

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	33536.1.1 (B-4189)	1	13

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

STRUCTURE
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 33536.1.1 (B-4189) F.A. PROJ. BRSTP-226(8)
COUNTY MCDOWELL
PROJECT DESCRIPTION _____

SITE DESCRIPTION BRIDGE NO. 49 ON NC 226 OVER
SOUTH MUDDY CREEK

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CAUTION NOTICE

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

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

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

PROJECT: 33536.1.1 ID: B-4189

PERSONNEL

T.B. DANIEL

R.D. CHILDERS

C.J. COFFEY

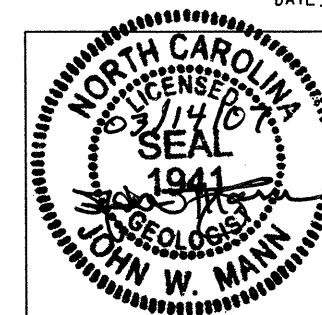
G.K. ROSE

INVESTIGATED BY **J.W. MANN**

CHECKED BY **W.D. FRYE**

SUBMITTED BY **W.D. FRYE**

DATE **03/14/07**



DRAWN BY: **J.W. MANN**

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																																																							
<p>SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLES:</p> <p align="center"><i>VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGH PLASTIC, A-7-6</i></p>		<p>WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED) GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.</p> <p>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.</p>		<p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p>		<p>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 SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. 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 DISLOGGED 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 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 (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.</p>																																																							
<p>SOIL LEGEND AND AASHTO CLASSIFICATION</p> <table border="1"> <tr> <th>GENERAL CLASS.</th> <th>GRANULAR MATERIALS (≤ 35% PASSING #200)</th> <th>SILT-CLAY MATERIALS (> 35% PASSING #200)</th> <th>ORGANIC MATERIALS</th> </tr> <tr> <td>GROUP CLASS.</td> <td>A-1, A-1-b, A-3</td> <td>A-2, A-2-4, A-2-5, A-2-6, A-2-7</td> <td>A-4, A-5, A-6, A-7</td> </tr> <tr> <td>SYMBOL</td> <td></td> <td></td> <td></td> </tr> <tr> <td>% PASSING</td> <td>50 MX, 30 MX, 15 MX, 10 MX, 5 MX</td> <td>40 MX, 30 MX, 20 MX, 15 MX, 10 MX, 5 MX</td> <td>40 MX, 30 MX, 20 MX, 15 MX, 10 MX, 5 MX</td> </tr> <tr> <td>LIQUID LIMIT PLASTIC INDEX</td> <td>6 MX</td> <td>NP, 10 MX, 11 MX, 12 MX, 13 MX, 14 MX, 15 MX, 16 MX, 17 MX, 18 MX, 19 MX, 20 MX, 21 MX, 22 MX, 23 MX, 24 MX, 25 MX, 26 MX, 27 MX, 28 MX, 29 MX, 30 MX, 31 MX, 32 MX, 33 MX, 34 MX, 35 MX, 36 MX, 37 MX, 38 MX, 39 MX, 40 MX, 41 MX, 42 MX, 43 MX, 44 MX, 45 MX, 46 MX, 47 MX, 48 MX, 49 MX, 50 MX</td> <td>SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER</td> </tr> <tr> <td>GROUP INDEX</td> <td>0</td> <td>0, 4 MX, 8 MX, 12 MX, 16 MX, 20 MX, 24 MX, 28 MX, 32 MX, 36 MX, 40 MX, 44 MX, 48 MX, 52 MX, 56 MX, 60 MX, 64 MX, 68 MX, 72 MX, 76 MX, 80 MX, 84 MX, 88 MX, 92 MX, 96 MX, 100 MX</td> <td>HIGHLY ORGANIC SOILS</td> </tr> <tr> <td>USUAL TYPES OF MAJOR MATERIALS</td> <td>STONE FRAGS, GRAVEL, AND SAND</td> <td>FINE SAND, SILTY OR CLAYEY GRAVEL AND SAND</td> <td>SILTY SOILS, CLAYEY SOILS</td> </tr> <tr> <td>GEN. RATING AS A SUBGRADE</td> <td>EXCELLENT TO GOOD</td> <td>FAIR TO POOR</td> <td>FAIR TO POOR, POOR, UNSUITABLE</td> </tr> </table> <p>PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30</p>		GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)	SILT-CLAY MATERIALS (> 35% PASSING #200)	ORGANIC MATERIALS	GROUP CLASS.	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RATING AS A SUBGRADE	EXCELLENT TO GOOD	FAIR TO POOR	FAIR TO POOR, POOR, UNSUITABLE	<p>MINERALOGICAL COMPOSITION</p> <p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.</p> <p>COMPRESSIBILITY</p> <p>SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50</p> <p>PERCENTAGE OF MATERIAL</p> <table border="1"> <tr> <th>ORGANIC MATERIAL</th> <th>GRANULAR SOILS</th> <th>SILT - CLAY SOILS</th> <th>OTHER MATERIAL</th> </tr> <tr> <td>TRACE OF ORGANIC MATTER</td> <td>2 - 3%</td> <td>3 - 5%</td> <td>TRACE 1 - 10%</td> </tr> <tr> <td>LITTLE ORGANIC MATTER</td> <td>3 - 5%</td> <td>5 - 12%</td> <td>LITTLE 10 - 20%</td> </tr> <tr> <td>MODERATELY ORGANIC</td> <td>5 - 10%</td> <td>12 - 20%</td> <td>SOME 20 - 35%</td> </tr> <tr> <td>HIGHLY ORGANIC</td> <td>>10%</td> <td>>20%</td> <td>HIGHLY 35% AND ABOVE</td> </tr> </table> <p>GROUND WATER</p> <p> WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING STATIC WATER LEVEL AFTER 24 HOURS PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA SPRING OR SEEP</p>		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	<p>WEATHERED ROCK (WR) NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>WEATHERING</p> <p>FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE. VERY SLIGHT (V SLI.) ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN. CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE. SLIGHT (SLI.) ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS. MODERATE (MOD.) SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED. SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK. MODERATELY SEVERE (MOD. SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i> SEVERE (SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. <i>IF TESTED, YIELDS SPT N VALUES > 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.</p>					
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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

