

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

STRUCTURE
SUBSURFACE INVESTIGATION

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PROJ. REFERENCE NO. 38621.1.1 B-4851 F.A. PROJ. BRZ-1308(6)
 COUNTY YANCEY
 PROJECT DESCRIPTION BRIDGE NO. 31 ON SR 1308 OVER
BRUSH CREEK

SITE DESCRIPTION _____

CAUTION NOTICE

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

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY IMBERT 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: 38621.1.1 ID: B-4851

PERSONNEL
M.M. HAGER

D.O. CHEEK

G.K. ROSE

C. J. COFFEY

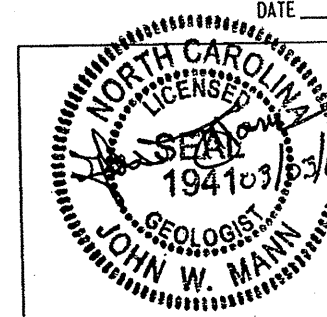
R.D. CHILDERS

INVESTIGATED BY **J.W. MANN**

CHECKED BY **W.D. FRYE**

SUBMITTED BY **W.D. FRYE**

DATE **03/03/11**



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.

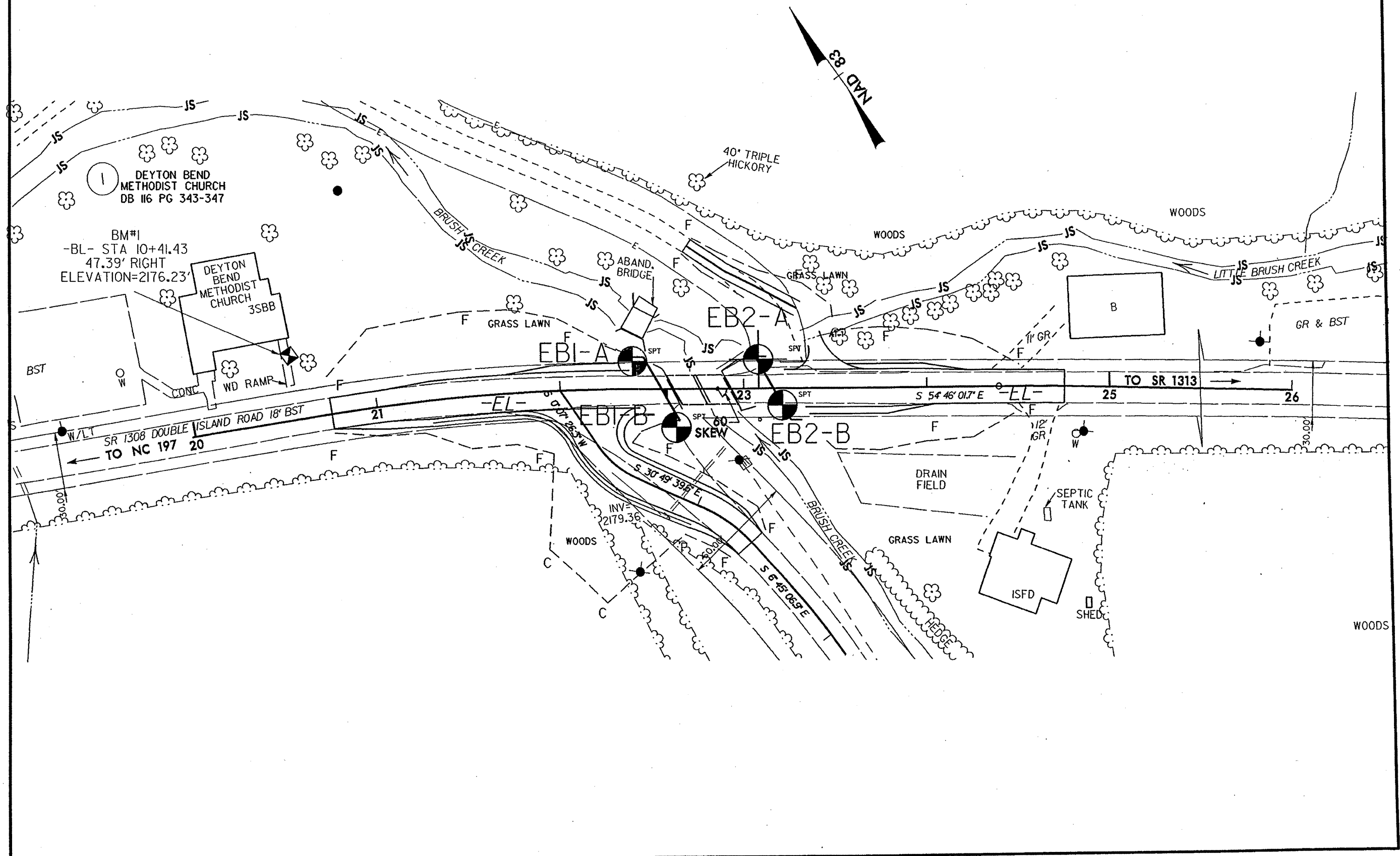
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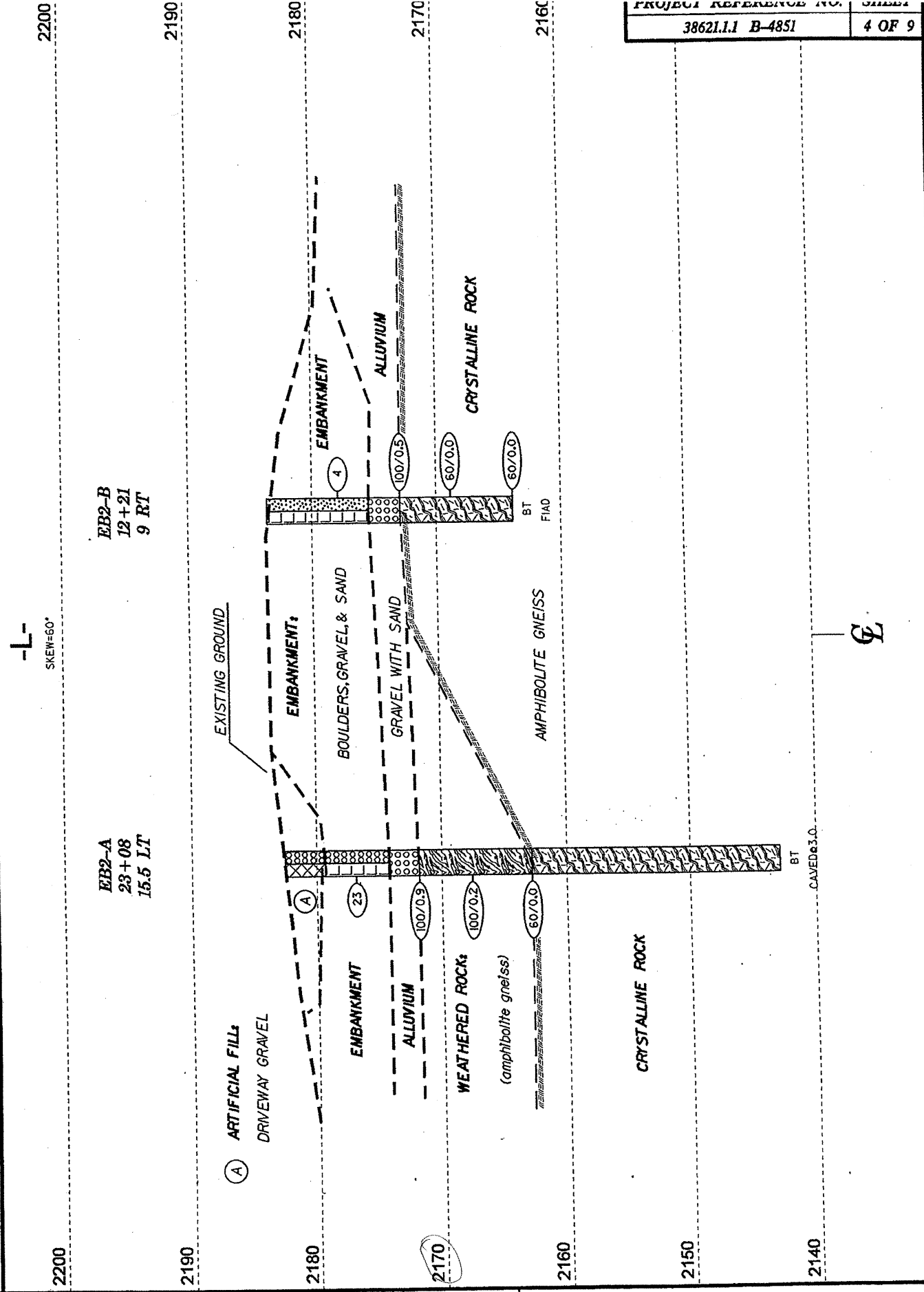
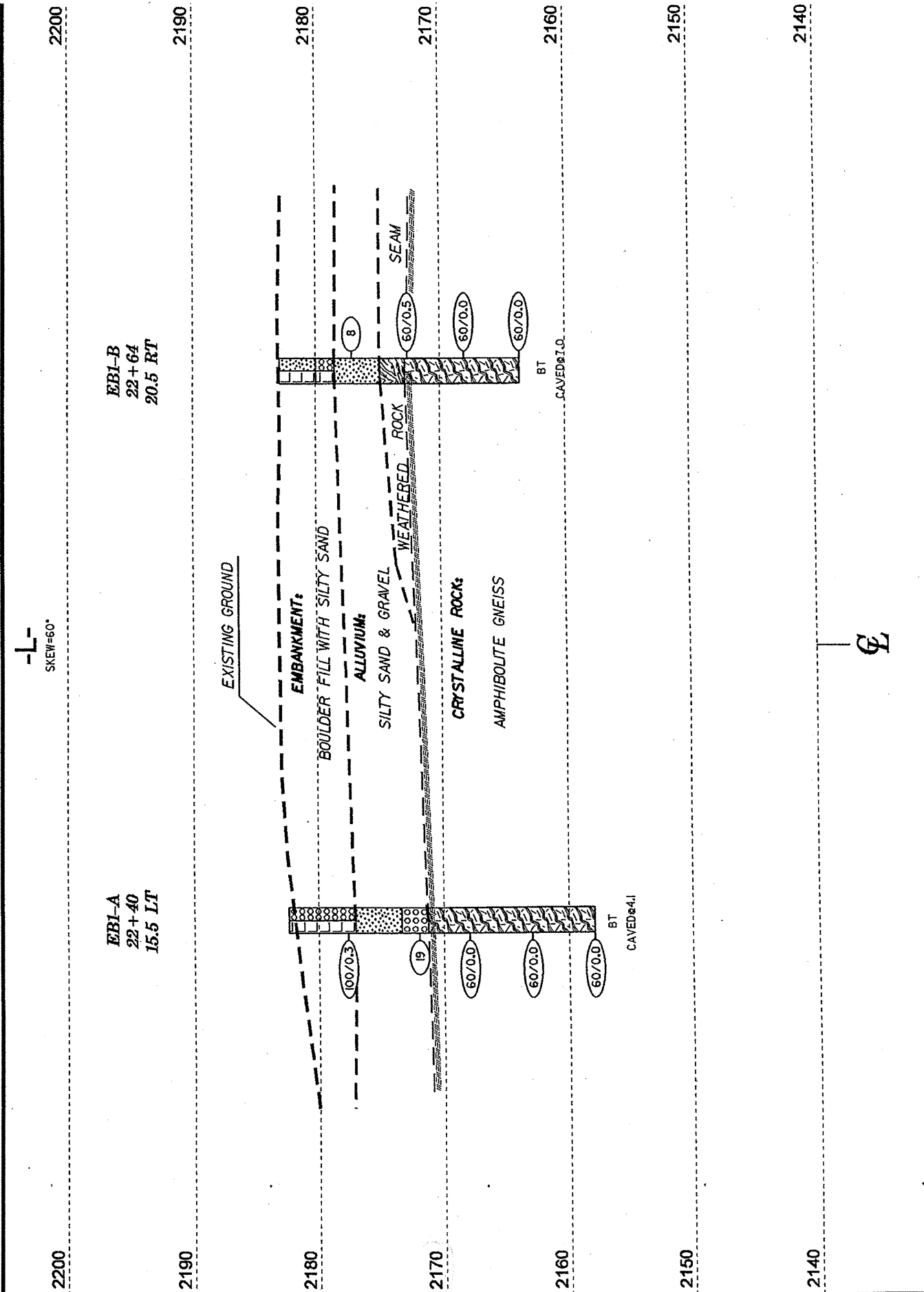
SUBSURFACE INVESTIGATION

