

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4194	33541.1.1	1

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

**STRUCTURE**  
**SUBSURFACE INVESTIGATION**

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PROJ. REFERENCE NO. 33541.1.1 B-4194 F.A. PROJ. \_\_\_\_\_  
COUNTY MCDOWELL  
PROJECT DESCRIPTION BR# 103 ON SR 1129 OVER CROOKED 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 FOLEY 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 (N-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.

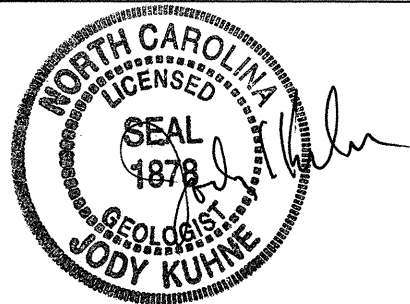
THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT 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: 33541.1.1 ID: B-4194**

PERSONNEL

T DANIEL  
C COFFEY  
R CHILDERS

INVESTIGATED BY J KUHNE  
CHECKED BY D FRYE  
SUBMITTED BY J KUHNE  
DATE 3/22/2007



DRAWN BY: JT WILLIAMS

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**

PROJECT REFERENCE NO.	SHEET NO.
33541.1J	B-4194
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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, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY 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.		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:		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 (ROD) - 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 (SCREC) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SROD) - 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.	
<b>SOIL LEGEND AND AASHTO CLASSIFICATION</b> GENERAL CLASS. GRANULAR MATERIALS (≤ 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS		<b>MINERALOGICAL COMPOSITION</b> MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.		<b>WEATHERING</b> 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 PHYLITE, 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.		<b>WEATHERING</b> FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE. VERY SLIGHT (V SL) 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 (SL) ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS. MODERATE (MOD.) SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED. SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK. MODERATELY SEVERE (MOD. SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i> SEVERE (SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. <i>IF TESTED, YIELDS SPT N VALUES &gt; 100 BPF</i> VERY SEVERE (V SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. <i>IF TESTED, YIELDS SPT N VALUES &lt; 100 BPF</i> COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.	
<b>COMPRESSION</b> SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50		<b>PERCENTAGE OF MATERIAL</b> 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		<b>GROUND WATER</b> 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		<b>MISCELLANEOUS SYMBOLS</b> 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 SPT TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION SPT N-VALUE SPT REFUSAL	
<b>CONSISTENCY OR DENSENESS</b> PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT <sup>2</sup> ) GENERALLY GRANULAR MATERIAL (NON-COHESIVE) VERY LOOSE LOOSE 4 TO 10 MEDIUM DENSE DENSE 10 TO 30 VERY DENSE 30 TO 50 >50 GENERALLY SILT-CLAY MATERIAL (COHESIVE) VERY SOFT SOFT 2 TO 4 MEDIUM STIFF STIFF 4 TO 8 VERY STIFF 8 TO 15 HARD 15 TO 30 >30 <0.25 0.25 TO 0.50 0.5 TO 1.0 1 TO 2 2 TO 4 >4		<b>TEXTURE OR GRAIN SIZE</b> 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 BOULDER (BLDR.) COBBLE (COB.) GRAVEL (GR.) COARSE SAND (CSE, SD.) FINE SAND (F SD.) SILT (SL.) CLAY (CL.) GRAIN MM 305 75 2.0 0.25 0.05 0.005 SIZE IN. 12 3		<b>ABBREVIATIONS</b> AR - AUGER REFUSAL HI. - HIGHLY BT - BORING TERMINATED MED. - MEDIUM CL. - CLAY MIC. - MICACEOUS CPT - CONE PENETRATION TEST MOD. - MODERATELY CSE. - COARSE ORG. - ORGANIC DMT - DILATOMETER TEST NP - NON PLASTIC DPT - DYNAMIC PENETRATION TEST PMT - PRESSUREMETER TEST e - VOID RATIO SAP. - SAPROLITE F - FINE SD. - SAND, SANDY FOSS. - FOSSILIFEROUS SL. - SILT, SILTY FRAC. - FRACTURED, FRACTURES SLL - SLIGHTLY FRAGS. - FRAGMENTS TCR - TRICONE REFUSAL		<b>ROCK HARDNESS</b> 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 FINGERNAIL.	
<b>SOIL MOISTURE - CORRELATION OF TERMS</b> 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		<b>EQUIPMENT USED ON SUBJECT PROJECT</b> 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: AUTOMATIC MANUAL CORE SIZE: B N XL H HAND TOOLS: POST HOLE DIGGER HAND AUGER SOUNDING ROD VANE SHEAR TEST		<b>FRACATURE SPACING</b> TERM SPACING TERM THICKNESS VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED > 4 FEET WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.16 - 1.5 FEET CLOSE 0.16 TO 1 FEET VERY THINLY BEDDED 0.03 - 0.16 FEET VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET			
<b>PLASTICITY</b> PLASTICITY INDEX (PI) DRY STRENGTH NONPLASTIC 0-5 VERY LOW LOW PLASTICITY 6-15 SLIGHT MED. PLASTICITY 16-25 MEDIUM HIGH PLASTICITY 26 OR MORE HIGH		<b>INDURATION</b> 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: #2 -L- STA. 15+12 146' RT, NAIL IN 14" OAK ELEVATION: 1459.42 FT. NOTES:			
<b>COLOR</b> 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

21 March, 2007

STATE PROJECT: 33541.1.1, B-4194  
F.A. PROJECT: BRZ-1129(9)  
COUNTY: McDowell  
DESCRIPTION: Bridge No. 103 on SR 1129 over Crooked Creek  
SUBJECT: Geotechnical Report – Foundation Investigation

**Introduction**

This is a 150' long three span replacement and realignment of the existing structure. According to the Hydraulics Report the skew is 90°. The investigation borings were advanced using a CME 550 ATV rig using 8-inch hollow stem augers and casing 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. Alluvium exists in corner borings EB-1A and B to elevation 1433.0. The alluvium is medium dense silt and sand with gravels. The alluvium lies over med. dense silty sand saprolite to approximate elevation 1410.0' – 1415.0". Weathered rock is 5 – 10' thick below this and grades back into dense saprolite across the end bent. A horizon of weathered rock, zero to 4' thick rests on top of the hard rock contact. EB1-A terminated at elevation 1395.6' hard rock. EB-1B terminated in rock at elevation 1402.1'.

Interior Bent One

B1 will be constructed in the floodway of Crooked Creek. Loose alluvial silty sands and gravel extend to depths of 10 – 15' across the bent at elevations 1430 to 1432'. This

overlies med. dense to dense saprolite to elevations 1402 – 1407'. A solid weathered rock horizon 10 – 12' thick overlies the hard rock contact at elevations 1391 – 1394'.

Interior Bent Two

Also located in the floodway with the potential for deepest scour, B2 will be constructed on fairly level alluvial silty sands and gravel to elevations 1431 – 1433'. This overlies med. dense to very dense silty sand saprolite to a nearly uniform elevation at 1406.2. Weathered rock dips steeply across the bent from Boring B2-A to B2-B and thickens from 10' to 15'. Hard rock was encountered at elevation 1396.4' in B2-A and 1391.0' in B2-B. Boring B2-B was advanced approximately 18' into rock to assess bedrock qualities. RQD in the bedrock was greater than 85% through the length of the core.

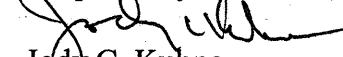
End Bent Two

EB-2 will be constructed on floodplain over silty sand and sand alluvium at depths to elevation 1429.6. Loose to med. dense silt and sand saprolite dips across the bent from EB2-B to EB2-A at elevations 1414.6 and 1408.6' respectively. Weathered rock is 8.5' thick in EB2-B and grades into very dense saprolite at elevation 1407.1. EB2-B was terminated in very dense saprolite at elevation 1403.7. EB2-A encountered 3.5' of weathered rock and was terminated in hard rock at 1405.1'.

**Groundwater**

Surface water level was noted at elevation 1334' in the Hydraulics Report. Water levels measured in the project borings ranged slightly higher than this and uniform at 1334 to 1336'.

Respectfully submitted,

  
Jody C. Kuhne

8/17/99

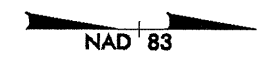
# BRIDGE NO.103 OVER CROOKED CREEK ON SR 1129