March 14, 2007

STATE PROJECT: 33536.1.1 (B-4189)
F. A. PROJECT: BRSTP-226(8)
COUNTY: McDowell

DESCRIPTION: Bridge No. 49 on NC-226 over South Muddy Creek

SUBJECT: Geotechnical Report – Foundation Investigation

Project Description

This project is located in southeastern McDowell County, approximately 0.5 mile northwest of the Dysartsville community. The replacement bridge is to be constructed in the same location as the existing crossing. The new structure will consist of a single 120 foot span erected on a 90 degree skew, with a roadway width of 30 feet.

The subsurface investigation performed by the Geotechnical Engineering Unit was completed utilizing a CME-550 ORV drill unit equipped with an automatic hammer for Standard Penetration Testing (SPT) through 8-inch hollow stem augers. Soil samples were collected and submitted to the Materials and Tests Unit for AASHTO classification.

Physiography and Geology

The project area is located in the Inner Piedmont Belt and underlain by an intrusive migmatitic granitic gneiss (identified by symbol OCgm on the 1985 North Carolina Geologic Map). Gently rolling terrain is characteristic of this area. At the bridge site, local relief is negligible due to the ± 700 foot floodplain developed by South Muddy Creek.

Embankment, alluvium, saprolite, weathered rock, and crystalline rock compose the soil and rock profile at the site. Embankment soils range from soft to medium stiff silty clay at End Bent One to soft sandy silt at End Bent Two. Up to 18 feet of these soils has been placed upon alluvium comprised of very loose to loose sand and soft silt. The stratigraphic break between the alluvium and saprolite horizons occurs between Elevations ± 1140 and ± 1145 feet. Approximately 20 to 25 feet of very loose to medium dense sand typifies the residual horizon before its abrupt contact with weathered rock between approximate Elevation 1120. Weathered rock was penetrated a maximum of three feet before auger refusal was achieved.

Detour Bridge

An 80 foot long single span detour bridge is proposed to be located ± 45 feet downstream from the existing -L- crossing. One centerline boring was advanced on both sides of the creek at this locale. Approximately 13 feet of very loose to loose alluvial sand and very soft silt has been deposited over saprolite at this site. The top of the residuum is at Elevation ± 1142 feet. Soft to stiff silt and loose to very dense sand comprise this horizon, which extends between 37 and 42 feet beneath the ground surface before the weathered rock – crystalline rock contact at elevations ± 1112 and ± 1118 feet.

Groundwater

Groundwater was not measured in the -L- alignment borings due to the urgency to re-open travel lanes. It was measured in both detour borings between elevation 1147 and 1149 feet.

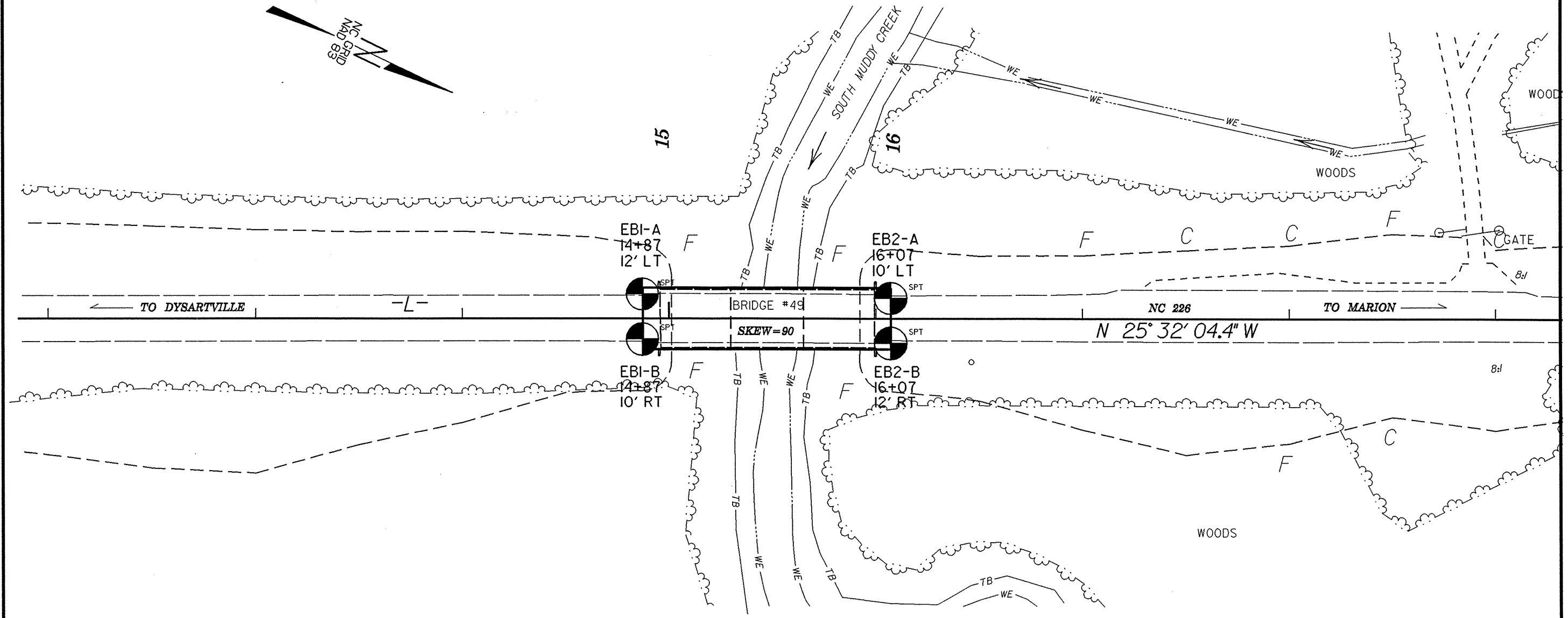
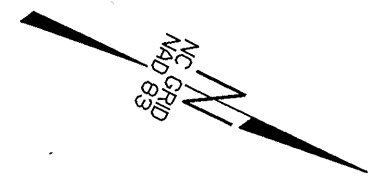
Closing Statement