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 (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>NEW STFT, GRA, SPT, CL, MOST WITH INTERBEDDED FINE SAND LAYERS, MOIST PLASTIC, A-7-6</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)</p> <p>POORLY GRADED</p> <p>GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.</p> <p>ANGULARITY OF GRAINS</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>WEATHERED ROCK (WR)</p> <p>NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.</p> <p>CRYSTALLINE ROCK (CR)</p> <p>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)</p> <p>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.</p> <p>COASTAL PLAIN SEDIMENTARY ROCK (CPS)</p> <p>COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.</p>		<p>ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.</p> <p>AQUIFER - A WATER BEARING FORMATION OR STRATA.</p> <p>ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.</p> <p>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.</p> <p>ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCLOSED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.</p> <p>CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.</p> <p>COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.</p> <p>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.</p> <p>DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.</p> <p>DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.</p> <p>DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.</p> <p>FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.</p> <p>FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.</p> <p>FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOADED FROM PARENT MATERIAL.</p> <p>FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.</p> <p>FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.</p> <p>JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.</p> <p>LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.</p> <p>LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.</p> <p>MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.</p> <p>PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.</p> <p>RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.</p> <p>ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.</p> <p>SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.</p> <p>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 INTRODUCED ROCKS.</p> <p>SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.</p> <p>STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (IN 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.</p> <p>STRATA CORE RECOVERY (SREC) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.</p> <p>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.</p> <p>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 colspan="7">GRANULAR MATERIALS (< 35% PASSING #200)</th> <th colspan="7">SILT-CLAY MATERIALS (> 35% PASSING #200)</th> <th colspan="2">ORGANIC MATERIALS</th> </tr> <tr> <th>GROUP CLASS.</th> <th colspan="2">A-1</th> <th colspan="2">A-3</th> <th colspan="3">A-2</th> <th colspan="2">A-4</th> <th colspan="2">A-5</th> <th colspan="3">A-6</th> <th colspan="2">A-7</th> <th colspan="2">A-1, A-2</th> <th colspan="2">A-4, A-5</th> </tr> <tr> <th>SYMBOL</th> <td colspan="2">[Symbol]</td> <td colspan="2">[Symbol]</td> <td colspan="3">[Symbol]</td> <td colspan="2">[Symbol]</td> <td colspan="2">[Symbol]</td> <td colspan="3">[Symbol]</td> <td colspan="2">[Symbol]</td> <td colspan="2">[Symbol]</td> <td colspan="2">[Symbol]</td> </tr> <tr> <th>% PASSING</th> <td>10</td> <td>40</td> <td>200</td> <td>40</td> <td>10</td> <td>40</td> <td>200</td> <td>40</td> <td>10</td> <td>40</td> <td>200</td> <td>40</td> <td>10</td> <td>40</td> <td>200</td> <td>40</td> <td>10</td> <td>40</td> <td>200</td> <td>40</td> </tr> <tr> <th>LIQUID LIMIT</th> <td colspan="2">5</td> <td colspan="2">10</td> <td colspan="3">15</td> <td colspan="2">20</td> <td colspan="2">25</td> <td colspan="3">30</td> <td colspan="2">35</td> <td colspan="2">40</td> <td colspan="2">45</td> </tr> <tr> <th>PLASTIC INDEX</th> <td colspan="2">0</td> <td colspan="2">1</td> <td colspan="3">2</td> <td colspan="2">3</td> <td colspan="2">4</td> <td colspan="3">5</td> <td colspan="2">6</td> <td colspan="2">7</td> <td colspan="2">8</td> </tr> <tr> <th>GROUP INDEX</th> <td colspan="2">0</td> <td colspan="2">1</td> <td colspan="3">2</td> <td colspan="2">3</td> <td colspan="2">4</td> <td colspan="3">5</td> <td colspan="2">6</td> <td colspan="2">7</td> <td colspan="2">8</td> </tr> <tr> <th>USUAL TYPES OF MAJOR MATERIALS</th> <td colspan="2">STONE FRAGS. 