PROJECT REFERENCE NO.	SHEET NO.
B-4194	33541JJ
	4 OF 17

SKREW = 90°

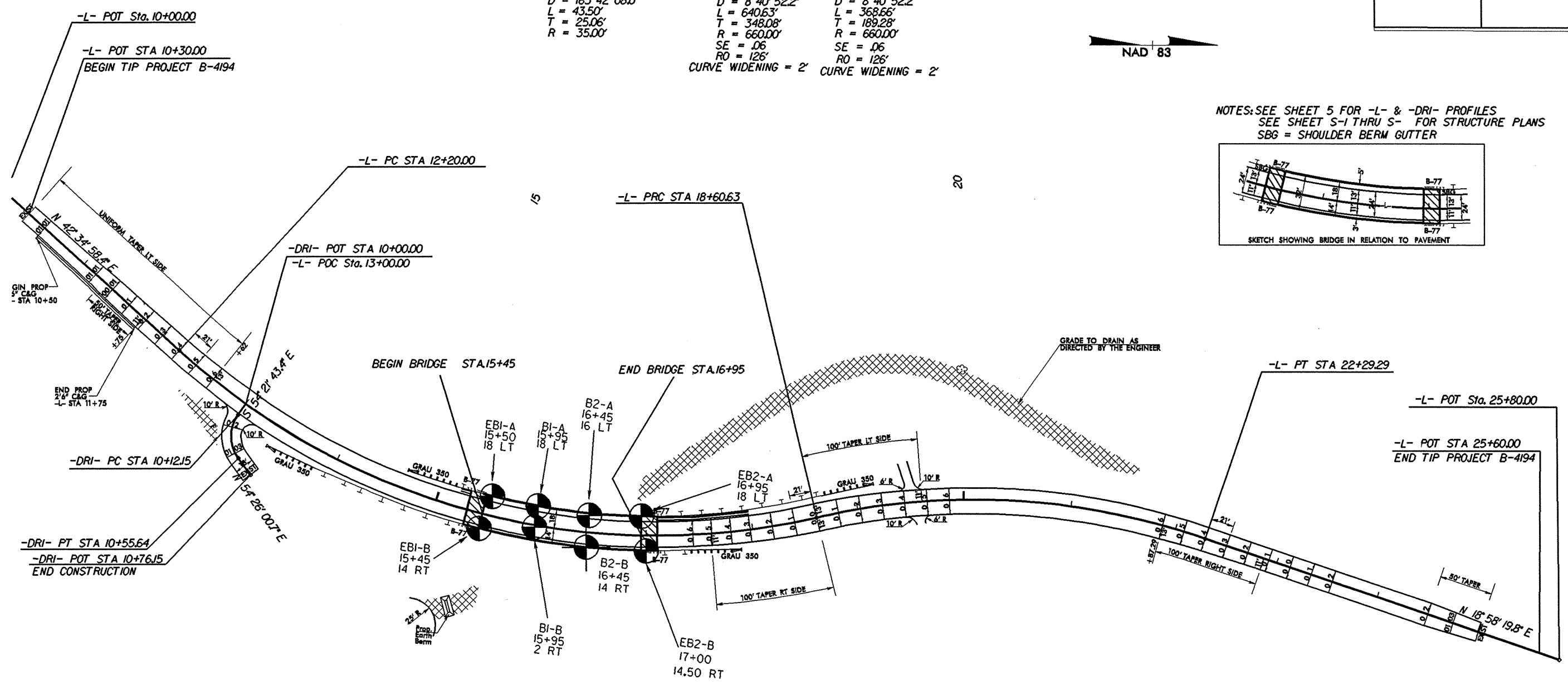
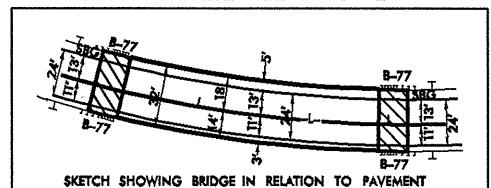


PRELIMINARY PLANS  
DO NOT USE FOR CONSTRUCTION

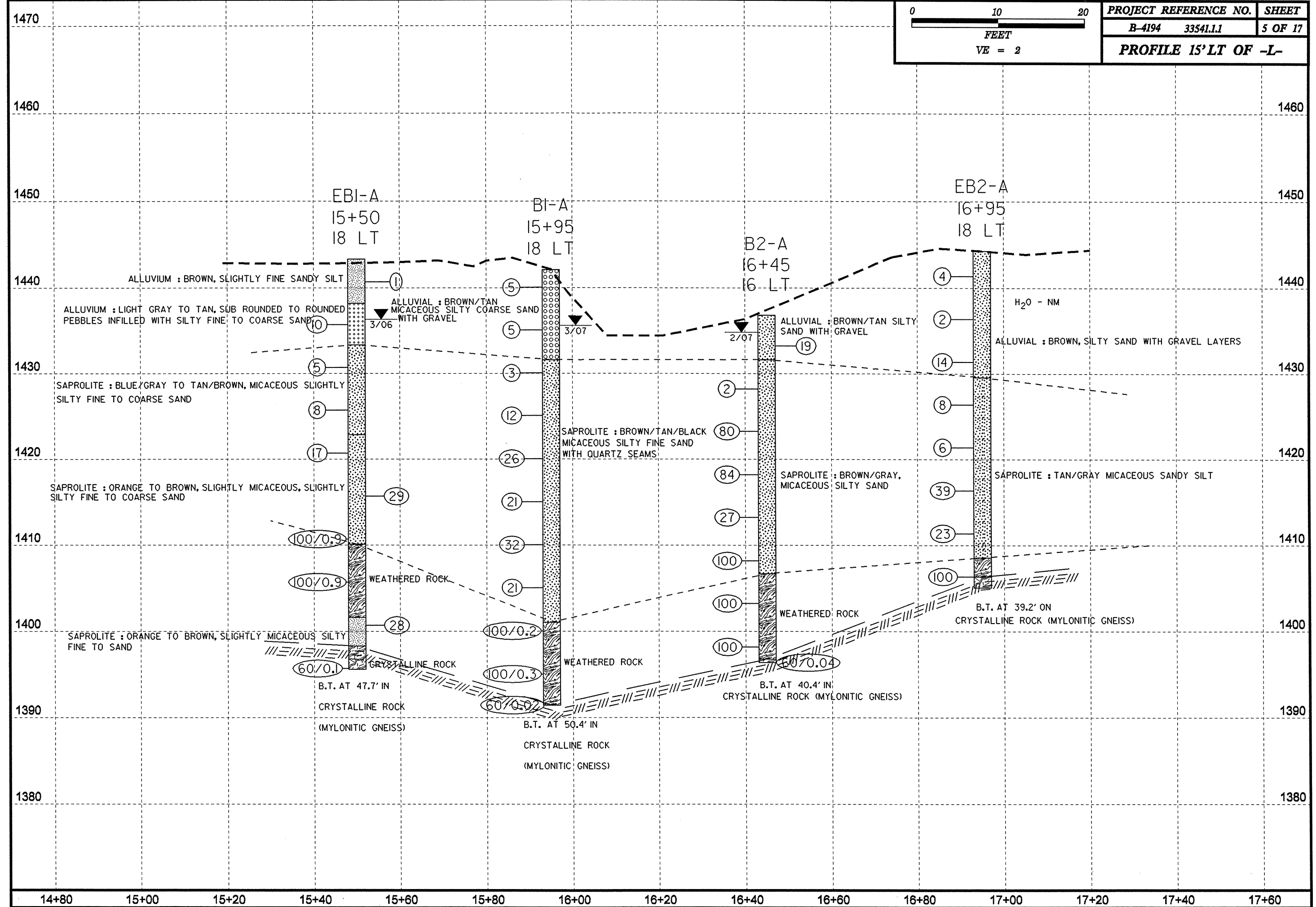
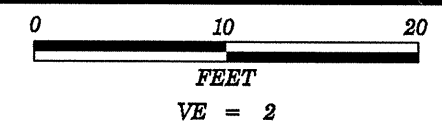


<b>-DRI-</b>	<b>-L-</b>	<b>-L-</b>
PI Sta 10+37.21	PI Sta 15+68.09	PI Sta 20+49.91
Δ = 71° 12' 16.0" (LT)	Δ = 55° 36' 52.1" (LT)	Δ = 32° 00' 13.4" (RT)
D = 163° 42' 08.0"	D = 8° 40' 52.2"	D = 8° 40' 52.2"
L = 43.50'	L = 640.63'	L = 368.66'
T = 25.06'	T = 348.08'	T = 189.28'
R = 35.00'	R = 660.00'	R = 660.00'
	SE = .06	SE = .06
	RO = 126'	RO = 126'
	CURVE WIDENING = 2'	CURVE WIDENING = 2'

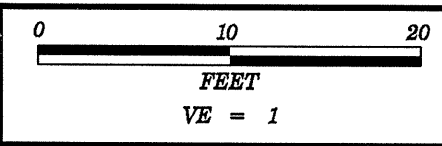
NOTES: SEE SHEET 5 FOR -L- & -DRI- PROFILES  
 SEE SHEET S-1 THRU S- FOR STRUCTURE PLANS  
 SBG = SHOULDER BERM GUTTER



21-MAR-2007 14:43  
 C:\caddpr\g...  
 21-MAR-2007 14:43  
 C:\caddpr\g...



1480



PROJECT REFERENCE NO.	SHEET
B-4194 33541.1.1	6 OF 17
CROSS SECTION THRU EBI	

1470

1470

1460

1460

1450

1450

EBI-A  
15+50  
18 LT

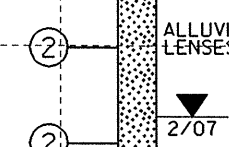
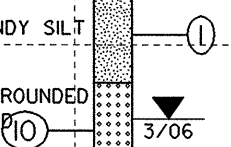
EBI-B  
15+45  
14 RT

GROUND SURFACE

ALLUVIUM : BROWN, SLIGHTLY FINE SANDY SILT

ALLUVIAL LENSES : TAN/BROWN, SILTY SAND WITH GRAVEL AND SILT

ALLUVIUM : LIGHT GRAY TO TAN, SUB ROUNDED TO ROUNDED PEBBLES INFILLED WITH SILTY FINE TO COARSE SAND



SAPROLITE : BLUE/GRAY TO TAN/BROWN, MICACEOUS SLIGHTLY SILTY FINE TO COARSE SAND

SAPROLITE : GRAY/BROWN SILTY SAND

SAPROLITE : ORANGE TO BROWN, SLIGHTLY MICACEOUS, SLIGHTLY SILTY FINE TO COARSE SAND

SAPROLITE : BROWN/GRAY MICACEOUS SILTY SAND

WEATHERED ROCK

WEATHERED ROCK

SAPROLITE : ORANGE TO BROWN, SLIGHTLY MICACEOUS, SILTY FINE TO SAND

B.T. AT 40.74' IN CRYSTALLINE ROCK (MYLONITIC GNEISS)

B.T. AT 47.7' IN CRYSTALLINE ROCK (MYLONITIC GNEISS)