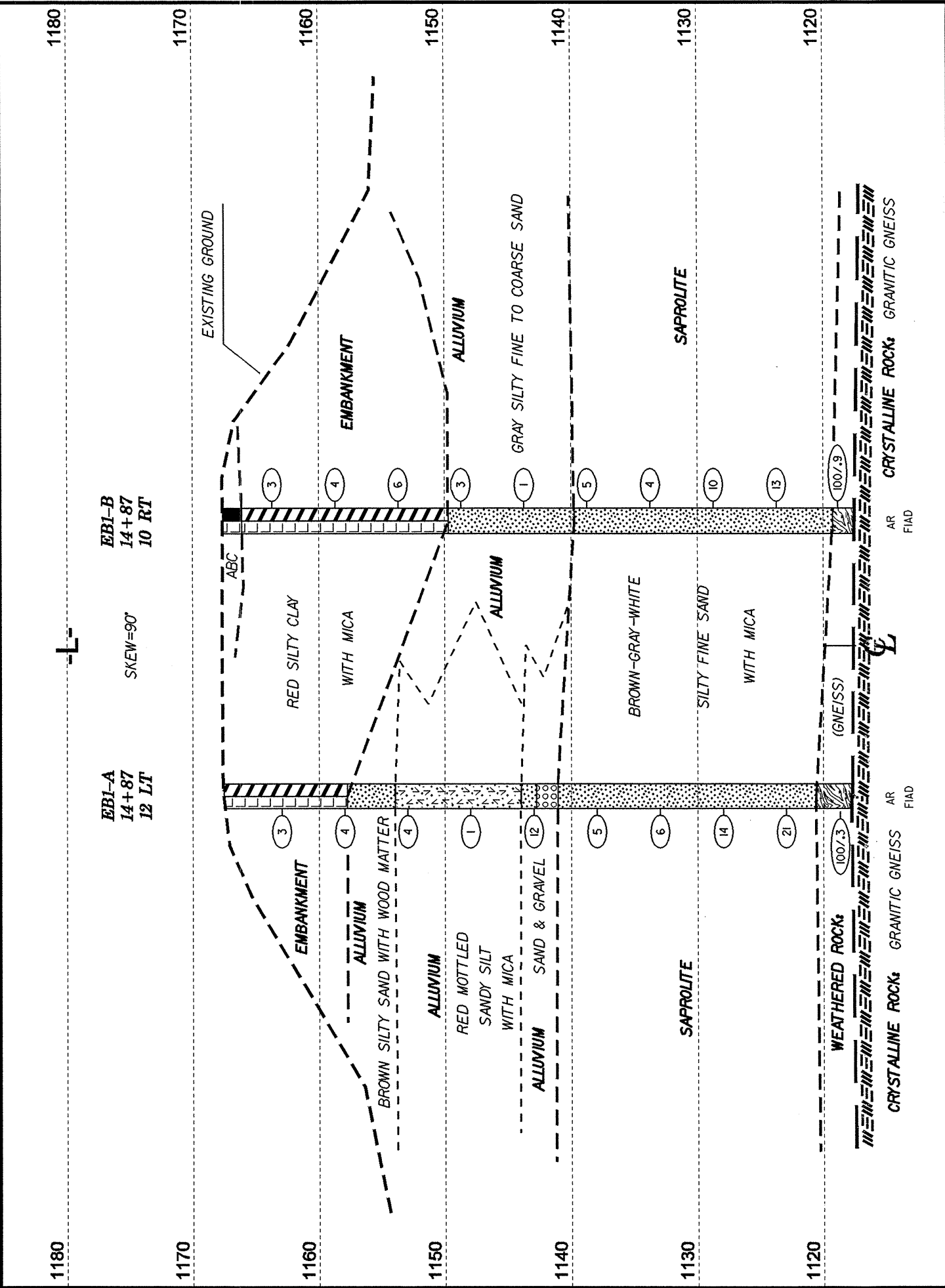
This Geotechnical Foundation Investigation was based on a Bridge Survey and Hydraulics Design report dated August 14, 2006. If any significant changes are made in either the design or location of the proposed structure, the subsurface information will have to be reviewed and modified as necessary.

