.05-0.005 mm %	8	9	7	12	8	9	8	7
Clay < 0.005 mm %	6	0.0	2	0.0	0.0	4	2	2
Passing # 40 Sieve %	--	--	--	--	--	--	--	--
Passing # 200 Sieve %	--	--	--	--	--	--	--	--

Liquid Limit	22	22	31	34	27	30	28	33
Plastic Index	NP							
AASHTO Classification	A-2-4 (0)	A-1-b (0)	A-2-4 (0)	A-1-b (0)	A-2-4 (0)	A-2-4 (0)	A-2-4 (0)	A-2-4 (0)
Quantity								
Texture								
Station	12+52	12+52	12+52	12+52	12+52	12+52	12+52	12+52
Hole No.								
Depth (ft) From:	4.5	9.5	14.5	19.5	24.5	34.5	39.5	49.5
To:	5.5	10.5	15.2	20.2	25.5	35.5	40.5	50.5

Remarks:

A-154242 - 154249

CC:

J. C. Kuhne

File

SOILS ENGINEER:

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

T.I.P. ID #: B-4675

REPORT ON SAMPLES OF: Soils for Quality

PROJECT:	33830.1.1 (cont.)	COUNTY:	Wilkes	Owner:	NCDOT
DATE SAMPLED:	12.5.06	DATE RECEIVED:	12.11.06	DATE REPORTED:	12.20.06
SAMPLED FROM:	Bridge	SAMPLED BY:	J. C. Kuhne		
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	SS-16
Lab Sample No. A	154250	154251	154252	154253	154254	154255	154256	154257
HiCAMS Sample #	--	--	--	--	--	--	--	--
Retained #4 Sieve %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Passing #10 Sieve %	99	99	99	100	62	100	100	94
Passing #40 Sieve %	94	82	93	78	54	92	87	83
Passing #200 Sieve %	34	21	17	22	11	22	30	44

MINUS #10 FRACTION

Soil Mortar - 100%								
Coarse Sand -Ret. #60	17	38	23	41	36	24	21	23
Fine Sand - Ret. #270	54	47	67	45	51	61	59	34
Silt 0.05-0.005 mm %	11	13	10	6	3	7	14	19
Clay < 0.005 mm %	18	2	0.0	8	10	8	6	24
Passing # 40 Sieve %	--	--	--	--	--	--	--	--
Passing # 200 Sieve %	--	--	--	--	--	--	--	--

Liquid Limit	24	34	29	33	29	31	38	30
Plastic Index	NP	NP						
AASHTO Classification	A-2-4 (0)	A-4 (2)						
Quantity								
Texture								
Station	13+38	13+38	13+38	13+43	13+43	12+40	12+40	13+38
Hole No.								
Depth (ft) From:	9.3	24.3	39.3	14.5	29.5	19.0	39.0	4.3
To:	10.3	25.3	40.3	15.5	30.5	20.0	40.0	5.3

Remarks:

A-154250 - 154257

CC:

J. C. Kuhne

File

SOILS ENGINEER:



**FIELD
SCOUR REPORT**

WBS: 33830.1.1 TIP: B-4675 COUNTY: WILKES

DESCRIPTION(1):

EXISTING BRIDGE

Information from: Field Inspection XX Microfilm (reel _____ pos: _____)
 Other (explain) _____
 Bridge No.: 34 Length: _____ Total Bents: 2 Bents in Channel: 0 Bents in Floodplain: 1
 Foundation Type: TIMBER COLUMNS ON CONC. SPREAD FOOTINGS

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: NONE NOTED

Interior Bents: NA

Channel Bed: NONE NOTED

Channel Bank: NONE NOTED

EXISTING SCOUR PROTECTION

Type(3): TIMBER WING WALLS

Extent(4): 10' EACH DIRECTION FROM END BENTS

Effectiveness(5): ADEQUATE

Obstructions(6): NONE NOTED

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): FINE TO COARSE SAND W/ COBBLES AND BOULDERS

Channel Bank Material(8): SANDY SILT/SILTY SAND W/ COLLUVIAL AND ALLUVIAL COBBLES AND BOULDERS

Channel Bank Cover(9): WOODED

Floodplain Width(10): 150' MAINLY TO WEST SIDE OF STREAM

Floodplain Cover(11): WOODED

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

Channel Migration Tendency(13): TOWARD EB-2

Observations and Other Comments: _____

DESIGN SCOUR ELEVATIONS(14)

Feet XX Meters _____

BENTS
EB1 EB2

	EB1	EB2											

Comparison of DSE to Hydraulics Unit theoretical scour:
SCOUR ENVELOPE DOES NOT REACH PROPOSED BENTS

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: *John Walker*

Date: _____