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ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.</p> <p>COMPRESSIBILITY</p> <p>SLIGHTLY COMPRESSIBLE</p> <p>MODERATELY COMPRESSIBLE</p> <p>HIGHLY COMPRESSIBLE</p> <p>LIQUID LIMIT LESS THAN 31</p> <p>LIQUID LIMIT EQUAL TO 31-50</p> <p>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</td> </tr> <tr> <td>LITTLE ORGANIC MATTER</td> <td>3 - 5%</td> <td>5 - 12%</td> <td>LITTLE</td> </tr> <tr> <td>MODERATELY ORGANIC</td> <td>5 - 10%</td> <td>12 - 20%</td> <td>SOME</td> </tr> <tr> <td>HIGHLY ORGANIC</td> <td>> 10%</td> <td>> 20%</td> <td>HIGHLY</td> </tr> </table>		ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	HIGHLY ORGANIC	> 10%	> 20%	HIGHLY	<p>WEATHERING</p> <p>FRESH</p> <p>ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE.</p> <p>VERY SLIGHT (V SL)</p> <p>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.</p> <p>SLIGHT (SL)</p> <p>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.</p> <p>MODERATE (MOD)</p> <p>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.</p> <p>MODERATELY SEVERE (MOD. SEV.)</p> <p>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. IF TESTED, WOULD YIELD SPT REFUSAL.</p> <p>SEVERE (SEV.)</p> <p>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. IF TESTED, YIELDS SPT N VALUES > 100 BPF.</p> <p>VERY SEVERE (V SEV.)</p> <p>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. IF TESTED, YIELDS SPT N VALUES < 100 BPF.</p> <p>COMPLETE</p> <p>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>		<p>GROUND WATER</p> <p>WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING</p> <p>STATIC WATER LEVEL AFTER 24 HOURS</p> <p>PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA</p> <p>SPRING OR SEEP</p>		<p>MISCELLANEOUS SYMBOLS</p> <p>ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION</p> <p>SOIL SYMBOL</p> <p>ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT</p> <p>INFERRED SOIL BOUNDARY</p> <p>INFERRED ROCK LINE</p> <p>ALLUVIAL SOIL BOUNDARY</p> <p>DIP & DIP DIRECTION OF ROCK STRUCTURES</p> <p>SOUNDING ROD</p> <p>SPT TEST BORING</p> <p>AUGER BORING</p> <p>CORE BORING</p> <p>MONITORING WELL</p> <p>PIEZOMETER INSTALLATION</p> <p>SLOPE INDICATOR INSTALLATION</p> <p>SPT N-VALUE</p> <p>SPT REFUSAL</p> <p>SAMPLE DESIGNATIONS</p> <p>S - BULK SAMPLE</p> <p>SS - SPLIT SPOON SAMPLE</p> <p>ST - SHELBY TUBE SAMPLE</p> <p>RS - ROCK SAMPLE</p> <p>RT - RECOMPACTED TRIAXIAL SAMPLE</p> <p>CR - CALIFORNIA BEARING RATIO SAMPLE</p>	
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LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE																																																																																																																																																																																																																					
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<p>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.</p>		<p>INDURATION</p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <p>FRIABLE</p> <p>RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</p> <p>MODERATELY INDURATED</p> <p>GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</p> <p>INDURATED</p> <p>GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</p> <p>EXTREMELY INDURATED</p> <p>SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p>																																																																																																																																																																																																																						
<p>BENCH MARK: BL-3: -L- STA. 23+24.95 18.94' LT.</p> <p>ELEVATION: 2182.38 FT.</p>		<p>NOTES:</p>																																																																																																																																																																																																																						