Respectfully Submitted,

John W. Mann, LG
Project Geological Engineer

PROJECT REFERENCE NO.	SHEET
33536.1.1 (B-4189)	4 OF 13
SITE PLAN	

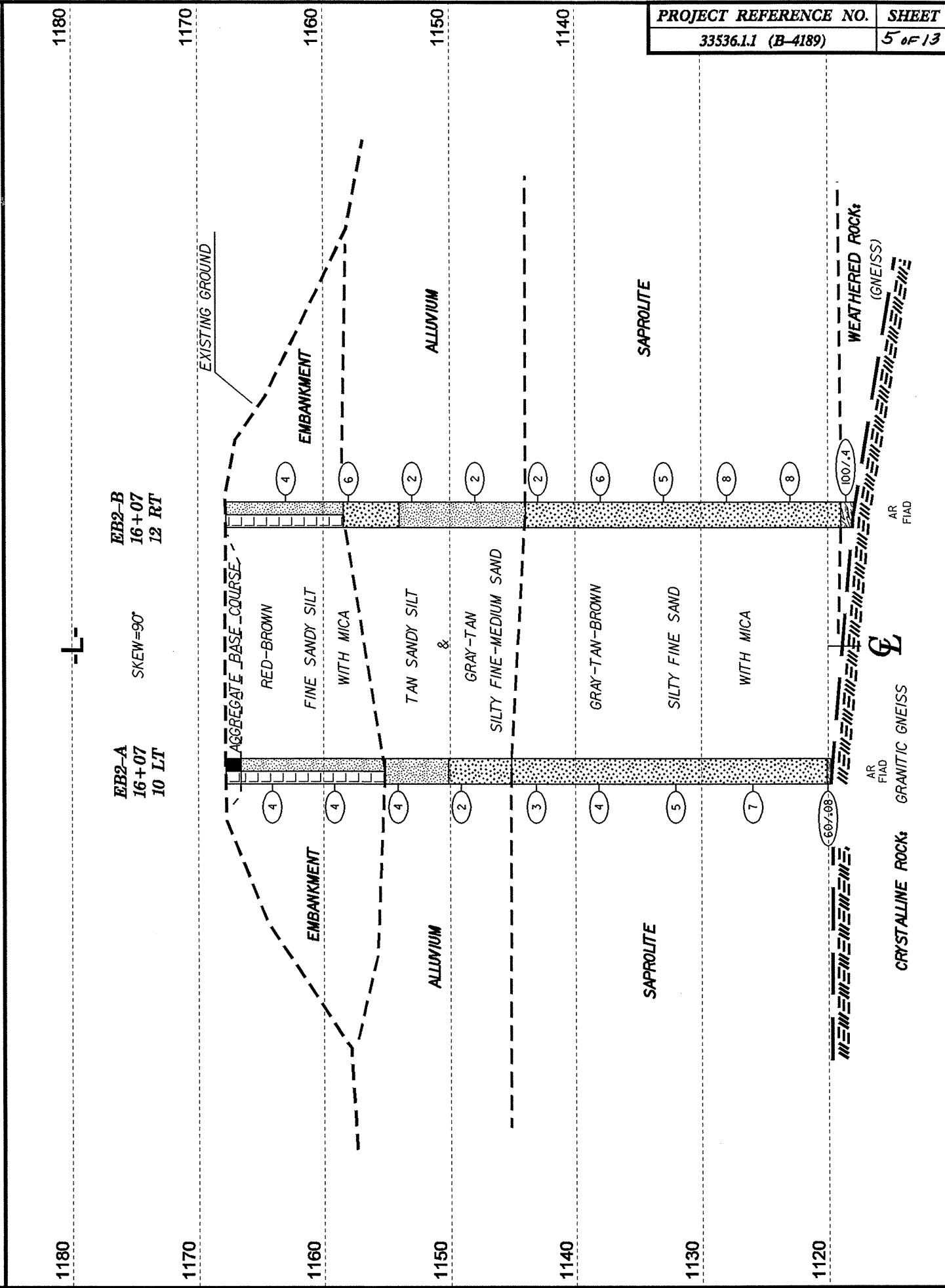




HORIZ. SCALE 0 10 20 (FEET)

VE = 1

END BENT 1 CROSS SECTION



HORIZ. SCALE 0 10 20 (FEET)

VE = 1

END BENT 2 CROSS SECTION

PROJECT NO. 33536.1.1		ID. B-4189		COUNTY McDowell		GEOLOGIST Daniel, T. B.									
SITE DESCRIPTION Bridge No. 49 on NC 226 over South Muddy Creek							GROUND WTR (ft)								
BORING NO. EB1-A		STATION 14+87		OFFSET 12 ft LT		ALIGNMENT -L-									
COLLAR ELEV. 1,167.6 ft		TOTAL DEPTH 49.8 ft		NORTHING 687,213		EASTING 1,145,804									
DRILL MACHINE CME-550X		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
START DATE 02/06/07		COMP. DATE 02/06/07		SURFACE WATER DEPTH N/A		DEPTH TO ROCK N/A									
ELEV. (ft)	ELEV. 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						
1170													1,167.6	GROUND SURFACE	0.0
1165	1,164.0 3.6	0	1	2							SS-10			ROADWAY EMBANKMENT Red silty CLAY with mica	
1160	1,159.0 8.6	1	2	2							SS-11		1,157.8		9.8
1155	1,154.0 13.6	2	2	2							SS-12		1,154.0	ALLUVIAL Brown silty SAND with wood matter	13.6
1150	1,149.0 18.6	1	1	0										ALLUVIAL Red mottled sandy SILT with mica	
1145	1,144.0 23.6	2	0	12							SS-13	Sat.	1,144.0 1,142.8	ALLUVIAL Gray silty fine Sand	23.6 24.8
1140	1,139.0 28.6	2	2	3									1,141.1	ALLUVIAL Gravel	26.5
1135	1,134.0 33.6	2	3	3							SS-14			SAPROLITE Brown-Gray-White silty fine SAND with mica	
1130	1,129.0 38.6	4	7	7							SS-15				
1125	1,124.0 43.6	12	10	11											
1120	1,119.0 48.6	100/3											1,120.6 1,117.8	WEATHERED ROCK (Gneiss)	47.0 49.8
Boring Terminated by Auger Refusal at Elevation 1,117.8 ft on Crystalline Rock (Granitic Gneiss)															