50

40

30

20

10

0

10

20

30

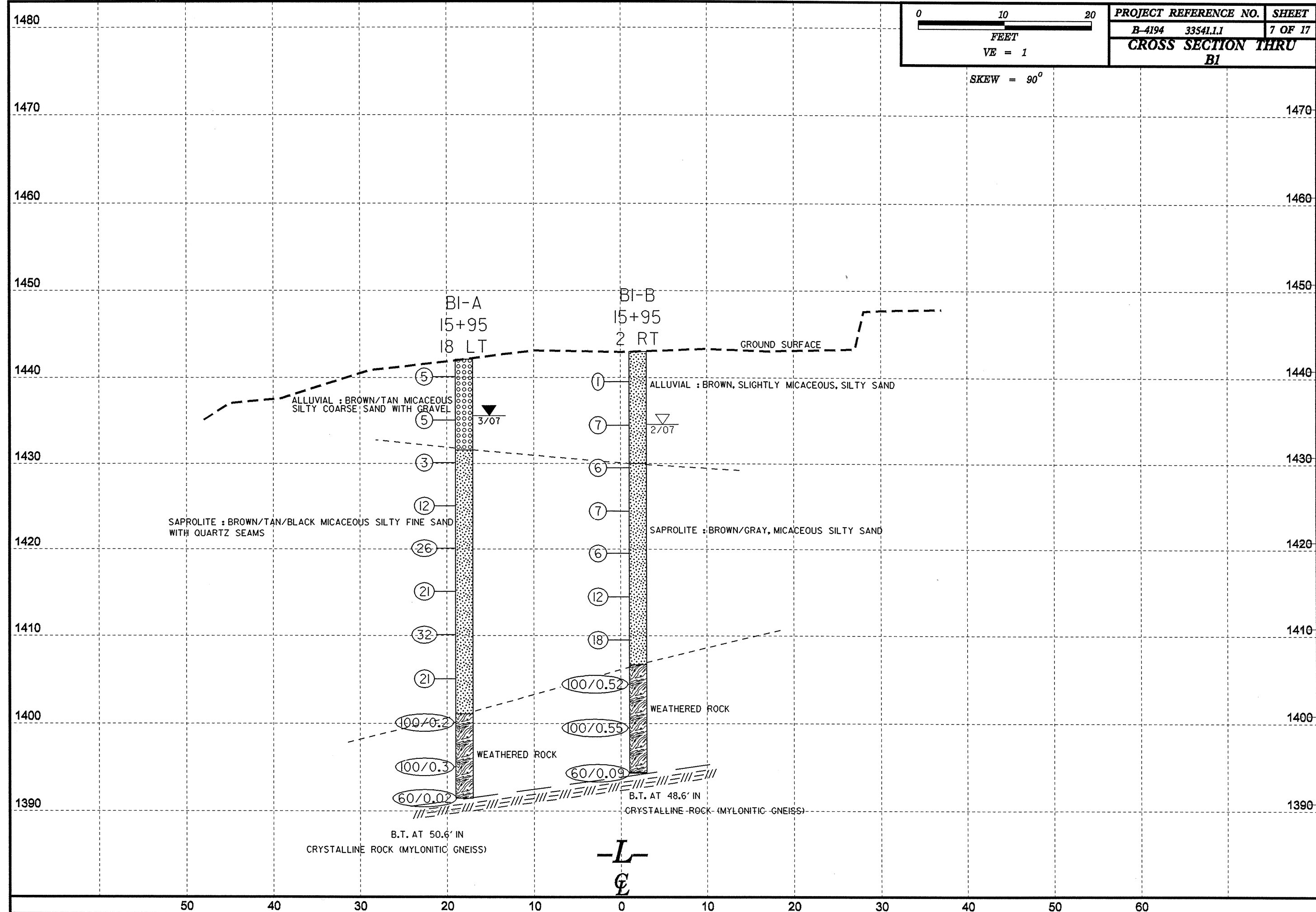
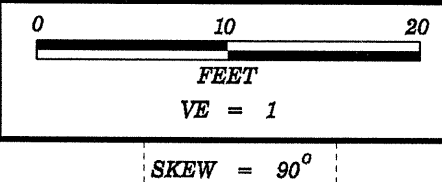
40

50

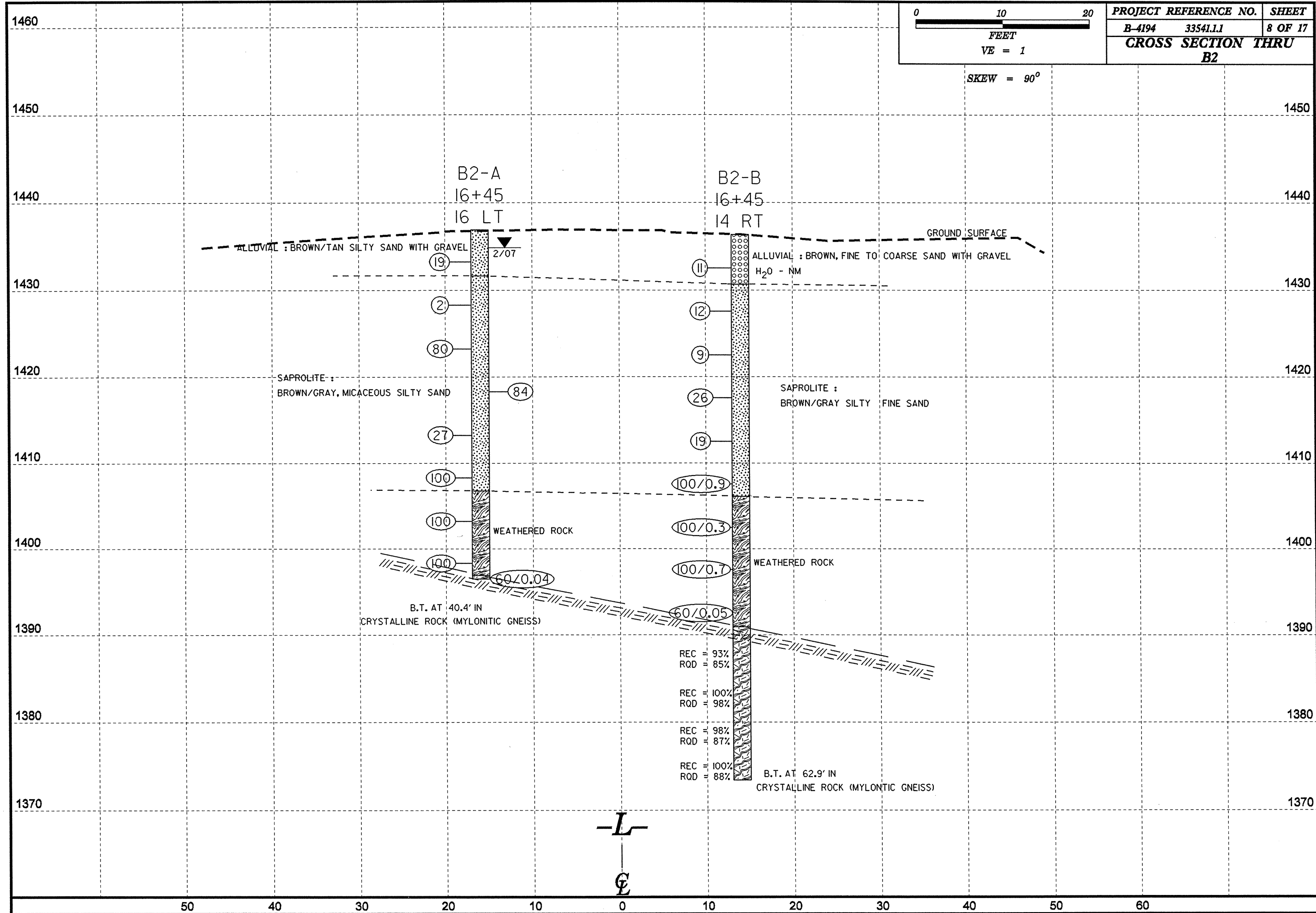
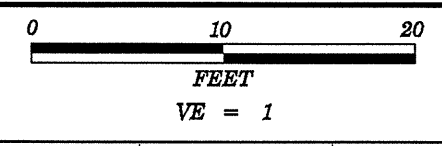
60