SITE PLAN





WBS 38621.1.1		TIP B-4851		COUNTY YANCEY		GEOLOGIST Hager, M. M.										
SITE DESCRIPTION Bridge No. 31 on SR 1308 over Brush Creek							GROUND WTR (ft)									
BORING NO. EB1-A		STATION 22+40		OFFSET 16 ft LT		ALIGNMENT -EL-										
COLLAR ELEV. 2,182.4 ft		TOTAL DEPTH 24.5 ft		NORTHING 835,597		EASTING 1,044,049										
DRILL RIG/HAMMER EFF./DATE AFO0070 CME-550X 81% 09/03/2009		DRILL METHOD NW Casing w/ SPT		HAMMER TYPE Automatic												
DRILLER Coffey, Jr., C.		START DATE 02/18/11		COMP. DATE 02/18/11		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	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						
2185														2,182.4	GROUND SURFACE	0.0
2180														2,177.0	ROADWAY EMBANKMENT BOULDER fill with silty sand	5.4
2175	2,177.9	4.5	100/0.3											2,173.3	ALLUVIAL Brown-gray silty SAND	9.1
2170	2,172.9	9.5	12	11	8									2,171.2	ALLUVIAL Dark gray-black basal GRAVEL	11.2
2165	2,167.9	14.5	60/0.0											2,157.9	CRYSTALLINE ROCK Amphibolite GNEISS	24.5
2160	2,162.9	19.5	60/0.0													
	2,157.9	24.5	60/0.0													

NCDOT BORE SINGLE B4851_GEO_BH_BRD0031.GPJ_NC_DOT.GDT_4/4/11

WBS 38621.1.1		TIP B-4851		COUNTY YANCEY		GEOLOGIST Hager, M. M.										
SITE DESCRIPTION Bridge No. 31 on SR 1308 over Brush Creek							GROUND WTR (ft)									
BORING NO. EB1-B		STATION 22+64		OFFSET 21 ft RT		ALIGNMENT -EL-										
COLLAR ELEV. 2,183.0 ft		TOTAL DEPTH 19.3 ft		NORTHING 835,555		EASTING 1,044,048										
DRILL RIG/HAMMER EFF./DATE AFO0070 CME-550X 81% 09/03/2009		DRILL METHOD NW Casing w/ SPT		HAMMER TYPE Automatic												
DRILLER Rose, G. K.		START DATE 02/21/11		COMP. DATE 02/21/11		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	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						
2185														2,183.0	GROUND SURFACE	0.0
2180														2,180.0	ROADWAY EMBANKMENT Tan-yellow-brown silty SAND	3.0
2175	2,178.1	4.9	2	4	4									2,178.5	ROADWAY EMBANKMENT BOULDER fill	4.5
2170	2,173.1	9.9	60/0.5											2,174.8	ALLUVIAL Dark brown-red-dark gray silty SAND	8.2
2165	2,168.1	14.9	60/0.0											2,172.8	WEATHERED ROCK (amphibolite Gneiss)	10.2
	2,163.7	19.3	60/0.0											2,163.7	CRYSTALLINE ROCK Amphibolite GNEISS	19.3

NCDOT BORE SINGLE B4851_GEO_BH_BRD0031.GPJ_NC_DOT.GDT_4/4/11

WBS 38621.1.1		TIP B-4851		COUNTY YANCEY		GEOLOGIST Hager, M. M.										
SITE DESCRIPTION Bridge No. 31 on SR 1308 over Brush Creek							GROUND WTR (ft)									
BORING NO. EB2-A		STATION 23+08		OFFSET 16 ft LT		ALIGNMENT -EL-										
COLLAR ELEV. 2,182.6 ft		TOTAL DEPTH 39.7 ft		NORTHING 835,559		EASTING 1,044,105										
DRILL RIG/HAMMER EFF./DATE AFO0070 CME-550X 81% 09/03/2009		DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic												
DRILLER Rose, G. K.		START DATE 02/17/11		COMP. DATE 02/17/11		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2185														2,182.6	GROUND SURFACE	0.0
2180														2,179.3	ARTIFICIAL FILL Driveway GRAVEL	3.3
2175	2,177.8	4.8	9	17	6									2,174.1	ROADWAY EMBANKMENT BOULDERS, GRAVEL, & SAND	8.5
2170	2,172.8	9.8	5	8	100/0.4									2,171.8	ALLUVIAL GRAVEL with sand	10.8
2165	2,167.8	14.8												2,162.8	WEATHERED ROCK (amphibolite Gneiss)	19.8
2160	2,162.8	19.8												2,162.8	CRYSTALLINE ROCK Amphibolite GNEISS	19.8
2155																
2150																
2145																
														2,142.9	Boring Terminated at Elevation 2,142.9 ft in Crystalline Rock: Amphibolite Gneiss	39.7

NCDOT BORE SINGLE B4851_GEO_BH_BRD0031.GPJ NC_DOT.GDT 4/4/11

WBS 38621.1.1		TIP B-4851		COUNTY YANCEY		GEOLOGIST Hager, M. M.								
SITE DESCRIPTION Bridge No. 31 on SR 1308 over Brush Creek							GROUND WTR (ft)							
BORING NO. EB2-A		STATION 23+08		OFFSET 16 ft LT		ALIGNMENT -EL-								
COLLAR ELEV. 2,182.6 ft		TOTAL DEPTH 39.7 ft		NORTHING 835,559		EASTING 1,044,105								
DRILL RIG/HAMMER EFF./DATE AFO0070 CME-550X 81% 09/03/2009		DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic										
DRILLER Rose, G. K.		START DATE 02/17/11		COMP. DATE 02/17/11		SURFACE WATER DEPTH N/A								
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	TOTAL RUN 19.9 ft		SAMP. NO.	STRATA		L O G	DESCRIPTION AND REMARKS	DEPTH (ft)		
					REC. (%)	RQD (%)		REC. (ft)	RQD (ft)					
2162.79	2,182.8	19.8	4.9	N=60/0.0 1:47/1.0 1:36/1.0 1:41/1.0 1:38/1.0 1:23/0.9	(4.5)	(4.0)					2,162.8	Begin Coring @ 19.8 ft CRYSTALLINE ROCK	19.8	
2160					92%	82%							Recovered rock is slightly weathered to fresh, hard, white to dark gray Amphibolite Gneiss. Fracture spacing is very to moderately close. Joint angles average ~30° with some high angle fractures.	
2155	2,157.9	24.7	5.0	1:22/1.0 1:44/1.0 1:36/1.0 1:34/1.0 1:16/1.0	(5.0)	(3.4)								
2150	2,152.9	29.7	5.0	1:16/1.0 1:29/1.0 1:47/1.0 1:53/1.0 1:47/1.0	100%	68%								
2145	2,147.9	34.7	5.0	2:16/1.0 1:51/1.0 1:10/1.0 1:29/1.0 1:28/1.0	(4.6)	(3.2)								
	2,142.9	39.7										2,142.9	Boring Terminated at Elevation 2,142.9 ft in Crystalline Rock: Amphibolite Gneiss	39.7

NCDOT BORE SINGLE B4851_GEO_BH_BRD0031.GPJ NC_DOT.GDT 4/4/11



NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

WBS 38621.1.1		TIP B-4851		COUNTY YANCEY		GEOLOGIST Hager, M. M.									
SITE DESCRIPTION Bridge No. 31 on SR 1308 over Brush Creek							GROUND WTR (ft)								
BORING NO. EB2-B		STATION 23+21		OFFSET 9 ft RT		ALIGNMENT -EL-									
COLLAR ELEV. 2,183.7 ft		TOTAL DEPTH 19.8 ft		NORTHING 835,531		EASTING 1,044,101									
DRILL RIG/HAMMER EFF./DATE AFO0070 CME-550X 81% 09/03/2009		DRILL METHOD NW Casing w/ SPT		HAMMER TYPE Automatic		SURFACE WATER DEPTH N/A									
DRILLER Cheek, D. O.		START DATE 02/22/11		COMP. DATE 02/22/11		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
2185														GROUND SURFACE	0.0
2180	2,178.9	4.8	1	1	3									ROADWAY EMBANKMENT Silty SAND	
2175	2,173.9	9.8	8	26	60/0.0									ALLUVIAL GRAVEL with sand	8.3
2170	2,168.9	14.8												CRYSTALLINE ROCK Amphibolite GNEISS	10.8
2165	2,163.9	19.8												Boring Terminated at Elevation 2,163.9 ft In Crystalline Rock: Amphibolite Gneiss	19.8

NCDOT BORE SINGLE_B4851_GEO_BH_BRDG0031.GPJ NC_DOT_GDT_4/4/11



**FIELD
 SCOUR REPORT**

WBS: 38621.1.1 TIP: B-4851 COUNTY: Yancey

DESCRIPTION(1): Bridge No. 31 on SR 1308 over Brush Creek

EXISTING BRIDGE

Information from: Field Inspection Microfilm _____ (reel _____ pos: _____)
 Other (explain) BSR dated 12/02/10

Bridge No.: 31 Length: ~31' Total Bents: 4 Bents in Channel: 2 Bents in Floodplain: 2
 Foundation Type: Stacked rock vertical abutments; Concrete & timber footings

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: Beneath both end bent's wingwalls

Interior Bents: Both interior bents

Channel Bed: None noted other than at the confluence of the two creeks

Channel Bank: End Bent Two banks upstream & downstream

EXISTING SCOUR PROTECTION

Type(3): Abutments

Extent(4): n/a

Effectiveness(5): Poor

Obstructions(6): Heavy debris under bridge; the remains of a wooden bridge downstream blocking the channel

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 & cobbles

Channel Bank Material(8): Gravel & sand

Channel Bank Cover(9): Trees, bramble

Floodplain Width(10): ~200'

Floodplain Cover(11): Trees, grass

Stream is(12): Aggrading _____ Degrading Static _____

Channel Migration Tendency(13): Toward End Bent Two

Observations and Other Comments: _____

DESIGN SCOUR ELEVATIONS(14)

Feet Meters _____

BENTS

N/A																			

Comparison of DSE to Hydraulics Unit theoretical scour:

No scour is predicted through calculations. DSE is in agreement with BSR dated 12/02/10.

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. Mann

Date: 2/16/2011

38621.1.1 (B-4851)
YANCEY COUNTY
BRIDGE # 31 ON SR 1308 OVER BRUSH CREEK

CORE PHOTOS

EB2-A



EB2-A