NCDOT BORE SINGLE B4189_GEO_BH.GPJ NC_DOT.GDT 09/01/07

PROJECT NO. 33536.1.1		ID. B-4189		COUNTY McDowell		GEOLOGIST Daniel, T. B.									
SITE DESCRIPTION Bridge No. 49 on NC 226 over South Muddy Creek							GROUND WTR (ft)								
BORING NO. EB1-B		STATION 14+87		OFFSET 10 ft RT		ALIGNMENT -L-									
COLLAR ELEV. 1,167.6 ft		TOTAL DEPTH 50.1 ft		NORTHING 687,223		EASTING 1,145,824									
DRILL MACHINE CME-550X		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
START DATE 02/07/07		COMP. DATE 02/07/07		SURFACE WATER DEPTH N/A		DEPTH TO ROCK N/A									
ELEV. (ft)	ELEV. 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						
1170													1,167.6	GROUND SURFACE	0.0
1165	1,164.7 2.9	2	2	1									1,166.1	ROADWAY EMBANKMENT Aggregate Base Course ROADWAY EMBANKMENT Red silty CLAY with mica	1.5
1160	1,159.7 7.9	1	2	2											
1155	1,154.7 12.9	1	2	4											
1150	1,149.7 17.9	1	1	2										ALLUVIAL Gray silty fine to coarse SAND	17.9
1145	1,144.7 22.9	0	0	1											
1140	1,139.7 27.9	2	2	3										SAPROLITE Brown-Gray silty fine SAND with mica	27.9
1135	1,134.7 32.9	3	2	2											
1130	1,129.7 37.9	2	4	6											
1125	1,124.7 42.9	4	6	7											
1120	1,119.7 47.9	2	100/4										1,119.2 1,117.5	WEATHERED ROCK (Gneiss)	48.4 50.1
Boring Terminated by Auger Refusal at Elevation 1,117.5 ft on Crystalline Rock (Granitic Gneiss)															

NCDOT BORE SINGLE B4189_GEO_BH.GPJ NC_DOT.GDT 09/01/07

PROJECT NO. 33536.1.1		ID. B-4189		COUNTY McDowell		GEOLOGIST Daniel, T. B.									
SITE DESCRIPTION Bridge No. 49 on NC 226 over South Muddy Creek							GROUND WTR (ft)								
BORING NO. EB2-A		STATION 16+07		OFFSET 10 ft LT		ALIGNMENT -L-									
COLLAR ELEV. 1,167.8 ft		TOTAL DEPTH 48.0 ft		NORTHING 687,323		EASTING 1,145,754									
DRILL MACHINE CME-550X		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
START DATE 02/07/07		COMP. DATE 02/07/07		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 47.7 ft									
ELEV. (ft)	ELEV. DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
		0.5ft	0.5ft	0.5ft	0	25	50	75	100						
1170													1,167.8	GROUND SURFACE	0.0
	1,165.1	2	2	2									1,166.6	ROADWAY EMBANKMENT Aggregate Base Course	1.2
														ROADWAY EMBANKMENT Red-Brown sandy SILT with mica	
1160	1,160.1	2	2	2											
	1,155.1	3	2	2									1,155.1	ALLUVIAL Tan sandy SILT with mica	12.7
1150	1,150.1	2	1	1							SS-16 Sat.		1,150.1	ALLUVIAL Tan silty fine to medium SAND	17.7
	1,145.1	2	1	2									1,145.1	SAPROLITE Gray-Tan-Brown silty fine SAND with mica	22.7
1140	1,140.1	1	2	2											
1135	1,135.1	2	2	3											
1130	1,130.1	2	3	4											
1125	1,125.1	5	11	9											
1120	1,120.1	60/08											1,120.1	CRYSTALLINE ROCK (migmatitic granitic GNEISS)	47.7
													1,119.8	Boring Terminated by Auger Refusal at Elevation 1,119.8 ft on Crystalline Rock (Granitic Gneiss)	48.0

NCDOT BORE SINGLE B4189 GEO_BH.GPJ NC_DOT.GDT 03/01/07

PROJECT NO. 33536.1.1		ID. B-4189		COUNTY McDowell		GEOLOGIST Daniel, T. B.									
SITE DESCRIPTION Bridge No. 49 on NC 226 over South Muddy Creek							GROUND WTR (ft)								
BORING NO. EB2-B		STATION 16+07		OFFSET 12 ft RT		ALIGNMENT -L-									
COLLAR ELEV. 1,167.8 ft		TOTAL DEPTH 49.8 ft		NORTHING 687,332		EASTING 1,145,774									
DRILL MACHINE CME-550X		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
START DATE 02/06/07		COMP. DATE 02/06/07		SURFACE WATER DEPTH N/A		DEPTH TO ROCK N/A									
ELEV. (ft)	ELEV. DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
		0.5ft	0.5ft	0.5ft	0	25	50	75	100						
1170													1,167.8	GROUND SURFACE	0.0
	1,164.0	2	2	2										ROADWAY EMBANKMENT Brown-Red fine sandy SILT	
1160	1,159.0	2	3	3											
	1,158.4												1,158.4	ALLUVIAL Gray silty fine SAND	9.4
1155	1,154.0	2	1	1									1,154.0	ALLUVIAL Tan fine sandy SILT	13.8
1150	1,149.0	0	1	1											
	1,144.0	1	1	1									1,144.0	SAPROLITE Gray-Brown-Tan silty fine SAND with mica	23.8
1140	1,139.0	1	3	3											
1135	1,134.0	1	2	3											
1130	1,129.0	1	2	6											
1125	1,124.0	2	3	5											
1120	1,119.0	100/4											1,119.0	WEATHERED ROCK (Gneiss)	48.8
													1,118.0	Boring Terminated by Auger Refusal at Elevation 1,118.0 ft on Crystalline Rock (Granitic Gneiss)	49.8

NCDOT BORE SINGLE B4189 GEO_BH.GPJ NC_DOT.GDT 03/01/07

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

T.I.P. ID #: B-4189

REPORT ON SAMPLES OF: Soils for Quality

PROJECT:	33536.1.1	COUNTY:	McDowell	Owner:	NCDOT
DATE SAMPLED:	2.6.07	DATE RECEIVED:	2.7.07	DATE REPORTED:	2.14.07
SAMPLED FROM:	Bridge	SAMPLED BY:	J. W. Mann		
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	154514	154515	154516	154517	154518	154519	154520	154521
HiCAMS Sample #	--	--	--	--	--	--	--	--
Retained #4 Sieve %	0.0	5.6	0.0	0.0	0.0	0.0	0.0	0.0
Passing #10 Sieve %	91	85	100	94	100	98	98	98
Passing #40 Sieve %	76	70	95	79	88	83	76	86
Passing #200 Sieve %	43	33	53	45	28	29	27	33