1390

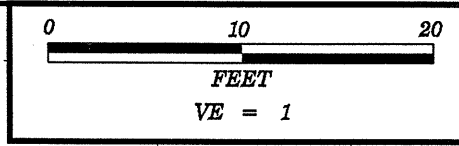
1390





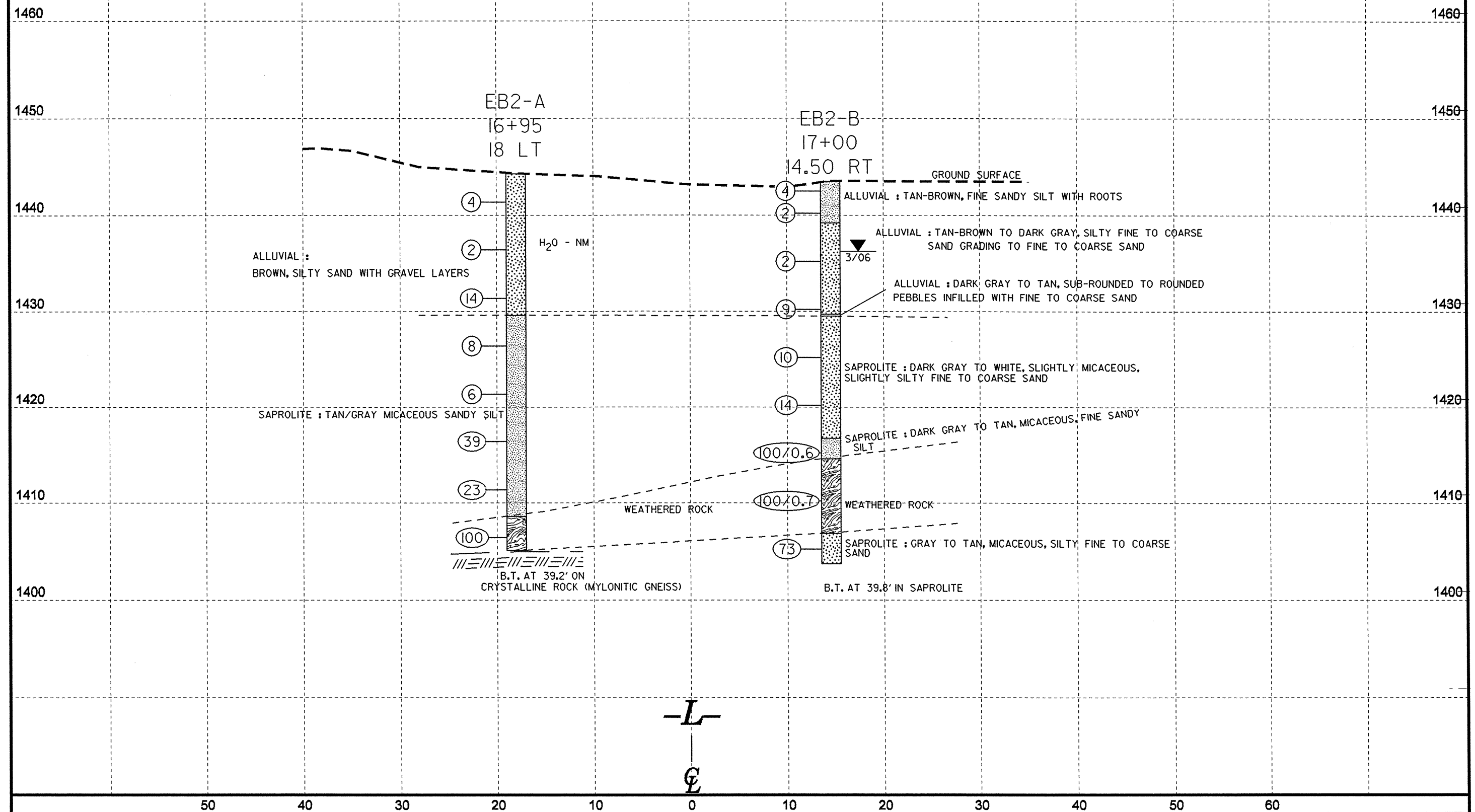




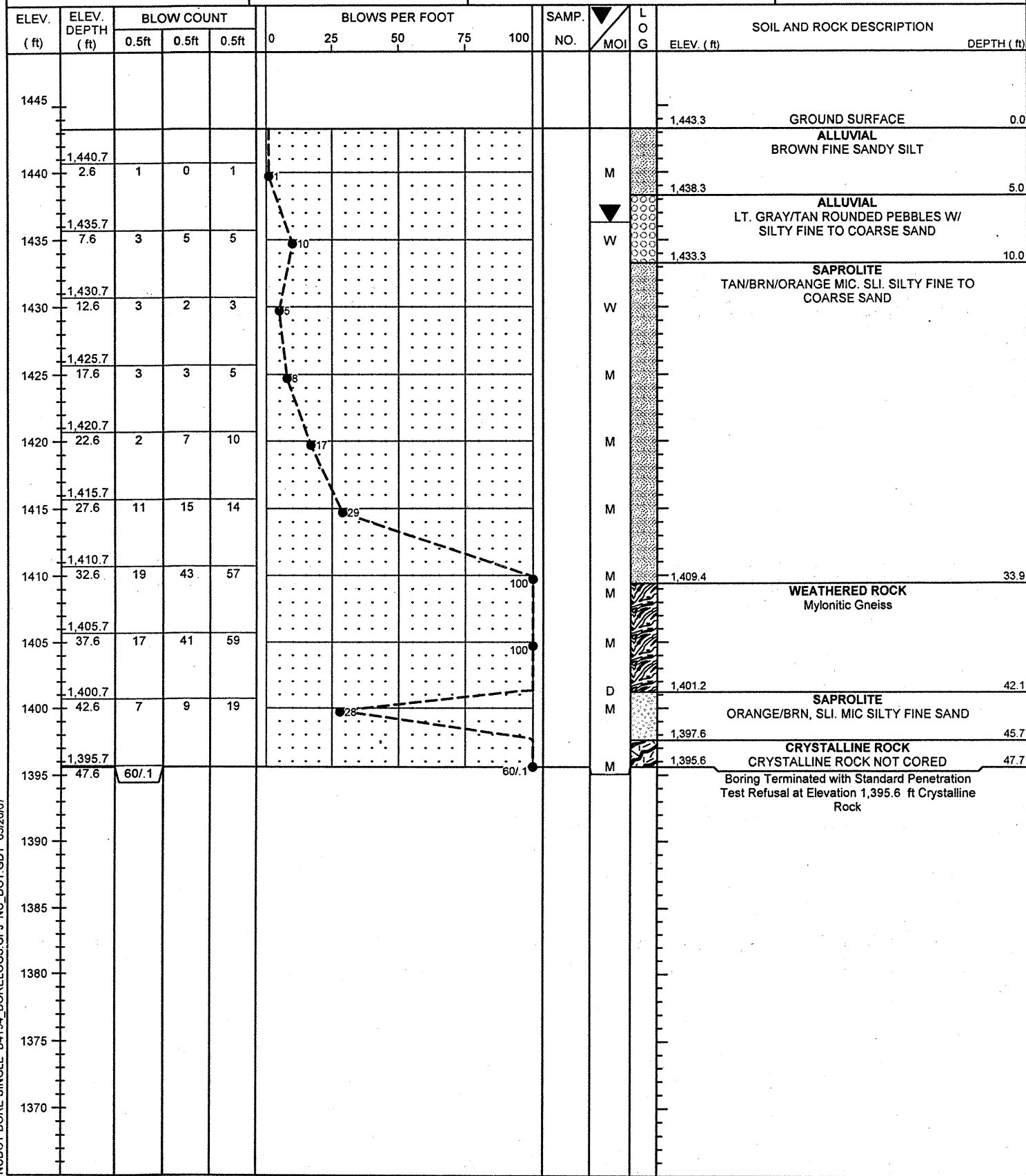


PROJECT REFERENCE NO.	SHEET
B-4194 33541.1.1	9 OF 17
CROSS SECTION THRU EB2	

SKEW = 90°

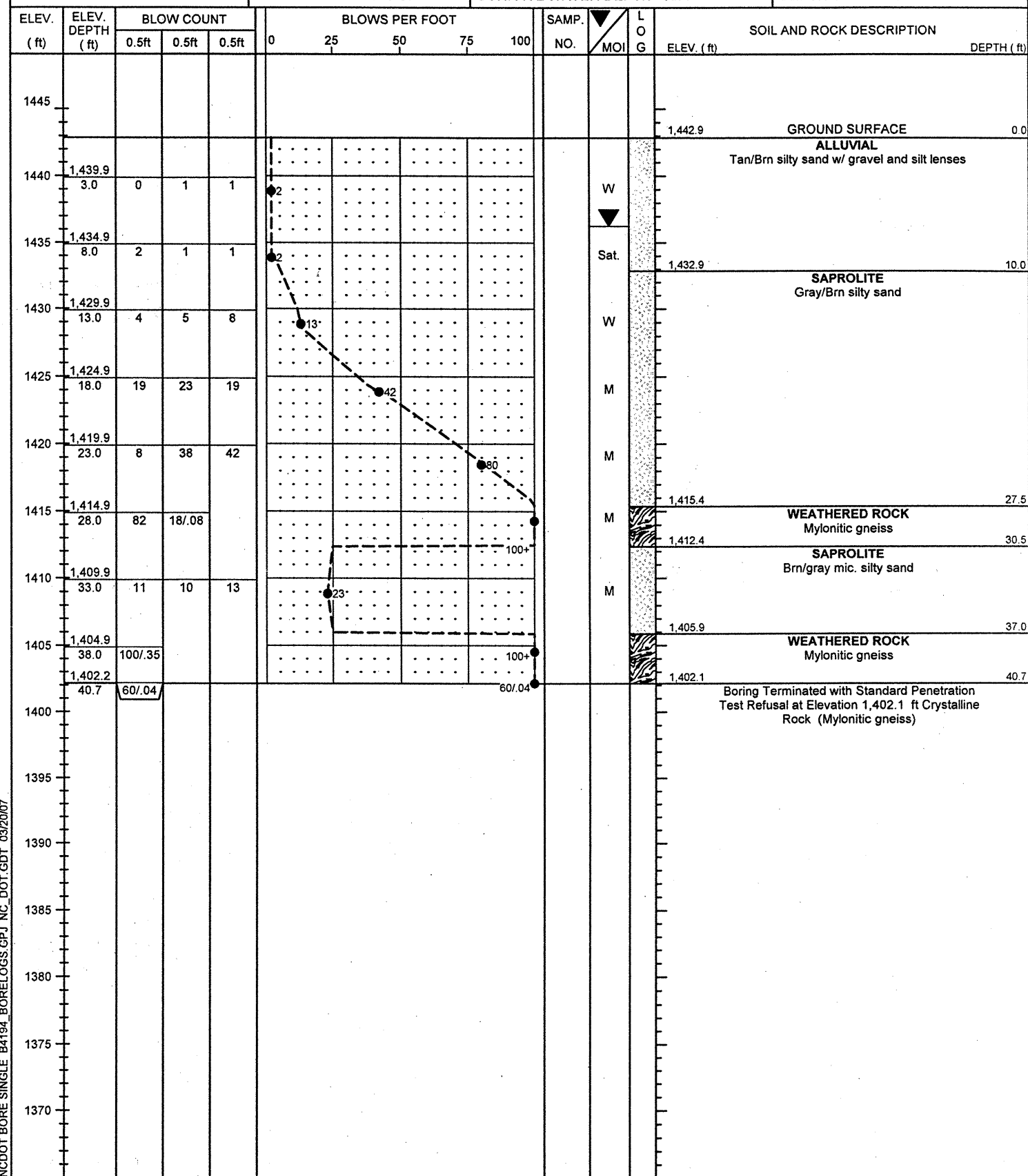


PROJECT NO. 33541.1.1	ID. B-4194	COUNTY McDowell	GEOLOGIST Hager, M. M.
SITE DESCRIPTION Br. #103 on SR 1129 over Crooked Creek			GROUND WTR (ft)
BORING NO. EB1-A	STATION 15+50	OFFSET 18 ft LT	ALIGNMENT -L-
COLLAR ELEV. 1,443.3 ft	TOTAL DEPTH 47.7 ft	NORTHING 682,348	EASTING 1,059,269
DRILL MACHINE CME-550	DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
START DATE 03/03/06	COMP. DATE N/A	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 45.7 ft