MINUS #10 FRACTION

Soil Mortar - 100%								
Coarse Sand -Ret. #60	29	33	14	28	27	29	36	22
Fine Sand - Ret. #270	29	33	43	27	55	50	47	56
Silt 0.05-0.005 mm %	18	14	23	13	12	19	17	22
Clay < 0.005 mm %	24	20	20	32	6	2	0	0
Passing # 40 Sieve %	--	--	--	--	--	--	--	--
Passing # 200 Sieve %	--	--	--	--	--	--	--	--

Liquid Limit	32	32	33	37	38	35	31	39
Plastic Index	NP	NP	NP	8	NP	NP	NP	NP
AASHTO Classification	A-4 (1)	A-2-4 (0)	A-4 (3)	A-4 (2)	A-2-4 (0)	A-2-4 (0)	A-2-4 (0)	A-2-4 (0)
Quantity								
Texture								
Station	16+07	16+07	16+07	16+07	16+07	16+07	16+07	16+07
Hole No.								
Depth (ft) From:	3.8	9.4	13.8	18.8	23.8	28.8	33.8	38.8
To:	5.3	10.3	15.3	20.3	25.3	29.3	35.3	40.3

Remarks:

A-154514 - 154521

CC:

J. W. Mann	
File	

SOILS ENGINEER:

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

T.I.P. ID #: B-4189

REPORT ON SAMPLES OF: Soils for Quality

PROJECT:	33536.1.1 (cont.)	COUNTY:	McDowell	Owner:	NCDOT
DATE SAMPLED:	2.6.07	DATE RECEIVED:	2.7.07	DATE REPORTED:	2.14.07
SAMPLED FROM:	Bridge	SAMPLED BY:	J. W. Mann		
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	154522	154523	154524	154525	154526	154527	154528	154531
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	94	92	95	97	100	94	95
Passing #40 Sieve %	84	80	81	82	81	83	80	73
Passing #200 Sieve %	27	51	52	51	15	22	26	19

MINUS #10 FRACTION

Soil Mortar - 100%								
Coarse Sand -Ret. #60	29	26	24	25	42	36	31	52
Fine Sand - Ret. #270	53	23	23	27	47	48	49	30
Silt 0.05-0.005 mm %	18	19	21	20	7	14	14	8
Clay < 0.005 mm %	0	32	32	28	4	2	6	10
Passing # 40 Sieve %	--	--	--	--	--	--	--	--
Passing # 200 Sieve %	--	--	--	--	--	--	--	--

Liquid Limit	39	42	43	44	27	34	33	23
Plastic Index	NP	14	12	8	NP	NP	NP	NP
AASHTO Classification	A-2-4 (0)	A-7-6 (5)	A-7-5 (4)	A-5 (3)	A-2-4 (0)	A-2-4 (0)	A-2-4 (0)	A-2-4 (0)
Quantity								
Texture								
Station	16+07	14+87	14+87	14+87	14+87	14+87	14+87	16+07
Hole No.								
Depth (ft) From:	43.8	3.6	8.6	13.6	23.6	33.6	38.6	17.7
To:	45.3	5.1	10.1	15.1	25.1	35.1	40.1	19.2

Remarks:

A-154522 - 154531

CC:

J. W. Mann	
File	

SOILS ENGINEER:



**FIELD
 SCOUR REPORT**

WBS: 33536.1.1 TIP: B-4189 COUNTY: MCDOWELL

DESCRIPTION(1): BRIDGE NO. 49 ON NC 226 OVER SOTH MUDDY CREEK

EXISTING BRIDGE

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

Bridge No.: 49 Length: 105.5' Total Bents: 4 Bents in Channel: 1 Bents in Floodplain: 3
 Foundation Type: Timber Piles

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: None: End Bents have a concrete apron.

Interior Bents: Scour evidenced upstation and at Bent 2.

Channel Bed: None Noted

Channel Bank: None Noted

EXISTING SCOUR PROTECTION

Type(3): Concrete aprons at End Bents; Rip rap at Bent 2

Extent(4): Bent 2 unprotected from normal channel flow

Effectiveness(5): Poor at Bent 2

Obstructions(6): Minor log debris

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): Silt, Sand & Gravel

Channel Bank Material(8): Sand

Channel Bank Cover(9): Trees, Bramble

Floodplain Width(10): ~700'

Floodplain Cover(11): Trees, Bramble

Stream is(12): Aggrading _____ Degrading Static _____

Channel Migration Tendency(13): Toward End Bent 2 (North)

Observations and Other Comments: Stream velocity is generally slow; significant meanders have developed downstream from bridge site

DESIGN SCOUR ELEVATIONS(14)

Feet Meters _____

BENTS

	B1	B2	B3	B4									
SB Lanes, Lt													
SB Lanes, Rt													
NB Lanes, Lt													
NB Lanes, Rt													

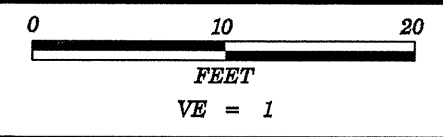
Comparison of DSE to Hydraulics Unit theoretical scour:
 Single Span Structure: No projected scour at End Bents on BSR.

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

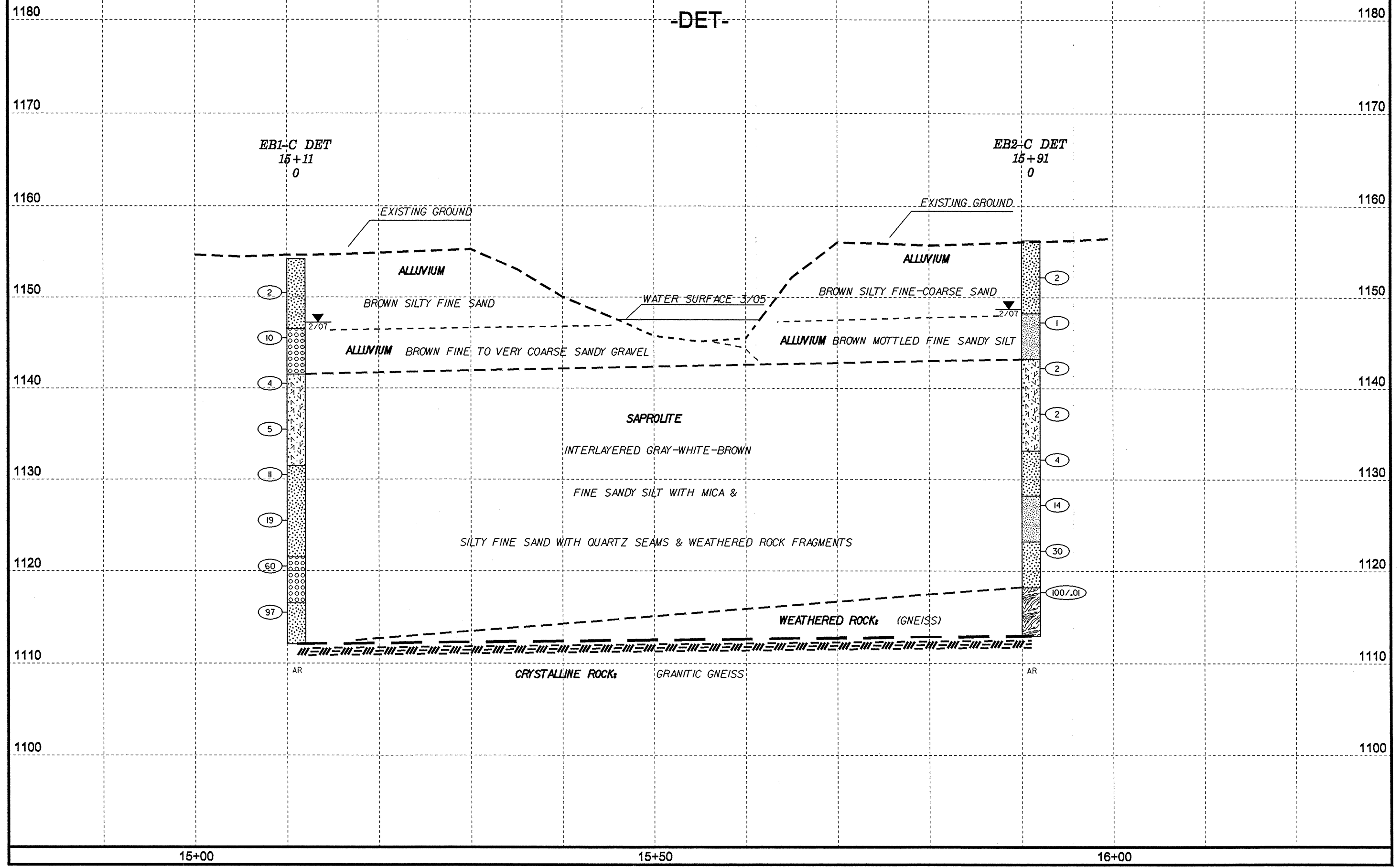
Bed or Bank													
Sample No.													
Retained #4													
Passed #10													
Passed #40													
Passed #200													
Coarse Sand													
Fine Sand													
Silt													
Clay													
LL													
PI													
AASHTO													
Station										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

Reported by: J.W. Mahn

Date: 3/7/2007



PROJECT REFERENCE NO.	SHEET
33536.1.1 (B-4189)	11 OF 13
DETOUR E PROFILE	



PROJECT NO. 33536.1.1		ID. B-4189		COUNTY McDowell		GEOLOGIST Daniel, T. B.									
SITE DESCRIPTION Bridge No. 49 on NC 226 over South Muddy Creek							GROUND WTR (ft)								
BORING NO. EB1-C DET		STATION 15+11		OFFSET 0 ft CL		ALIGNMENT -DET-									
COLLAR ELEV. 1,154.2 ft		TOTAL DEPTH 42.1 ft		NORTHING 687,257		EASTING 1,145,845									
DRILL MACHINE CME-550X		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
START DATE 02/08/07		COMP. DATE 02/08/07		SURFACE WATER DEPTH N/A		DEPTH TO ROCK N/A									
ELEV. (ft)	ELEV. 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						
1155													1,154.2	GROUND SURFACE	0.0
	1,151.5	1	1	1										ALLUVIAL Brown silty fine SAND	
1150	2.7														
	1,146.5	2	4	6									1,146.5	ALLUVIAL Brown fine to very coarse sandy GRAVEL	7.7
1145	7.7														
	1,141.5	2	2	2									1,141.5	SAPROLITE Gray-White fine sandy SILT with mica	12.7
1140	12.7														
	1,136.5	1	2	3											
1135	17.7														
	1,131.5	3	6	5									1,131.5	SAPROLITE Gray-Brown-White silty fine SAND with mica	22.7
1130	22.7														
	1,126.5	10	11	8											
1125	27.7														
	1,121.5	10	27	33									1,121.5	SAPROLITE Brown silty fine SAND with weathered rock fragments	32.7
1120	32.7														
	1,116.5	30	41	56									1,116.5	SAPROLITE Brown-Gray silty fine SAND with mica	37.7
1115	37.7														
													1,112.1	Boring Terminated by Auger Refusal at Elevation 1,112.1 ft on Crystalline Rock (Granitic Gneiss)	42.1
1110															