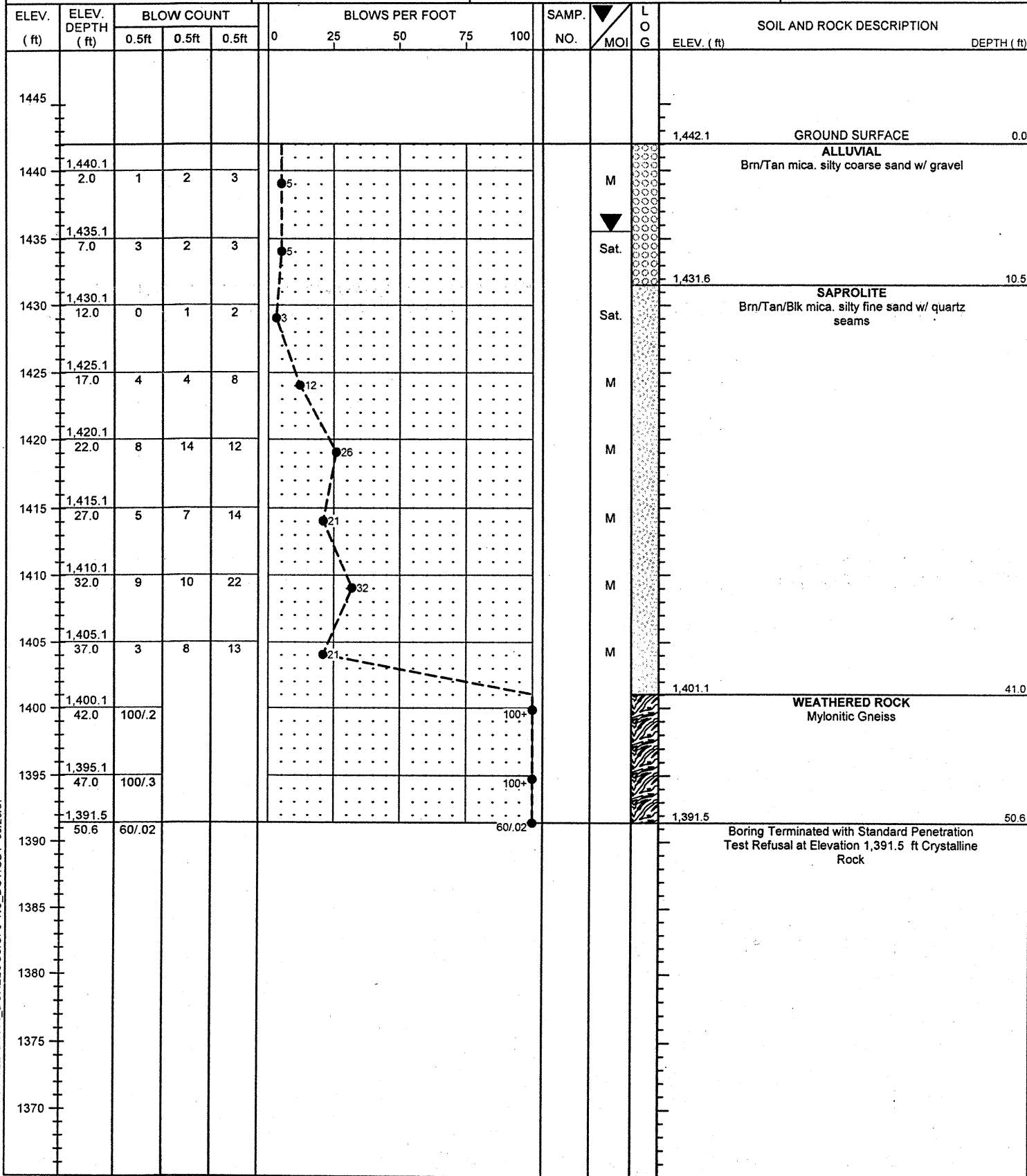
NCDOT BORE SINGLE B4194\_BORELOGS.GPJ NC\_DOT\_GDT\_03/20/07

PROJECT NO. 33541.1.1	ID. B-4194	COUNTY McDowell	GEOLOGIST Daniel, T. B.
SITE DESCRIPTION Br. #103 on SR 1129 over Crooked Creek			GROUND WTR (ft)
BORING NO. EB1-B	STATION 15+45	OFFSET 14 ft RT	ALIGNMENT -L-
COLLAR ELEV. 1,442.9 ft	TOTAL DEPTH 40.7 ft	NORTHING 682,336	EASTING 1,059,299
DRILL MACHINE CME-550	DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
START DATE 02/15/07	COMP. DATE 02/15/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A



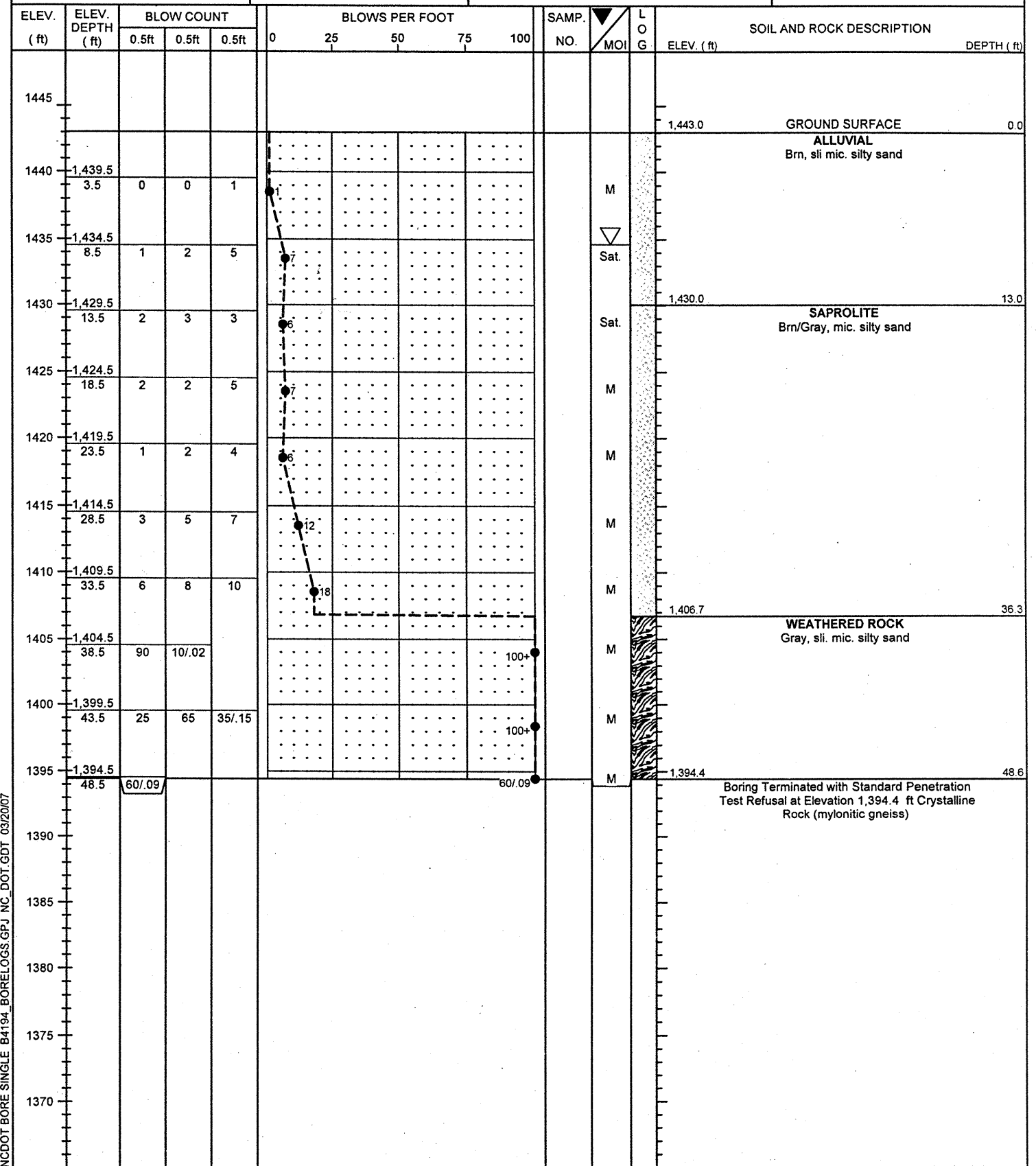
NCDOT BORE SINGLE B4194\_BORELOGS.GPJ NC\_DOT\_GDT\_03/20/07

PROJECT NO. 33541.1.1	ID. B-4194	COUNTY McDowell	GEOLOGIST Daniel, T. B.
SITE DESCRIPTION Br. #103 on SR 1129 over Crooked Creek			GROUND WTR (ft)
BORING NO. B1-A	STATION 15+95	OFFSET 18 ft LT	ALIGNMENT -L-
COLLAR ELEV. 1,442.1 ft	TOTAL DEPTH 50.6 ft	NORTHING 682,395	EASTING 105,268
DRILL MACHINE CME-550	DRILL METHOD NW Casing w/ SPT	HAMMER TYPE Automatic	
START DATE 03/01/07	COMP. DATE 03/02/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A



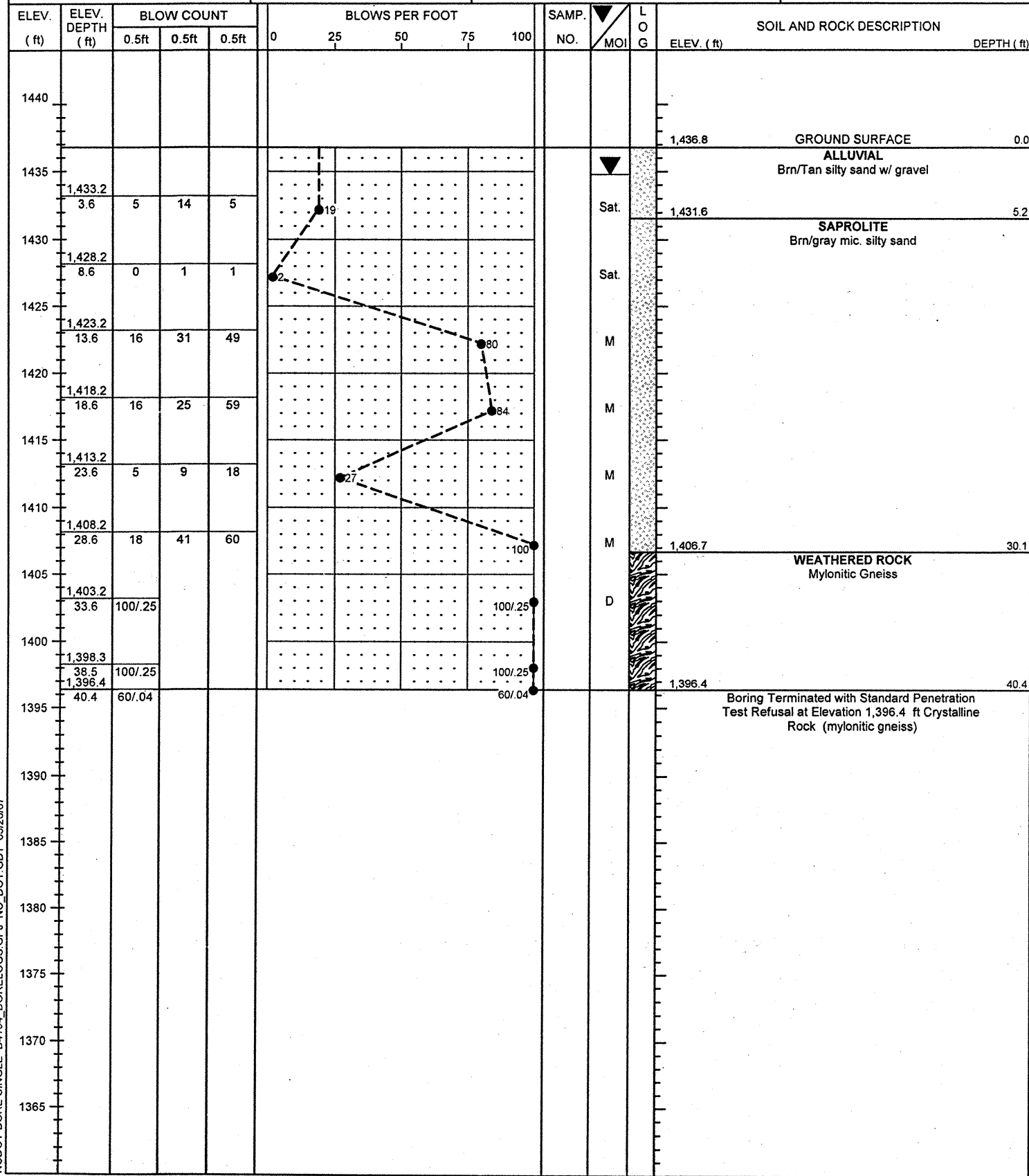
NCDOT BORE SINGLE B4194\_BORELOGS.GPJ\_NC\_DOT.GDT 03/20/07

PROJECT NO. 33541.1.1	ID. B-4194	COUNTY McDowell	GEOLOGIST Daniel, T. B.
SITE DESCRIPTION Br. #103 on SR 1129 over Crooked Creek			GROUND WTR (ft)
BORING NO. B1-B	STATION 15+95	OFFSET 2 ft RT	ALIGNMENT -L-
COLLAR ELEV. 1,443.0 ft	TOTAL DEPTH 48.6 ft	NORTHING 682,439	EASTING 1,059,287
DRILL MACHINE CME-550	DRILL METHOD NW Casing w/ SPT	HAMMER TYPE Automatic	
START DATE 02/26/07	COMP. DATE 02/26/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

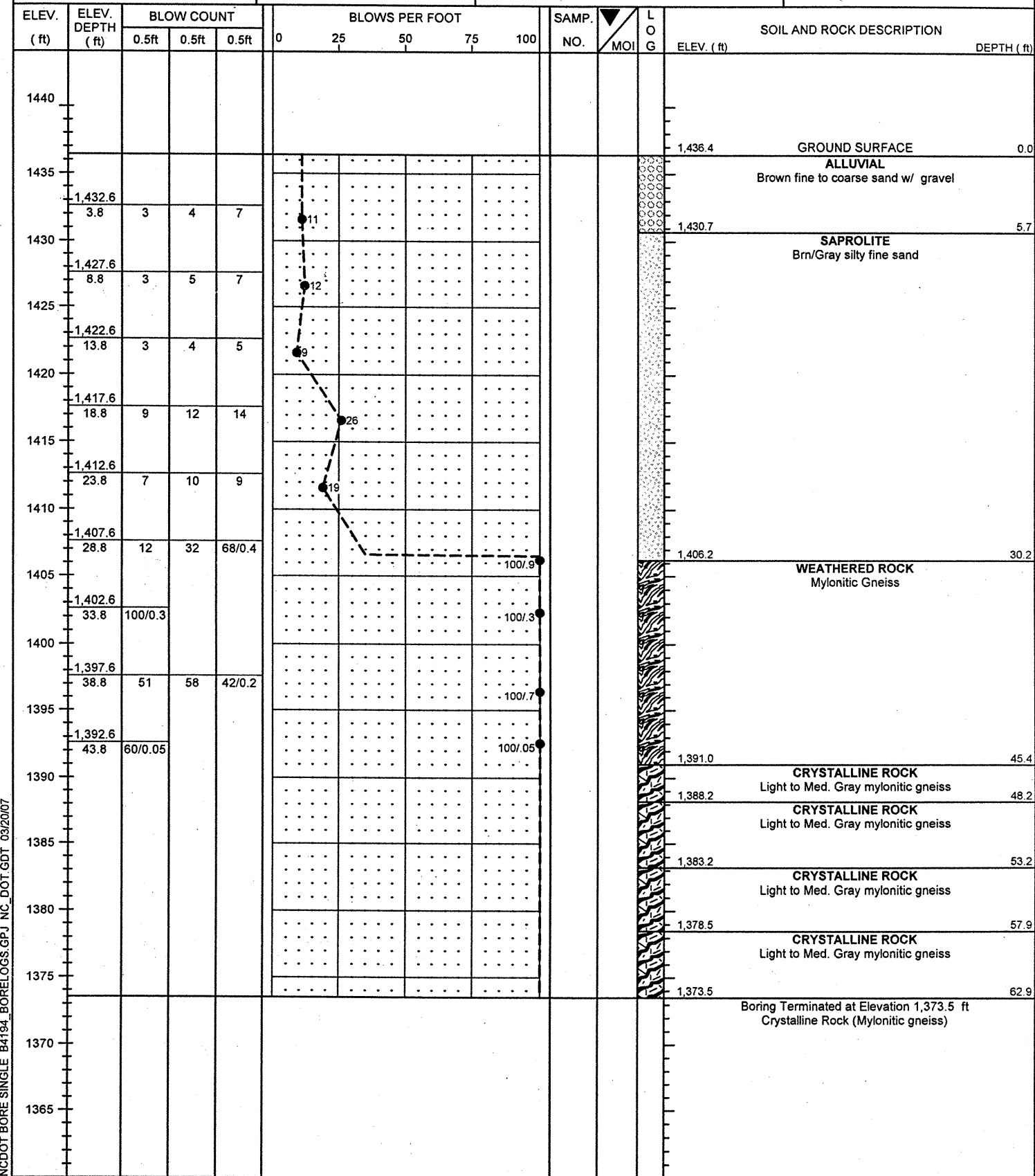


NCDOT BORE SINGLE B4194\_BORELOGS.GPJ\_NC\_DOT.GDT 03/20/07

PROJECT NO. 33541.1.1	ID. B-4194	COUNTY McDowell	GEOLOGIST Daniel, T. B.
SITE DESCRIPTION Br. #103 on SR 1129 over Crooked Creek			GROUND WTR (ft)
BORING NO. B2-A	STATION 16+45	OFFSET 16 ft LT	ALIGNMENT -L-
COLLAR ELEV. 1,436.8 ft	TOTAL DEPTH 40.4 ft	NORTHING 682,388	EASTING 1,059,298
DRILL MACHINE CME-550	DRILL METHOD NW Casing w/ SPT	HAMMER TYPE Automatic	
START DATE 02/27/07	COMP. DATE 02/27/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A



PROJECT NO. 33541.1.1	ID. B-4194	COUNTY McDowell	GEOLOGIST Daniel, T. B.
SITE DESCRIPTION Br. #103 on SR 1129 over Crooked Creek			GROUND WTR (ft)
BORING NO. B2-B	STATION 16+45	OFFSET 14 ft RT	ALIGNMENT -L-
COLLAR ELEV. 1,436.4 ft	TOTAL DEPTH 62.9 ft	NORTHING 682,436	EASTING 1,059,317
DRILL MACHINE CME-550	DRILL METHOD NW Casing w/ SPT Core	HAMMER TYPE Automatic	
START DATE 02/14/07	COMP. DATE 02/14/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 45.4 ft



NCDOT BORE SINGLE B4194\_BORELOGS.GPJ NC\_DOT\_GDT\_03/20/07

NCDOT BORE SINGLE B4194\_BORELOGS.GPJ NC\_DOT\_GDT\_03/20/07

DATE 14-Feb-07

### CORE BORING REPORT

PROJECT: 33541.1.1 I. D. NO: B-4194 BORING NO: B2-B GEOLOGIST: TB DANIEL

DESCRIPTION: BRIDGE NO. 65 ON S.R. 1760 OVER NORTH MUDDY CREEK

COUNTY: McDOWELL COLLAR ELEVATION: 1436.4 FT. TOTAL DEPTH: 62.9 FT.

ELEV. (FEET)	DEPTH (FEET)	DRILL RATE MIN./FT.	RUN (FEET)	REC. FEET %	RQD. FEET %	SAMP. #	FIELD CLASSIFICATION AND REMARKS
1391.0	45.4		2.8	2.6	2.2		LIGHT TO MED. GRAY MYLONITIC GNEISS
				93	79		
1388.2	48.2		5.0	5.0	4.9		LIGHT TO MED. GRAY MYLONITIC GNEISS
1388.2	48.2			100	98		
1383.2	53.2		4.7	4.6	4.0		LIGHT TO MED. GRAY MYLONITIC GNEISS
1383.2	53.2			98	85		
1378.5	57.9		5.0	5.0	4.4		LIGHT TO MED. GRAY MYLONITIC GNEISS
1378.5	57.9			100	88		
1373.5	62.9						

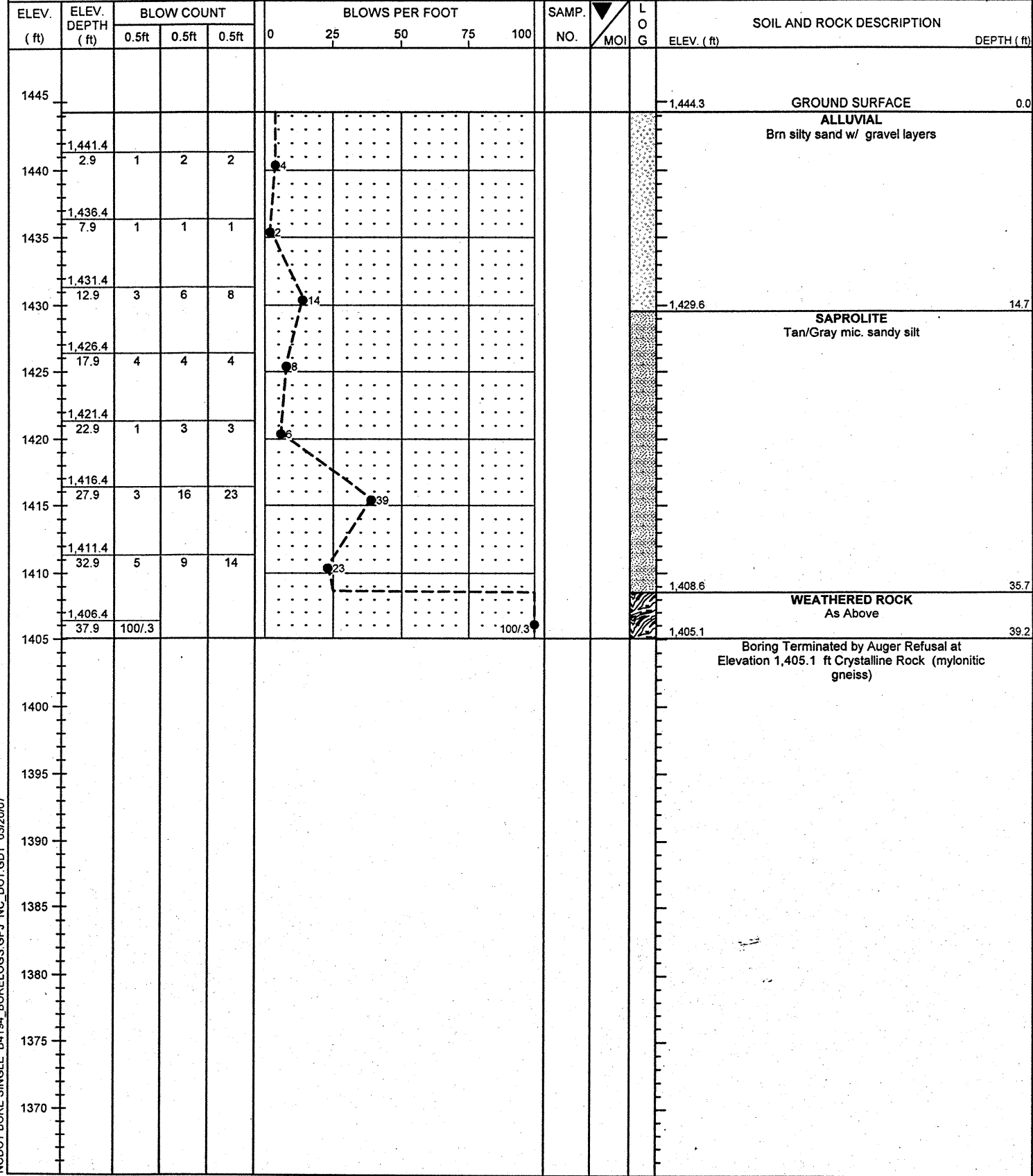
CORING TERMINATED AT  
ELEVATION 1373.5 FT.

DRILLER: CJ COFFEY

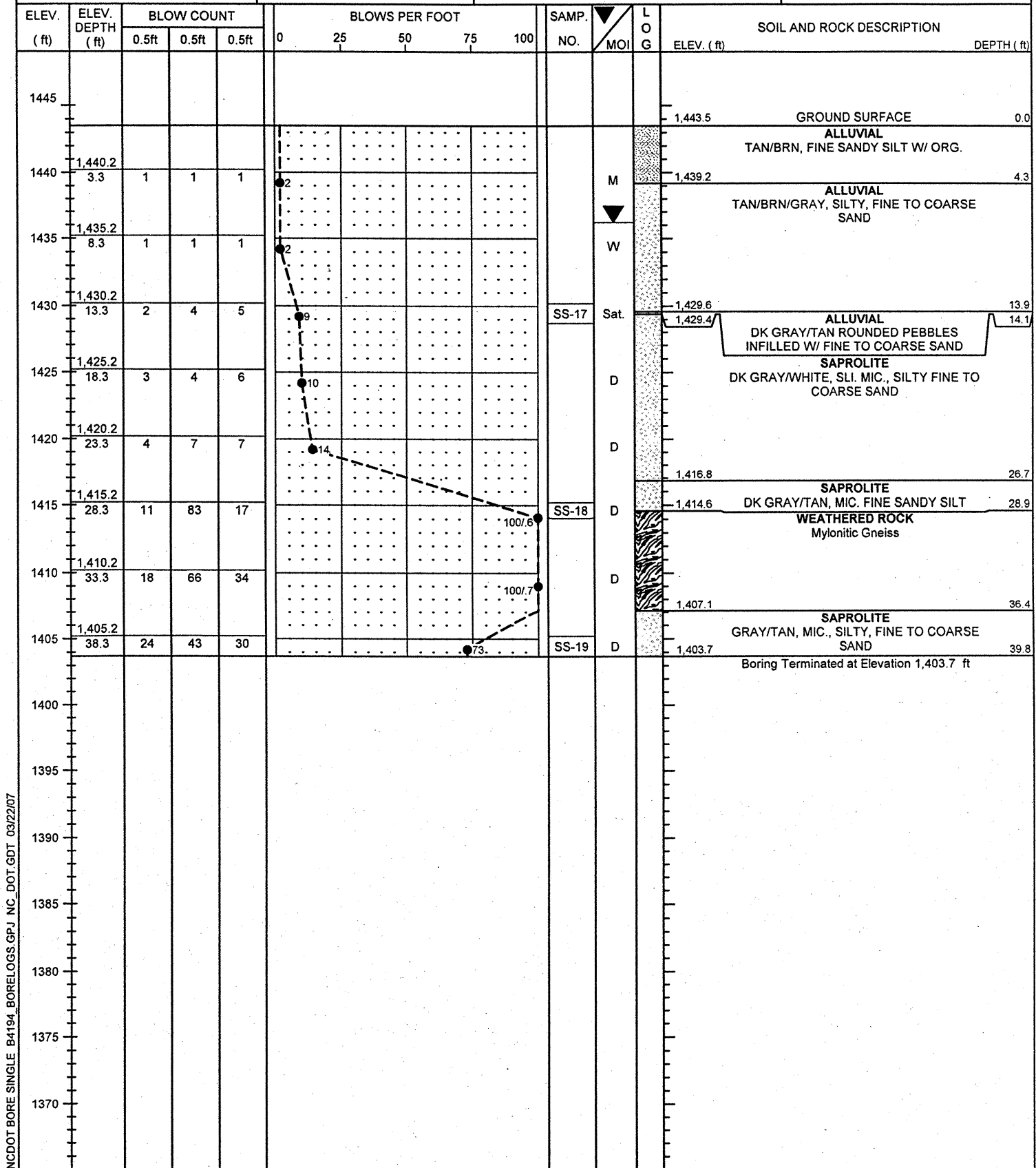
CORE SIZE: NXWL

EQUIPMENT: CME-550

PROJECT NO. 33541.1.1	ID. B-4194	COUNTY McDowell	GEOLOGIST Daniel, T. B.
SITE DESCRIPTION Br. #103 on SR 1129 over Crooked Creek			GROUND WTR (ft)
BORING NO. EB2-A	STATION 16+95	OFFSET 18 ft LT	ALIGNMENT -L-
COLLAR ELEV. 1,444.3 ft	TOTAL DEPTH 39.2 ft	NORTHING 682,488	EASTING 1,059,288
DRILL MACHINE CME-550	DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
START DATE 02/13/07	COMP. DATE 02/13/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A



PROJECT NO. 33541.1.1	ID. B-4194	COUNTY McDowell	GEOLOGIST Hager, M. M.
SITE DESCRIPTION Br. #103 on SR 1129 over Crooked Creek			GROUND WTR (ft)
BORING NO. EB2-B	STATION 17+00	OFFSET 15 ft RT	ALIGNMENT -L-
COLLAR ELEV. 1,443.5 ft	TOTAL DEPTH 39.8 ft	NORTHING 682,492	EASTING 1,059,321
DRILL MACHINE CME-550	DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
START DATE 03/03/06	COMP. DATE 03/03/06	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A



NCDOT BORE SINGLE B4194\_BORELOGS.GPJ NC\_DOT\_GDT 03/20/07

NCDOT BORE SINGLE B4194\_BORELOGS.GPJ NC\_DOT\_GDT 03/22/07



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

T.I.P. ID #: B-4194

REPORT ON SAMPLES OF: Soils for Quality

PROJECT:	33541.1.1	COUNTY:	McDowell	Owner:	NCDOT
DATE SAMPLED:	2.14.07	DATE RECEIVED:	2.23.07	DATE REPORTED:	2.28.07
SAMPLED FROM:	SPT	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			
Lab Sample No. A	154607	154608	154609	154610	154611			
HiCAMS Sample #	--	--	--	--	--			
Retained #4 Sieve %	0.0	6.0	0.0	0.0	0.0			
Passing #10 Sieve %	87	81	92	98	98			
Passing #40 Sieve %	83	69	82	91	90			
Passing #200 Sieve %	41	24	40	46	33			

**MINUS #10 FRACTION**

Soil Mortar - 100%								
Coarse Sand -Ret. #60	10	29	21	14	21			
Fine Sand - Ret. #270	57	49	51	56	57			
Silt 0.05-0.005 mm %	15	10	20	22	16			
Clay < 0.005 mm %	18	12	8	8	6			
Passing # 40 Sieve %	--	--	--	--	--			
Passing # 200 Sieve %	--	--	--	--	--			

Liquid Limit	27	21	32	32	28			
Plastic Index	NP	NP	NP	NP	NP			
AASHTO Classification	A-4 (2)	A-2-4 (0)	A-4 (1)	A-4 (2)	A-2-4 (0)			
Quantity								
Texture								
Station	N/A	N/A	N/A	N/A	N/A			
Hole No.								
Depth (ft) From:	5.0	5.0	5.0	5.0	5.0			
To:								

**Remarks:**

A-154607 - 154611

**CC:**

J. C. Kuhne	
File	

SOILS ENGINEER:

15 of 17

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

T.I.P. ID #: B-4194

REPORT ON SAMPLES OF: Soils for Classification

PROJECT:	33541.1.1	COUNTY:	McDowell	Owner:	--
DATE SAMPLED:	3.06	DATE RECEIVED:	3.7.06	DATE REPORTED:	3.20.06
SAMPLED FROM:	Roadway	SAMPLED BY:	M. M. Hager		
SUBMITTED BY:	W. D. Frye	2002	STANDARD SPECIFICATION		
LABORATORY:	Asheville				

**TEST RESULTS**

Project Sample No.	SS-17	SS-18	SS-19	SS-20	SS-21	SS-22	SS-23	SS-24
Lab Sample No. A	151994	151995	151996	151997	151998	151999	152000	152001
HiCAMS Sample #	--	--	--	--	--	--	--	--
Retained #4 Sieve %	--	--	--	--	--	--	--	--
Passing #10 Sieve %	100	98	94	100	92	100	99	100
Passing #40 Sieve %	87	88	84	86	77	95	97	100
Passing #200 Sieve %	31	43	34	35	33	39	30	67

**MINUS #10 FRACTION**

Soil Mortar - 100%								
Coarse Sand -Ret. #60	25	19	23	26	28	17	4	1
Fine Sand - Ret. #270	59	54	56	52	47	57	44	46
Silt 0.05-0.005 mm %	14	25	21	18	21	24	36	39
Clay < 0.005 mm %	2	2	0	4	4	2	16	14
Passing # 40 Sieve %	--	--	--	--	--	--	--	--
Passing # 200 Sieve %	--	--	--	--	--	--	--	--

Liquid Limit	48	26	27	49	32	38	36	29
Plastic Index	NP	NP	NP	NP	NP	NP	NP	NP
AASHTO Classification	A-2-5 (0)	A-4 (2)	A-2-4 (0)	A-2-5 (0)	A-2-4 (0)	A-4 (1)	A-2-4 (0)	A-4 (7)
Quantity								
Texture								
Station	17+00	17+00	17+00	15+50	15+50	15+50	14+50	13+50
Hole No.								
Depth (ft) From:	14.1	28.8	38.8	13.1	28.1	43.1	4.4	5.5
To:	14.8	29.4	39.8	14.1	29.1	44.1	5.4	6.2

**Remarks:**

A-151994 - 152001

**CC:**

M. M. Hager	
File	

SOILS ENGINEER:





**FIELD  
 SCOUR REPORT**

WBS: 33541.1.1 TIP: B-4194 COUNTY: MCDOWELL

DESCRIPTION(1):

**EXISTING BRIDGE**

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

Bridge No.: 103 Length: 100 Total Bents: 5 Bents in Channel: 3 Bents in Floodplain: 2  
 Foundation Type: WOOD PILINGS DRIVEN OR ON SPREAD FOOTINGS

**EVIDENCE OF SCOUR(2)**

Abutments or End Bent Slopes: NONE

Interior Bents: INT. BENTS 3 & 4, IN STREAM CHANNEL, RECENT FLOOD SCOUR TO 1'

Channel Bed: RECENT FLOOD SCOUR UP TO 2'

Channel Bank: SOUTH ABUTMENT, EB-2, UNDERCUTTING OF BANK

**EXISTING SCOUR PROTECTION**

Type(3): BOULDERS, SHOT ROCK

Extent(4): LOCAL TO SOUTH ABUTMENT ONLY

Effectiveness(5): LOSING FINES FROM BTW COBBLE AND BOULDER SIZE MATERIAL

Obstructions(6): BRUSH DEBRIS ON BENT 3

**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 AND GRAVEL

Channel Bank Material(8): SAND, GRAVEL & COBBLES

Channel Bank Cover(9): GRASS, SHRUBS, SOME TREES

Floodplain Width(10): 300-400'

Floodplain Cover(11): GRASS

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

Channel Migration Tendency(13): TO THE SOUTH AGAINST EB-2

Observations and Other Comments: SCOUR LIKELY AT EB-2, PROPOSED BRIDGE GEOMETRY WILL ALLEVIATE PROBLEM

**DESIGN SCOUR ELEVATIONS(14)**

Feet  Meters \_\_\_

**BENTS**

EB1	B1	B2	EB2							
1434.5	1433	1427	1436							

Comparison of DSE to Hydraulics Unit theoretical scour:

EB1: No scour predicted w/ bank protection. B1: Scour predicted at 1429, defer to Hydro. B2: Scour predicted at 1424, defer to Hydro. EB2: No scour predicted w/ bank protection.

**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									

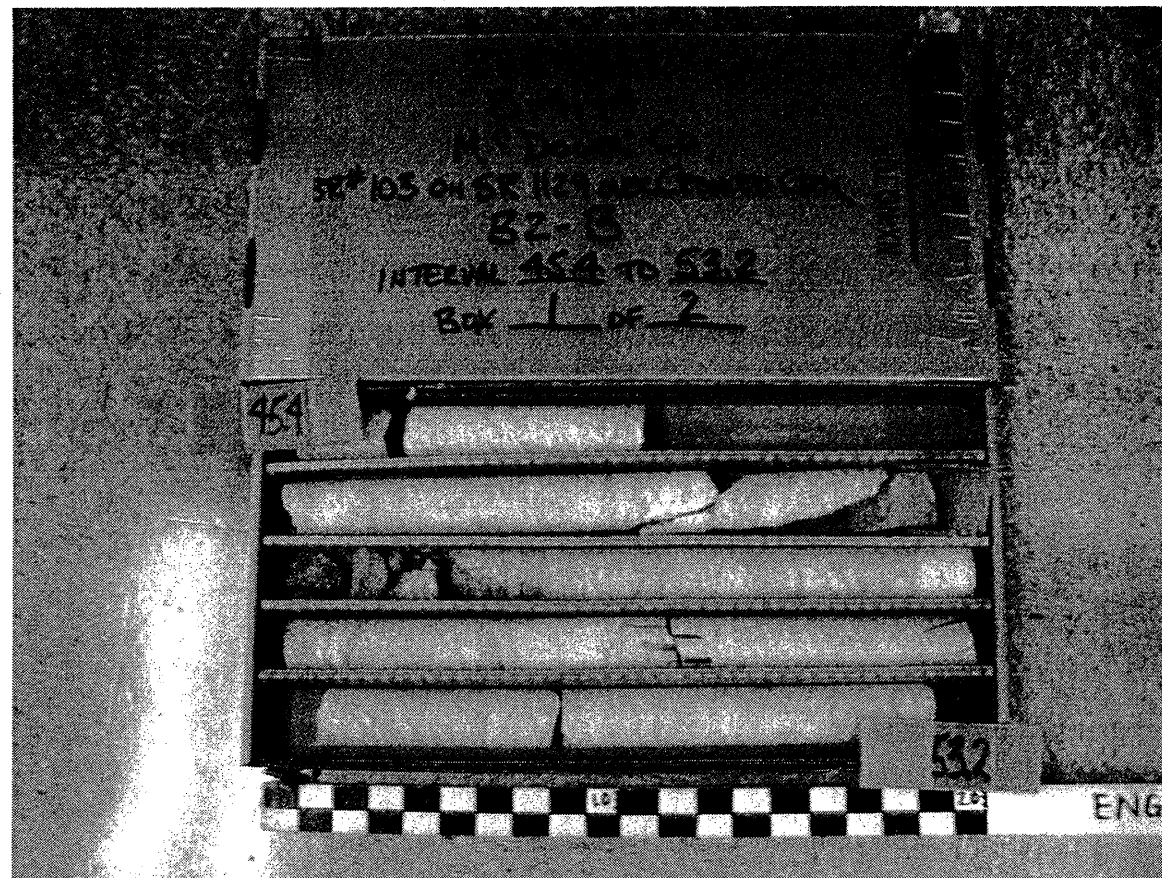
Template Revised 02/07/06

Reported by:

*Jody K. [Signature]*

Date: 3/22/2007

B-4194, 33541.1.1  
BORING B2-B  
DEPTH: 45.4 - 53.2



B-4194, 33541.1.1  
BORING B2-B  
DEPTH: 53.2 - 62.9