NCDOT BORE SINGLE B4189_GEO_BH.GPJ_NC_DOT.GDT_03/01/07

PROJECT NO. 33536.1.1		ID. B-4189		COUNTY McDowell		GEOLOGIST Daniel, T. B.									
SITE DESCRIPTION Bridge No. 49 on NC 226 over South Muddy Creek							GROUND WTR (ft)								
BORING NO. EB2-C DET		STATION 15+91		OFFSET 0 ft CL		ALIGNMENT -DET-									
COLLAR ELEV. 1,156.2 ft		TOTAL DEPTH 43.2 ft		NORTHING 687,329		EASTING 1,145,810									
DRILL MACHINE CME-550X		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
START DATE 02/08/07		COMP. DATE 02/08/07		SURFACE WATER DEPTH N/A		DEPTH TO ROCK N/A									
ELEV. (ft)	ELEV. 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						
1160															
	1,156.2												1,156.2	GROUND SURFACE	0.0
1155														ALLUVIAL Brown silty fine to coarse SAND	
	1,153.2	1	1	1											
1150	3.0														
	1,148.2	0	0	1									1,148.2	ALLUVIAL Brown mottled fine sandy SILT	8.0
1145	8.0														
	1,143.2	0	1	1									1,143.2	SAPROLITE Brown-Gray fine sandy SILT with mica	13.0
1140	13.0														
	1,138.2	0	1	1											
1135	18.0														
	1,133.2	2	2	2									1,133.2	SAPROLITE Gray-Brown-White silty SAND with quartz seams	23.0
1130	23.0														
	1,128.2	2	5	9									1,128.2	SAPROLITE Brown sandy SILT	28.0
1125	28.0														
	1,123.2	10	18	12									1,123.2	SAPROLITE Brown-Gray silty fine SAND with quartz seams	33.0
1120	33.0														
	1,118.2	70	307.01										1,118.2	WEATHERED ROCK (Gneiss)	38.0
1115	38.0														
													1,113.0	Boring Terminated by Auger Refusal at Elevation 1,113.0 ft on Crystalline Rock (Granitic Gneiss)	43.2
1110															

NCDOT BORE SINGLE B4189_GEO_BH.GPJ_NC_DOT.GDT_03/01/07

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

T.I.P. ID #: B-4189

REPORT ON SAMPLES OF: Soils for Quality

PROJECT:	33536.1.1	COUNTY:	McDowell	Owner:	NCDOT
DATE SAMPLED:	2.8.07	DATE RECEIVED:	2.9.07	DATE REPORTED:	2.22.07
SAMPLED FROM:	Bridge	SAMPLED BY:	J. W. Mann		
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	154545	154546	154547	154548	154549	154550	154551	154552
HiCAMS Sample #	--	--	--	--	--	--	--	--
Retained #4 Sieve %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.0
Passing #10 Sieve %	96	95	100	100	96	98	89	69
Passing #40 Sieve %	85	83	93	95	76	91	67	41
Passing #200 Sieve %	33	40	43	39	28	37	26	7

MINUS #10 FRACTION

Soil Mortar - 100%								
Coarse Sand -Ret. #60	25	27	17	14	35	20	38	68
Fine Sand - Ret. #270	47	35	50	57	44	55	41	24
Silt 0.05-0.005 mm %	14	16	25	21	17	19	17	6
Clay < 0.005 mm %	14	22	8	8	4	6	4	2
Passing # 40 Sieve %	--	--	--	--	--	--	--	--
Passing # 200 Sieve %	--	--	--	--	--	--	--	--

Liquid Limit	23	21	48	42	34	31	26	15
Plastic Index	NP	NP	NP	NP	NP	NP	NP	NP
AASHTO Classification	A-2-4 (0)	A-4 (1)	A-5 (2)	A-5 (1)	A-2-4 (0)	A-4 (1)	A-2-4 (0)	A-1-b (0)
Quantity								
Texture								
Station	14+94	14+94	14+94	14+94	14+94	14+94	14+94	14+14
Hole No.								
Depth (ft) From:	3.0	8.0	13.0	18.0	23.0	28.0	33.0	7.7
To:	4.5	9.5	14.5	19.5	24.5	29.5	34.5	9.2

Remarks:
A-154545 - 154552

CC:
J. W. Mann
File

SOILS ENGINEER:

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

T.I.P. ID #: B-4189

REPORT ON SAMPLES OF: Soils for Quality

PROJECT:	33536.1.1 (cont.)	COUNTY:	McDowell	Owner:	NCDOT
DATE SAMPLED:	2.8.07	DATE RECEIVED:	2.9.07	DATE REPORTED:	2.22.07
SAMPLED FROM:	Bridge	SAMPLED BY:	J. W. Mann		
SUBMITTED BY:	W. D. Frye	2002	STANDARD SPECIFICATION		
LABORATORY:	Asheville				

TEST RESULTS

Project Sample No.	SS-25	SS-26						
Lab Sample No. A	154553	154554						
HiCAMS Sample #	--	--						
Retained #4 Sieve %	17.0	0.0						
Passing #10 Sieve %	59	77						
Passing #40 Sieve %	42	59						
Passing #200 Sieve %	17	22						

MINUS #10 FRACTION

Soil Mortar - 100%								
Coarse Sand -Ret. #60	42	38						
Fine Sand - Ret. #270	34	39						
Silt 0.05-0.005 mm %	18	19						
Clay < 0.005 mm %	6	4						
Passing # 40 Sieve %	--	--						
Passing # 200 Sieve %	--	--						

Liquid Limit	19	23						
Plastic Index	NP	NP						
AASHTO Classification	A-1-b (0)	A-2-4 (0)						
Quantity								
Texture								
Station	14+14	14+14						
Hole No.								
Depth (ft) From:	32.7	37.7						
To:	34.2	39.2						

Remarks:
A-154553 & 154554

CC:
J. W. Mann
File

SOILS ENGINEER: