

CONTRACT: 33206.1.1 ID: B-3661

# STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL UNIT

## STRUCTURE SUBSURFACE INVESTIGATION

STATE PROJECT 33206.1.1 I.D. NO. B-3661

F.A. PROJECT BRZ-1503 (4)

COUNTY HAYWOOD

PROJECT DESCRIPTION BRIDGE NO. 36 ON  
SR-1503 OVER CRABTREE CREEK

SITE DESCRIPTION \_\_\_\_\_

### CONTENTS:

SHEET	DESCRIPTION
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
4	PROFILE
5	CROSS SECTIONS
6	BORE LOG & CORE REPORTS
10	SOIL TEST RESULTS
11	SCOUR REPORT
12	CORE PHOTOGRAPHS

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	33206.1.1 (B-3661)	1	14
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
33206.1.1	BRZ-1503 (4)	P.E. CONST.	

### CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WAS 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 UNIT @ (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA IS 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.

INVESTIGATED BY J.W. MANN PERSONNEL M.M. HAGER

CHECKED BY W.D. FRYE L.E. LANKFORD

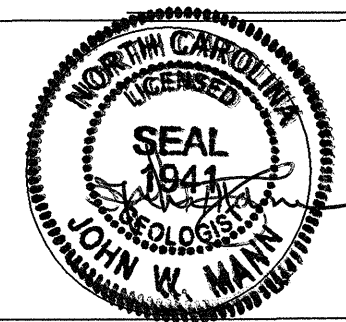
SUBMITTED BY W.D. FRYE R.D. CHILDRRESS

DATE 6/7/05 D.O. CHEEK

DRAWN BY: M.M. HAGER

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 UNIT**

ID	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
B-3661	33206.1.1	2	14

**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 WHICH CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND WHICH YIELDS LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T296, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM AND BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:</p> <p align="center"><i>VERY STIFF, GRN SKTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HEAVY PLASTIC, A-7-6</i></p>				<p><b>WELL GRADED:</b> INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE  <b>UNIFORM:</b> INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED)  <b>GAP-GRADED:</b> INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.</p> <p align="center"><b>ANGULARITY OF GRAINS</b></p> <p>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS ARE DESIGNATED BY THE TERMS: <u>ANGULAR</u>, <u>SUBANGULAR</u>, <u>SUBROUNDED</u>, OR <u>ROUNDED</u>.</p>				<p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WHEN 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:</p> <p><b>WEATHERED ROCK (WR)</b>  NON-COASTAL PLAIN MATERIAL THAT YIELDS SPT N VALUES &gt; 100 BLOWS PER FOOT.</p> <p><b>CRYSTALLINE ROCK (CR)</b>  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><b>NON-CRYSTALLINE ROCK (NCR)</b>  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><b>COASTAL PLAIN SEDIMENTARY ROCK (CP)</b>  COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.</p>				<p><b>ALLUVIUM (ALLUV.)</b> - SOILS WHICH HAVE BEEN TRANSPORTED BY WATER.  <b>AQUIFER</b> - A WATER BEARING FORMATION OR STRATA.  <b>ARENACEOUS</b> - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.  <b>ARGILLACEOUS</b> - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.  <b>ARTESIAN</b> - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.  <b>CALCAREOUS (CALC.)</b> - SOILS WHICH CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.  <b>COLLUVIUM</b> - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.  <b>CORE RECOVERY (REC.)</b> - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.  <b>DIKE</b> - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.  <b>DIP</b> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.  <b>DIP DIRECTION (DIP AZIMUTH)</b> - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.  <b>FAULT</b> - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.  <b>FISSILE</b> - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.  <b>FLOAT</b> - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.  <b>FLOOD PLAIN (F.P.)</b> - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.  <b>FORMATION (FM.)</b> - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.  <b>JOINT</b> - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.  <b>LEDGE</b> - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.  <b>LENS</b> - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.  <b>MOTTLED (MOT.)</b> - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.  <b>PERCHED WATER</b> - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.  <b>RESIDUAL SOIL</b> - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.  <b>ROCK QUALITY DESIGNATION (R.Q.D.)</b> - 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.  <b>SAPROLITE (SAP.)</b> - RESIDUAL SOIL WHICH RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.  <b>SILL</b> - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, WHICH HAS BEEN PLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.  <b>SLICKENSIDE</b> - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.  <b>STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT)</b> - NUMBER OF BLOWS (IN OR B.P.F.) 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 LESS THAN 0.1 FOOT PENETRATION WITH 60 BLOWS.  <b>STRATA CORE RECOVERY (SREC.)</b> - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.  <b>STRATA ROCK QUALITY DESIGNATION (S.R.Q.D.)</b> - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 10 CENTIMETERS DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.  <b>TOPSOIL (T.S.)</b> - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>																																																																																																																																																																																																	
<p align="center"><b>SOIL LEGEND AND AASHTO CLASSIFICATION</b></p> <table border="1"> <tr> <th rowspan="2">GENERAL CLASS.</th> <th colspan="7">GRANULAR MATERIALS (&gt;85% PASSING #200)</th> <th colspan="7">SILT-CLAY MATERIALS (&gt;85% PASSING #200)</th> <th colspan="2">ORGANIC MATERIALS</th> </tr> <tr> <th>A-1</th> <th>A-3</th> <th>A-2</th> <th>A-4</th> <th>A-5</th> <th>A-6</th> <th>A-7</th> <th>A-1, A-2</th> <th>A-3</th> <th>A-4, A-5</th> <th>A-6</th> <th>A-7</th> <th>A-1, A-2</th> <th>A-3</th> <th>A-4, A-5</th> <th>A-6</th> <th>A-7</th> </tr> <tr> <td>GROUP CLASS.</td> <td>A-1-a</td> <td>A-1-b</td> <td>A-2-4</td> <td>A-2-5</td> <td>A-2-6</td> <td>A-2-7</td> <td>A-4-4</td> <td>A-4-5</td> <td>A-4-6</td> <td>A-4-7</td> <td>A-5-4</td> <td>A-5-5</td> <td>A-5-6</td> <td>A-5-7</td> <td>A-6-4</td> <td>A-6-5</td> <td>A-6-6</td> <td>A-6-7</td> </tr> <tr> <td>SYMBOL</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>% PASSING</td> <td>100</td> <td>100</td> <td>100</td> <td>100</td> <td>100</td> <td>100</td> <td>100</td> <td>100</td> <td>100</td> <td>100</td> <td>100</td> <td>100</td> <td>100</td> <td>100</td> <td>100</td> <td>100</td> <td>100</td> <td>100</td> <td>100</td> </tr> <tr> <td>LIQUID LIMIT PLASTIC INDEX</td> <td>50 MX</td> <td>30 MX50</td> <td>40 MX41 MN</td> <td>40 MX41 MN</td> <td>40 MX41 MN</td> <td>40 MX41 MN</td> <td>40 MX41 MN</td> <td>40 MX41 MN</td> <td>40 MX41 MN</td> <td>40 MX41 MN</td> <td>40 MX41 MN</td> <td>40 MX41 MN</td> <td>40 MX41 MN</td> <td>40 MX41 MN</td> <td>40 MX41 MN</td> <td>40 MX41 MN</td> <td>40 MX41 MN</td> <td>40 MX41 MN</td> <td>40 MX41 MN</td> </tr> <tr> <td>GROUP INDEX</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>USUAL TYPES OF MAJOR MATERIALS</td> <td>STONE FRAGS. GRAVEL AND SAND</td> <td>FINE SAND</td> <td>SILTY OR CLAYEY GRAVEL AND SAND</td> <td>SILTY SOILS</td> <td>CLAYEY SOILS</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>GENERAL RATING AS A SUBGRADE</td> <td colspan="7">EXCELLENT TO GOOD</td> <td colspan="7">FAIR TO POOR</td> <td>FAIR TO POOR</td> <td>POOR</td> <td>UNSATURABLE</td> </tr> </table> <p align="center">P.I. OF A-7-5 ≤ L.L. - 30 + P.I. OF A-7-6 &gt; L.L. - 30</p>				GENERAL CLASS.	GRANULAR MATERIALS (>85% PASSING #200)							SILT-CLAY MATERIALS (>85% PASSING #200)							ORGANIC MATERIALS		A-1	A-3	A-2	A-4	A-5	A-6	A-7	A-1, A-2	A-3	A-4, A-5	A-6	A-7	A-1, A-2	A-3	A-4, A-5	A-6	A-7	GROUP CLASS.	A-1-a	A-1-b	A-2-4	A-2-5	A-2-6	A-2-7	A-4-4	A-4-5	A-4-6	A-4-7	A-5-4	A-5-5	A-5-6	A-5-7	A-6-4	A-6-5	A-6-6	A-6-7	SYMBOL																			% PASSING	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	LIQUID LIMIT PLASTIC INDEX	50 MX	30 MX50	40 MX41 MN	40 MX41 MN	40 MX41 MN	40 MX41 MN	40 MX41 MN	40 MX41 MN	40 MX41 MN	40 MX41 MN	40 MX41 MN	40 MX41 MN	40 MX41 MN	40 MX41 MN	40 MX41 MN	40 MX41 MN	40 MX41 MN	40 MX41 MN	40 MX41 MN	GROUP INDEX	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL AND SAND	FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND	SILTY SOILS	CLAYEY SOILS															GENERAL RATING AS A SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR							FAIR TO POOR	POOR	UNSATURABLE	<p align="center"><b>MINERALOGICAL COMPOSITION</b></p> <p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.</p>				<p align="center"><b>COMPRESSION</b></p> <p>SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 30          MODERATELY COMPRESSIBLE LIQUID LIMIT 31-50          HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50</p>				<p align="center"><b>PERCENTAGE OF MATERIAL</b></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>&gt;10%</td> <td>&gt;20%</td> <td>HIGHLY 35% AND ABOVE</td> </tr> </table>				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
GENERAL CLASS.	GRANULAR MATERIALS (>85% PASSING #200)							SILT-CLAY MATERIALS (>85% PASSING #200)							ORGANIC MATERIALS																																																																																																																																																																																														
	A-1	A-3	A-2	A-4	A-5	A-6	A-7	A-1, A-2	A-3	A-4, A-5	A-6	A-7	A-1, A-2	A-3	A-4, A-5	A-6	A-7																																																																																																																																																																																												
GROUP CLASS.	A-1-a	A-1-b	A-2-4	A-2-5	A-2-6	A-2-7	A-4-4	A-4-5	A-4-6	A-4-7	A-5-4	A-5-5	A-5-6	A-5-7	A-6-4	A-6-5	A-6-6	A-6-7																																																																																																																																																																																											
SYMBOL																																																																																																																																																																																																													
% PASSING	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100																																																																																																																																																																																										
LIQUID LIMIT PLASTIC INDEX	50 MX	30 MX50	40 MX41 MN	40 MX41 MN	40 MX41 MN	40 MX41 MN	40 MX41 MN	40 MX41 MN	40 MX41 MN	40 MX41 MN	40 MX41 MN	40 MX41 MN	40 MX41 MN	40 MX41 MN	40 MX41 MN	40 MX41 MN	40 MX41 MN	40 MX41 MN	40 MX41 MN																																																																																																																																																																																										
GROUP INDEX	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																																																																																																																																																																																										
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL AND SAND	FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND	SILTY SOILS	CLAYEY SOILS																																																																																																																																																																																																								
GENERAL RATING AS A SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR							FAIR TO POOR	POOR	UNSATURABLE																																																																																																																																																																																												
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 align="center"><b>CONSISTENCY OR DENSENESS</b></p> <table border="1"> <tr> <th>PRIMARY SOIL TYPE</th> <th>COMPACTNESS OR CONSISTENCY</th> <th>RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)</th> <th>RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT<sup>2</sup>)</th> </tr> <tr> <td>GENERALLY GRANULAR MATERIAL (NON-COHESIVE)</td> <td>VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE</td> <td>&lt;4 4 TO 10 10 TO 30 30 TO 50 &gt;50</td> <td>N/A</td> </tr> <tr> <td>GENERALLY SILT-CLAY MATERIAL (COHESIVE)</td> <td>VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD</td> <td>&lt;2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 &gt;30</td> <td>&lt;0.25 0.25 TO 0.5 0.5 TO 1 1 TO 2 2 TO 4 &gt;4</td> </tr> </table>				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 MEDIUM DENSE DENSE VERY DENSE	<4 4 TO 10 10 TO 30 30 TO 50 >50	N/A	GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	<2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 >30	<0.25 0.25 TO 0.5 0.5 TO 1 1 TO 2 2 TO 4 >4	<p align="center"><b>MISCELLANEOUS SYMBOLS</b></p> <table border="1"> <tr> <td></td> <td>ROADWAY EMBANKMENT WITH SOIL DESCRIPTION</td> <td></td> <td>SPT CPT DPT VST TEST BORING</td> <td></td> <td>S- BULK SAMPLE</td> </tr> <tr> <td></td> <td>SOIL SYMBOL</td> <td></td> <td>AUGER BORING</td> <td></td> <td>SS- SPLIT SPOON SAMPLE</td> </tr> <tr> <td></td> <td>ARTIFICIAL FILL OTHER THAN ROADWAY EMBANKMENTS</td> <td></td> <td>CORE BORING</td> <td></td> <td>ST- SHELBY TUBE SAMPLE</td> </tr> <tr> <td></td> <td>INFERRED SOIL BOUNDARIES</td> <td></td> <td>MONITORING WELL</td> <td></td> <td>RS- ROCK SAMPLE</td> </tr> <tr> <td></td> <td>INFERRED ROCK LINE</td> <td></td> <td>PIEZOMETER INSTALLATION</td> <td></td> <td>RT- RECOMPACTED TRIAXIAL SAMPLE</td> </tr> <tr> <td></td> <td>ALLUVIAL SOIL BOUNDARY</td> <td></td> <td>SLOPE INDICATOR INSTALLATION</td> <td></td> <td>CBR - CBR SAMPLE</td> </tr> <tr> <td></td> <td>DIP/DIP DIRECTION OF ROCK STRUCTURES</td> <td></td> <td>SOUNDING ROD</td> <td></td> <td>SPT REFUSAL</td> </tr> </table>					ROADWAY EMBANKMENT WITH SOIL DESCRIPTION		SPT CPT DPT VST TEST BORING		S- BULK SAMPLE		SOIL SYMBOL		AUGER BORING		SS- SPLIT SPOON SAMPLE		ARTIFICIAL FILL OTHER THAN ROADWAY EMBANKMENTS		CORE BORING		ST- SHELBY TUBE SAMPLE		INFERRED SOIL BOUNDARIES		MONITORING WELL		RS- ROCK SAMPLE		INFERRED ROCK LINE		PIEZOMETER INSTALLATION		RT- RECOMPACTED TRIAXIAL SAMPLE		ALLUVIAL SOIL BOUNDARY		SLOPE INDICATOR INSTALLATION		CBR - CBR SAMPLE		DIP/DIP DIRECTION OF ROCK STRUCTURES		SOUNDING ROD		SPT REFUSAL																																																																																																																																																
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 MEDIUM DENSE DENSE VERY DENSE	<4 4 TO 10 10 TO 30 30 TO 50 >50	N/A																																																																																																																																																																																																										
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	<2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 >30	<0.25 0.25 TO 0.5 0.5 TO 1 1 TO 2 2 TO 4 >4																																																																																																																																																																																																										
	ROADWAY EMBANKMENT WITH SOIL DESCRIPTION		SPT CPT DPT VST TEST BORING		S- BULK SAMPLE																																																																																																																																																																																																								
	SOIL SYMBOL		AUGER BORING		SS- SPLIT SPOON SAMPLE																																																																																																																																																																																																								
	ARTIFICIAL FILL OTHER THAN ROADWAY EMBANKMENTS		CORE BORING		ST- SHELBY TUBE SAMPLE																																																																																																																																																																																																								
	INFERRED SOIL BOUNDARIES		MONITORING WELL		RS- ROCK SAMPLE																																																																																																																																																																																																								
	INFERRED ROCK LINE		PIEZOMETER INSTALLATION		RT- RECOMPACTED TRIAXIAL SAMPLE																																																																																																																																																																																																								
	ALLUVIAL SOIL BOUNDARY		SLOPE INDICATOR INSTALLATION		CBR - CBR SAMPLE																																																																																																																																																																																																								
	DIP/DIP DIRECTION OF ROCK STRUCTURES		SOUNDING ROD		SPT REFUSAL																																																																																																																																																																																																								
<p align="center"><b>TEXTURE OR GRAIN SIZE</b></p> <table border="1"> <tr> <th>U.S. STD. SIEVE SIZE OPENING (MM)</th> <th>4</th> <th>10</th> <th>40</th> <th>60</th> <th>200</th> <th>270</th> </tr> <tr> <td></td> <td>4.76</td> <td>2.0</td> <td>0.42</td> <td>0.25</td> <td>0.075</td> <td>0.053</td> </tr> </table> <table border="1"> <tr> <th>BOULDER (BLDR.)</th> <th>COBBLE (COB.)</th> <th>GRAVEL (GR.)</th> <th>COARSE SAND (CSE. SD.)</th> <th>FINE SAND (F. SD.)</th> <th>SILT (SL.)</th> <th>CLAY (CL.)</th> </tr> <tr> <td>GRAIN SIZE MM 305</td> <td>75</td> <td>2.0</td> <td>0.25</td> <td>0.05</td> <td>0.005</td> <td></td> </tr> <tr> <td>SIZE IN. 12"</td> <td>3"</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>				U.S. STD. SIEVE SIZE OPENING (MM)	4	10	40	60	200	270		4.76	2.0	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 SIZE MM 305	75	2.0	0.25	0.05	0.005		SIZE IN. 12"	3"						<p align="center"><b>ABBREVIATIONS</b></p> <table border="1"> <tr> <td>AR - AUGER REFUSAL</td> <td>PMT - PRESSUREMETER TEST</td> </tr> <tr> <td>BT - BORING TERMINATED</td> <td>SD - SAND, SANDY</td> </tr> <tr> <td>CL - CLAY</td> <td>SL - SILT, SILTY</td> </tr> <tr> <td>CPT - CONE PENETRATION TEST</td> <td>SL - SLIGHTLY</td> </tr> <tr> <td>CSE. - COARSE</td> <td>TR - TRICONE REFUSAL</td> </tr> <tr> <td>DMT - DILATOMETER TEST</td> <td>TCR - TRICONE REFUSAL</td> </tr> <tr> <td>DPT - DYNAMIC PENETRATION TEST</td> <td>U - UNIT WEIGHT</td> </tr> <tr> <td>e - VOID RATIO</td> <td>U<sub>d</sub> - DRY UNIT WEIGHT</td> </tr> <tr> <td>F. - FINE</td> <td>w - MOISTURE CONTENT</td> </tr> <tr> <td>FOSS. - FOSSILIFEROUS</td> <td>v. - VERY</td> </tr> <tr> <td>FRAC. - FRACTURED</td> <td>VST - VANE SHEAR TEST</td> </tr> <tr> <td>FRAGS. - FRAGMENTS</td> <td></td> </tr> <tr> <td>MED. - MEDIUM</td> <td></td> </tr> </table>				AR - AUGER REFUSAL	PMT - PRESSUREMETER TEST	BT - BORING TERMINATED	SD - SAND, SANDY	CL - CLAY	SL - SILT, SILTY	CPT - CONE PENETRATION TEST	SL - SLIGHTLY	CSE. - COARSE	TR - TRICONE REFUSAL	DMT - DILATOMETER TEST	TCR - TRICONE REFUSAL	DPT - DYNAMIC PENETRATION TEST	U - UNIT WEIGHT	e - VOID RATIO	U <sub>d</sub> - DRY UNIT WEIGHT	F. - FINE	w - MOISTURE CONTENT	FOSS. - FOSSILIFEROUS	v. - VERY	FRAC. - FRACTURED	VST - VANE SHEAR TEST	FRAGS. - FRAGMENTS		MED. - MEDIUM																																																																																																																																										
U.S. STD. SIEVE SIZE OPENING (MM)	4	10	40	60	200	270																																																																																																																																																																																																							
	4.76	2.0	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 SIZE MM 305	75	2.0	0.25	0.05	0.005																																																																																																																																																																																																								
SIZE IN. 12"	3"																																																																																																																																																																																																												
AR - AUGER REFUSAL	PMT - PRESSUREMETER TEST																																																																																																																																																																																																												
BT - BORING TERMINATED	SD - SAND, SANDY																																																																																																																																																																																																												
CL - CLAY	SL - SILT, SILTY																																																																																																																																																																																																												
CPT - CONE PENETRATION TEST	SL - SLIGHTLY																																																																																																																																																																																																												
CSE. - COARSE	TR - TRICONE REFUSAL																																																																																																																																																																																																												
DMT - DILATOMETER TEST	TCR - TRICONE REFUSAL																																																																																																																																																																																																												
DPT - DYNAMIC PENETRATION TEST	U - UNIT WEIGHT																																																																																																																																																																																																												
e - VOID RATIO	U <sub>d</sub> - DRY UNIT WEIGHT																																																																																																																																																																																																												
F. - FINE	w - MOISTURE CONTENT																																																																																																																																																																																																												
FOSS. - FOSSILIFEROUS	v. - VERY																																																																																																																																																																																																												
FRAC. - FRACTURED	VST - VANE SHEAR TEST																																																																																																																																																																																																												
FRAGS. - FRAGMENTS																																																																																																																																																																																																													
MED. - MEDIUM																																																																																																																																																																																																													
<p align="center"><b>SOIL MOISTURE - CORRELATION OF TERMS</b></p> <table border="1"> <tr> <th>SOIL MOISTURE SCALE (ATTERBERG LIMITS)</th> <th>FIELD MOISTURE DESCRIPTION</th> <th>GUIDE FOR FIELD MOISTURE DESCRIPTION</th> </tr> <tr> <td rowspan="3">LL - LIQUID LIMIT PL - PLASTIC LIMIT OM - OPTIMUM MOISTURE SL - SHRINKAGE LIMIT</td> <td>- SATURATED - (SAT.)</td> <td>USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE</td> </tr> <tr> <td>- WET - (W)</td> <td>SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE</td> </tr> <tr> <td>- MOIST - (M)</td> <td>SOLID; AT OR NEAR OPTIMUM MOISTURE</td> </tr> <tr> <td></td> <td>- DRY - (D)</td> <td>REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE</td> </tr> </table>				SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION	LL - LIQUID LIMIT PL - PLASTIC LIMIT OM - OPTIMUM MOISTURE SL - SHRINKAGE LIMIT	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE		- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	<p align="center"><b>EQUIPMENT USED ON SUBJECT PROJECT</b></p> <table border="1"> <tr> <td><input type="checkbox"/> MOBILE B-</td> <td><input type="checkbox"/> CLAY BITS</td> <td><input checked="" type="checkbox"/> AUTOMATIC</td> <td><input type="checkbox"/> MANUAL</td> </tr> <tr> <td><input type="checkbox"/> BK-51</td> <td><input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER</td> <td><input type="checkbox"/> CORE SIZE:</td> <td><input type="checkbox"/> -B-</td> </tr> <tr> <td><input type="checkbox"/> CME-45C</td> <td><input type="checkbox"/> 8" HOLLOW AUGERS</td> <td><input checked="" type="checkbox"/> -N-</td> <td><input type="checkbox"/> -H-</td> </tr> <tr> <td><input checked="" type="checkbox"/> CME-550</td> <td><input type="checkbox"/> HARD FACED FINGER BITS</td> <td><input type="checkbox"/> HAND TOOLS:</td> <td><input type="checkbox"/> POST HOLE DIGGER</td> </tr> <tr> <td><input type="checkbox"/> PORTABLE HOIST</td> <td><input type="checkbox"/> TUNG.-CARBIDE INSERTS</td> <td><input type="checkbox"/> HAND AUGER</td> <td><input type="checkbox"/> SOUNDING ROD</td> </tr> <tr> <td><input type="checkbox"/> OTHER _____</td> <td><input checked="" type="checkbox"/> CASING <input checked="" type="checkbox"/> W/ ADVANCER</td> <td><input type="checkbox"/> VANE SHEAR TEST</td> <td><input type="checkbox"/> OTHER _____</td> </tr> <tr> <td><input type="checkbox"/> OTHER _____</td> <td><input type="checkbox"/> TRICONE _____ *STEEL TEETH</td> <td><input type="checkbox"/> OTHER _____</td> <td></td> </tr> <tr> <td><input type="checkbox"/> OTHER _____</td> <td><input type="checkbox"/> TRICONE _____ *TUNG.-CARB.</td> <td></td> <td></td> </tr> <tr> <td><input type="checkbox"/> OTHER _____</td> <td><input type="checkbox"/> CORE BIT</td> <td></td> <td></td> </tr> <tr> <td><input type="checkbox"/> OTHER _____</td> <td><input type="checkbox"/> OTHER _____</td> <td></td> <td></td> </tr> </table>				<input type="checkbox"/> MOBILE B-	<input type="checkbox"/> CLAY BITS	<input checked="" type="checkbox"/> AUTOMATIC	<input type="checkbox"/> MANUAL	<input type="checkbox"/> BK-51	<input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER	<input type="checkbox"/> CORE SIZE:	<input type="checkbox"/> -B-	<input type="checkbox"/> CME-45C	<input type="checkbox"/> 8" HOLLOW AUGERS	<input checked="" type="checkbox"/> -N-	<input type="checkbox"/> -H-	<input checked="" type="checkbox"/> CME-550	<input type="checkbox"/> HARD FACED FINGER BITS	<input type="checkbox"/> HAND TOOLS:	<input type="checkbox"/> POST HOLE DIGGER	<input type="checkbox"/> PORTABLE HOIST	<input type="checkbox"/> TUNG.-CARBIDE INSERTS	<input type="checkbox"/> HAND AUGER	<input type="checkbox"/> SOUNDING ROD	<input type="checkbox"/> OTHER _____	<input checked="" type="checkbox"/> CASING <input checked="" type="checkbox"/> W/ ADVANCER	<input type="checkbox"/> VANE SHEAR TEST	<input type="checkbox"/> OTHER _____	<input type="checkbox"/> OTHER _____	<input type="checkbox"/> TRICONE _____ *STEEL TEETH	<input type="checkbox"/> OTHER _____		<input type="checkbox"/> OTHER _____	<input type="checkbox"/> TRICONE _____ *TUNG.-CARB.			<input type="checkbox"/> OTHER _____	<input type="checkbox"/> CORE BIT			<input type="checkbox"/> OTHER _____	<input type="checkbox"/> OTHER _____																																																																																																																																																			
SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION																																																																																																																																																																																																											
LL - LIQUID LIMIT PL - PLASTIC LIMIT OM - OPTIMUM MOISTURE SL - SHRINKAGE LIMIT	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE																																																																																																																																																																																																											
	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE																																																																																																																																																																																																											
	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE																																																																																																																																																																																																											
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE																																																																																																																																																																																																											
<input type="checkbox"/> MOBILE B-	<input type="checkbox"/> CLAY BITS	<input checked="" type="checkbox"/> AUTOMATIC	<input type="checkbox"/> MANUAL																																																																																																																																																																																																										
<input type="checkbox"/> BK-51	<input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER	<input type="checkbox"/> CORE SIZE:	<input type="checkbox"/> -B-																																																																																																																																																																																																										
<input type="checkbox"/> CME-45C	<input type="checkbox"/> 8" HOLLOW AUGERS	<input checked="" type="checkbox"/> -N-	<input type="checkbox"/> -H-																																																																																																																																																																																																										
<input checked="" type="checkbox"/> CME-550	<input type="checkbox"/> HARD FACED FINGER BITS	<input type="checkbox"/> HAND TOOLS:	<input type="checkbox"/> POST HOLE DIGGER																																																																																																																																																																																																										
<input type="checkbox"/> PORTABLE HOIST	<input type="checkbox"/> TUNG.-CARBIDE INSERTS	<input type="checkbox"/> HAND AUGER	<input type="checkbox"/> SOUNDING ROD																																																																																																																																																																																																										
<input type="checkbox"/> OTHER _____	<input checked="" type="checkbox"/> CASING <input checked="" type="checkbox"/> W/ ADVANCER	<input type="checkbox"/> VANE SHEAR TEST	<input type="checkbox"/> OTHER _____																																																																																																																																																																																																										
<input type="checkbox"/> OTHER _____	<input type="checkbox"/> TRICONE _____ *STEEL TEETH	<input type="checkbox"/> OTHER _____																																																																																																																																																																																																											
<input type="checkbox"/> OTHER _____	<input type="checkbox"/> TRICONE _____ *TUNG.-CARB.																																																																																																																																																																																																												
<input type="checkbox"/> OTHER _____	<input type="checkbox"/> CORE BIT																																																																																																																																																																																																												
<input type="checkbox"/> OTHER _____	<input type="checkbox"/> OTHER _____																																																																																																																																																																																																												
<p align="center"><b>PLASTICITY</b></p> <table border="1"> <tr> <th>NONPLASTIC</th> <th>PLASTICITY INDEX (PI)</th> <th>DRY STRENGTH</th> </tr> <tr> <td>LOW PLASTICITY</td> <td>0-5</td> <td>VERY LOW</td> </tr> <tr> <td>MED. PLASTICITY</td> <td>6-15</td> <td>SLIGHT</td> </tr> <tr> <td>HIGH PLASTICITY</td> <td>16-25</td> <td>MEDIUM</td> </tr> <tr> <td></td> <td>26 OR MORE</td> <td>HIGH</td> </tr> </table>				NONPLASTIC	PLASTICITY INDEX (PI)	DRY STRENGTH	LOW PLASTICITY	0-5	VERY LOW	MED. PLASTICITY	6-15	SLIGHT	HIGH PLASTICITY	16-25	MEDIUM		26 OR MORE	HIGH	<p align="center"><b>FRACURE SPACING</b></p> <table border="1"> <tr> <th>TERM</th> <th>SPACING</th> <th>TERM</th> <th>THICKNESS</th> </tr> <tr> <td>VERY WIDE</td> <td>MORE THAN 10 FEET</td> <td>VERY THICKLY BEDDED</td> <td>&gt; 4 FEET</td> </tr> <tr> <td>WIDE</td> <td>3 TO 10 FEET</td> <td>THICKLY BEDDED</td> <td>1.5 - 4 FEET</td> </tr> <tr> <td>MODERATELY CLOSE</td> <td>1 TO 3 FEET</td> <td>THINLY BEDDED</td> <td>0.16 - 1.5 FEET</td> </tr> <tr> <td>CLOSE</td> <td>0.16 TO 1 FEET</td> <td>VERY THINLY BEDDED</td> <td>0.03 - 0.16 FEET</td> </tr> <tr> <td>VERY CLOSE</td> <td>LESS THAN 0.16 FEET</td> <td>THICKLY LAMINATED</td> <td>0.008 - 0.03 FEET</td> </tr> <tr> <td></td> <td></td> <td>THINLY LAMINATED</td> <td>&lt; 0.008 FEET</td> </tr> </table>				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																																																																																																																																																											
NONPLASTIC	PLASTICITY INDEX (PI)	DRY STRENGTH																																																																																																																																																																																																											
LOW PLASTICITY	0-5	VERY LOW																																																																																																																																																																																																											
MED. PLASTICITY	6-15	SLIGHT																																																																																																																																																																																																											
HIGH PLASTICITY	16-25	MEDIUM																																																																																																																																																																																																											
	26 OR MORE	HIGH																																																																																																																																																																																																											
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																																																																																																																																																																																																										
<p align="center"><b>COLOR</b></p> <p>DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YEL.-BRN, BLUE-GRAY) MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.</p>				<p align="center"><b>INDURATION</b></p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <table border="1"> <tr> <td>FRIABLE</td> <td>RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</td> </tr> <tr> <td>MODERATELY INDURATED</td> <td>GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</td> </tr> <tr> <td>INDURATED</td> <td>GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</td> </tr> <tr> <td>EXTREMELY INDURATED</td> <td>SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</td> </tr> </table>				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.																																																																																																																																																																																														
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.																																																																																																																																																																																																												
<p align="center"><b>FRACURE SPACING</b></p> <p>TERM SPACING TERM THICKNESS</p>				<p align="center"><b>INDURATION</b></p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p>																																																																																																																																																																																																									
<p align="center"><b>FRACURE SPACING</b></p> <p>TERM SPACING TERM THICKNESS</p>				<p align="center"><b>INDURATION</b></p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p>																																																																																																																																																																																																									
<p align="center"><b>FRACURE SPACING</b></p> <p>TERM SPACING TERM THICKNESS</p>				<p align="center"><b>INDURATION</b></p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p>																																																																																																																																																																																																									
<p align="center"><b>FRACURE SPACING</b></p> <p>TERM SPACING TERM THICKNESS</p>				<p align="center"><b>INDURATION</b></p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p>																																																																																																																																																																																																									
<p align="center"><b>FRACURE SPACING</b></p> <p>TERM SPACING TERM THICKNESS</p>				<p align="center"><b>INDURATION</b></p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p>																																																																																																																																																																																																									
<p align="center"><b>FRACURE SPACING</b></p> <p>TERM SPACING TERM THICKNESS</p>				<p align="center"><b>INDURATION</b></p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p>																																																																																																																																																																																																									
<p align="center"><b>FRACURE SPACING</b></p> <p>TERM SPACING TERM THICKNESS</p>				<p align="center"><b>INDURATION</b></p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p>																																																																																																																																																																																																									
<p align="center"><b>FRACURE SPACING</b></p> <p>TERM SPACING TERM THICKNESS</p>				<p align="center"><b>INDURATION</b></p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p>																																																																																																																																																																																																									
<p align="center"><b>FRACURE SPACING</b></p> <p>TERM SPACING TERM THICKNESS</p>				<p align="center"><b>INDURATION</b></p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p>																																																																																																																																																																																																									
<p align="center"><b>FRACURE SPACING</b></p> <p>TERM SPACING TERM THICKNESS</p>				<p align="center"><b>INDURATION</b></p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p>																																																																																																																																																																																																									
<p align="center"><b>FRACURE SPACING</b></p> <p>TERM SPACING TERM THICKNESS</p>				<p align="center"><b>INDURATION</b></p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p>																																																																																																																																																																																																									
<p align="center"><b>FRACURE SPACING</b></p> <p>TERM SPACING TERM THICKNESS</p>				<p align="center"><b>INDURATION</b></p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p>																																																																																																																																																																																																									
<p align="center"><b>FRACURE SPACING</b></p> <p>TERM SPACING TERM THICKNESS</p>				<p align="center"><b>INDURATION</b></p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p>																																																																																																																																																																																																									
<p align="center"><b>FRACURE SPACING</b></p> <p>TERM SPACING TERM THICKNESS</p>				<p align="center"><b>INDURATION</b></p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p>																																																																																																																																																																																																									
<p align="center"><b>FRACURE SPACING</b></p> <p>TERM SPACING TERM THICKNESS</p>				<p align="center"><b>INDURATION</b></p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p>																																																																																																																																																																																																									
<p align="center"><b>FRACURE SPACING</b></p> <p>TERM SPACING TERM THICKNESS</p>				<p align="center"><b>INDURATION</b></p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p>																																																																																																																																																																																																									
<p align="center"><b>FRACURE SPACING</b></p> <p>TERM SPACING TERM THICKNESS</p>				<p align="center"><b>INDURATION</b></p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p>																																																																																																																																																																																																									
<p align="center"><b>FRACURE SPACING</b></p> <p>TERM SPACING TERM THICKNESS</p>				<p align="center"><b>INDURATION</b></p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p>																																																																																																																																																																																																									
<p align="center"><b>FRACURE SPACING</b></p> <p>TERM SPACING TERM THICKNESS</p>				<p align="center"><b>INDURATION</b></p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p>																																																																																																																																																																																																									
<p align="center"><b>FRACURE SPACING</b></p> <p>TERM SPACING TERM THICKNESS</p>				<p align="center"><b>INDURATION</b></p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p>																																																																																																																																																																																																									
<p align="center"><b>FRACURE SPACING</b></p> <p>TERM SPACING TERM THICKNESS</p>				<p align="center"><b>INDURATION</b></p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p>																																																																																																																																																																																																									
<p align="center"><b>FRACURE SPACING</b></p> <p>TERM SPACING TERM THICKNESS</p>				<p align="center"><b>INDURATION</b></p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p>																																																																																																																																																																																																									
<p align="center"><b>FRACURE SPACING</b></p> <p>TERM SPACING TERM THICKNESS</p>				<p align="center"><b>INDURATION</b></p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p>																																																																																																																																																																																																									
<p align="center"><b>FRACURE SPACING</b></p> <p>TERM SPACING TERM THICKNESS</p>				<p align="center"><b>INDURATION</b></p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p>																																																																																																																																																																																																									
<p align="center"><b>FRACURE SPACING</b></p> <p>TERM SPACING TERM THICKNESS</p>				<p align="center"><b>INDURATION</b></p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p>																																																																																																																																																																																																									
<p align="center"><b>FRACURE SPACING</b></p> <p>TERM SPACING TERM THICKNESS</p>				<p align="center"><b>INDURATION</b></p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p>																																																																																																																																																																																																									
<p align="center"><b>FRACURE SPACING</b></p> <p>TERM SPACING TERM THICKNESS</p>				<p align="center"><b>INDURATION</b></p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p>																																																																																																																																																																																																									
<p align="center"><b>FRACURE SPACING</b></p> <p>TERM SPACING TERM THICKNESS</p>				<p align="center"><b>INDURATION</b></p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p>																																																																																																																																																																																																									
<p align="center"><b>FRACURE SPACING</b></p> <p>TERM SPACING TERM THICKNESS</p>				<p align="center"><b>INDURATION</b></p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p>																																																																																																																																																																																																									
<p align="center"><b>FRACURE SPACING</b></p> <p>TERM SPACING TERM THICKNESS</p>				<p align="center"><b>INDURATION</b></p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p>																																																																																																																																																																																																									
<p align="center"><b>FRACURE SPACING</b></p> <p>TERM SPACING TERM THICKNESS</p>				<p align="center"><b>INDURATION</b></p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p>																																																																																																																																																																																																									
<p align="center"><b>FRACURE SPACING</b></p> <p>TERM SPACING TERM THICKNESS</p>				<p align="center"><b>INDURATION</b></p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p>																																																																																																																																																																																																									
<p align="center"><b>FRACURE SPACING</b></p> <p>TERM SPACING TERM THICKNESS</p>				<p align="center"><b>INDURATION</b></p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p>																																																																																																																																																																																																									
<p align="center"><b>FRACURE SPACING</b></p> <p>TERM SPACING TERM THICKNESS</p>				<p align="center"><b>INDURATION</b></p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE</p>																																																																																																																																																																																																									



STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY  
GOVERNOR

LYNDO TIPPETT  
SECRETARY

July 20, 2005

STATE PROJECT: 33206.1.1 (B-3661)  
F. A. PROJECT: BRZ-1503(4)  
COUNTY: Haywood  
  
DESCRIPTION: Bridge No. 36 on SR-1503 over Crabtree Creek  
  
SUBJECT: Geotechnical Report – Foundation Investigation

**PROJECT DESCRIPTION**

This project is located in northeast Haywood County just east of the Crabtree community. A single span 90-foot long bridge is proposed to replace the existing structure. The new crossing is to be located 100 feet upstream. The replacement bridge is to have 24 feet of clear roadway with both end bents constructed on a skew angle of 55 degrees.

A subsurface investigation was conducted in May of 2005 utilizing a CME-550 ORV drill unit. Standard Penetration Tests were performed through NX casing with an automatic drop hammer. NXWL rock coring apparatus was used for rock specimen retrieval. Soil samples were collected and submitted for AASHTO classification by the Materials and Tests Unit.

**PHYSIOGRAPHY AND GEOLOGY**

The project area is located in the Blue Ridge Belt of the Mountain Physiographic Province. The topography of the site is steep with a local relief of over 1000 feet. Crabtree Creek is incised at the crossing and has developed a minimal floodplain of approximately 100 feet in width. The corridor is underlain by a biotite gneiss unit (Zybn) as identified by the 1985 Geologic Map of North Carolina. Retrieved core specimens revealed the rock to be gray, medium to coarse-grained, hard, and slightly weathered to fresh. Fracture spacing varied from close to wide resulting in average RQD values between 57 and 84 percent.

**Foundation Materials**

Embankment, alluvium, weathered rock, and hard rock comprise the foundation materials that were found at the site. Embankment has been placed only at the End Bent Two locale and consists of very loose to medium dense fine to coarse sand with basal gravel cobbles and boulders. Alluvium lies 15 feet beneath the embankment at End Bent Two and occurs as surficial soil at End Bent One. It is approximately five feet thick and composed of soft silt to dense sand with gravel and cobbles. The sand occurs at End Bent One while the silt was found only in the EB2-A boring. Weathered rock is positioned beneath the alluvium at approximate elevation 2529 feet. The weathered rock grades to hard rock within a foot at End Bent One borings and is less than 4 feet thick at End Bent Two. The top of hard rock elevations varies between 2023± and 2029± feet.

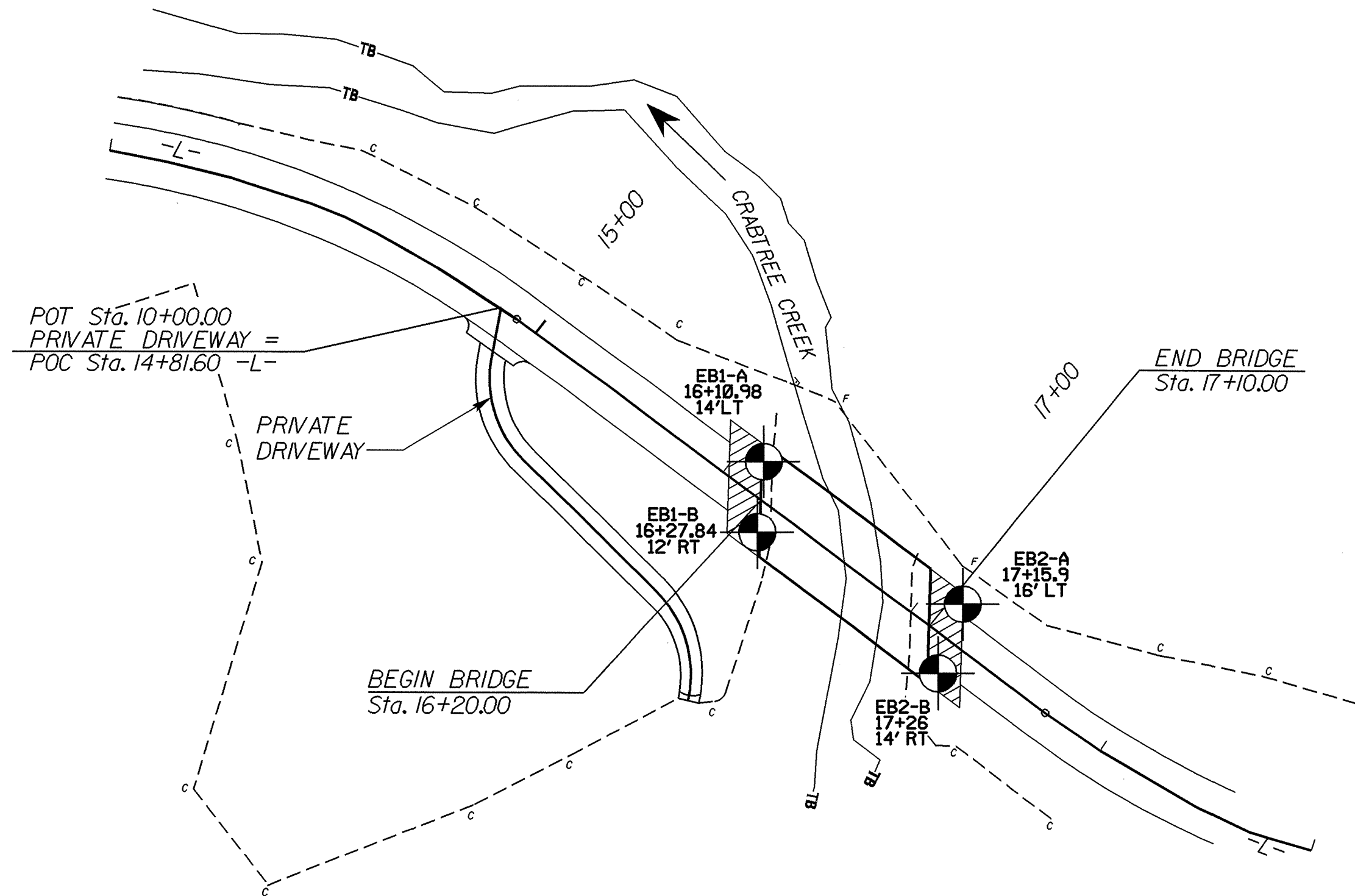
**Groundwater**

Groundwater was measured in boring EB1-A at elevation 2029± feet and 2034± feet at EB2-B.

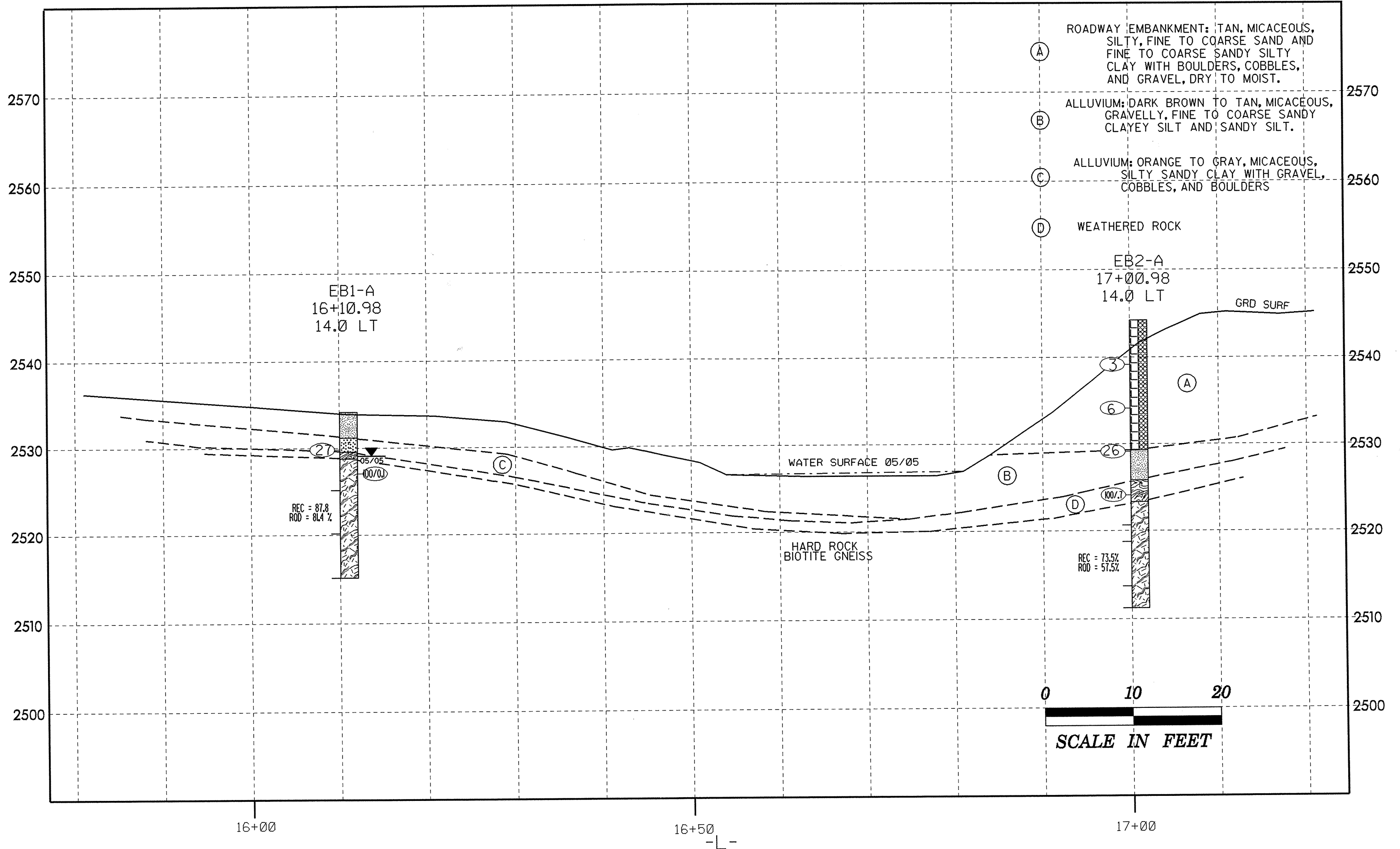
Respectfully Submitted,

John W. Mann, LG  
Project Engineering Geologist

# BORING LOCATIONS

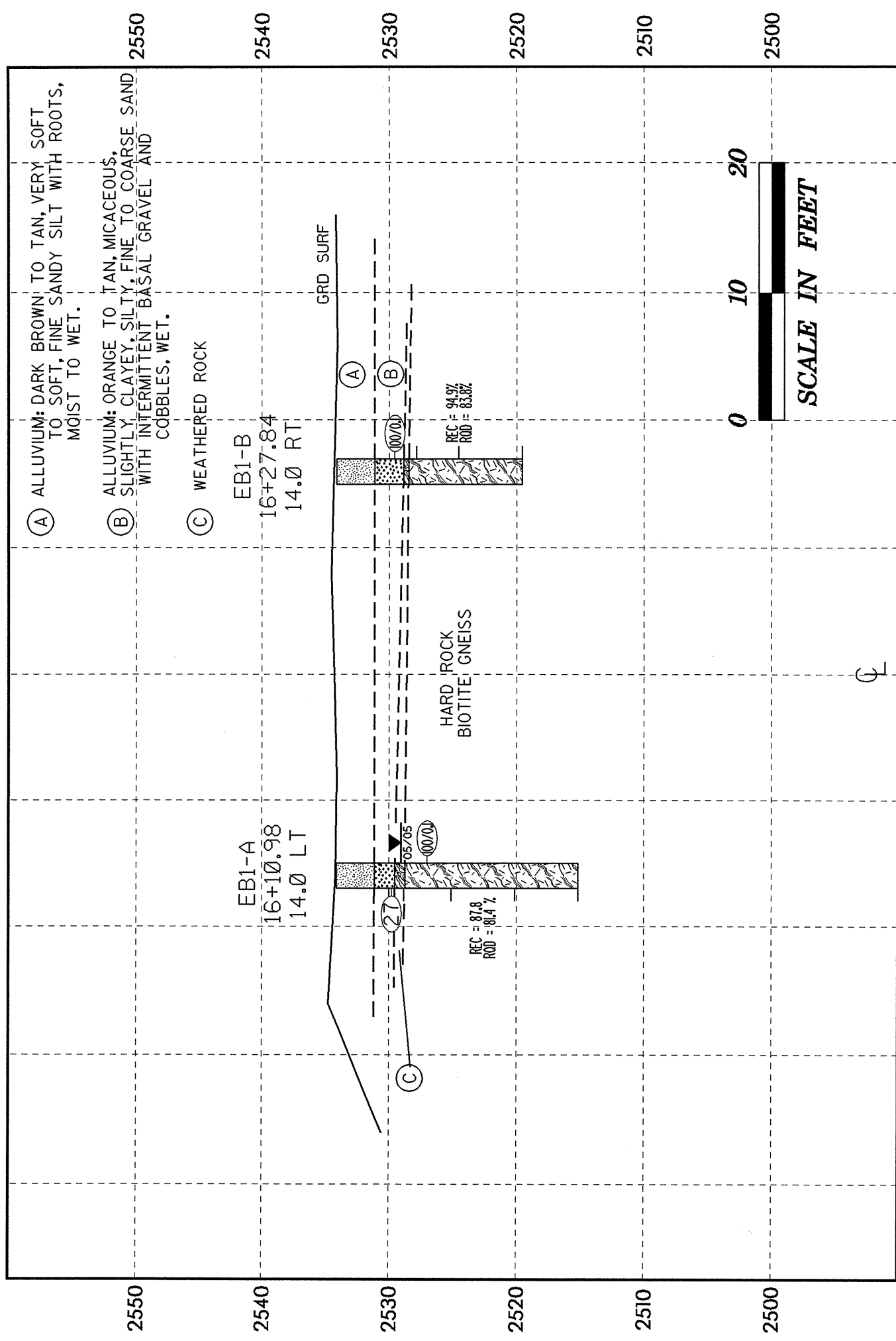


# PROFILE ALONG SIDE A (14 FT. LT.)



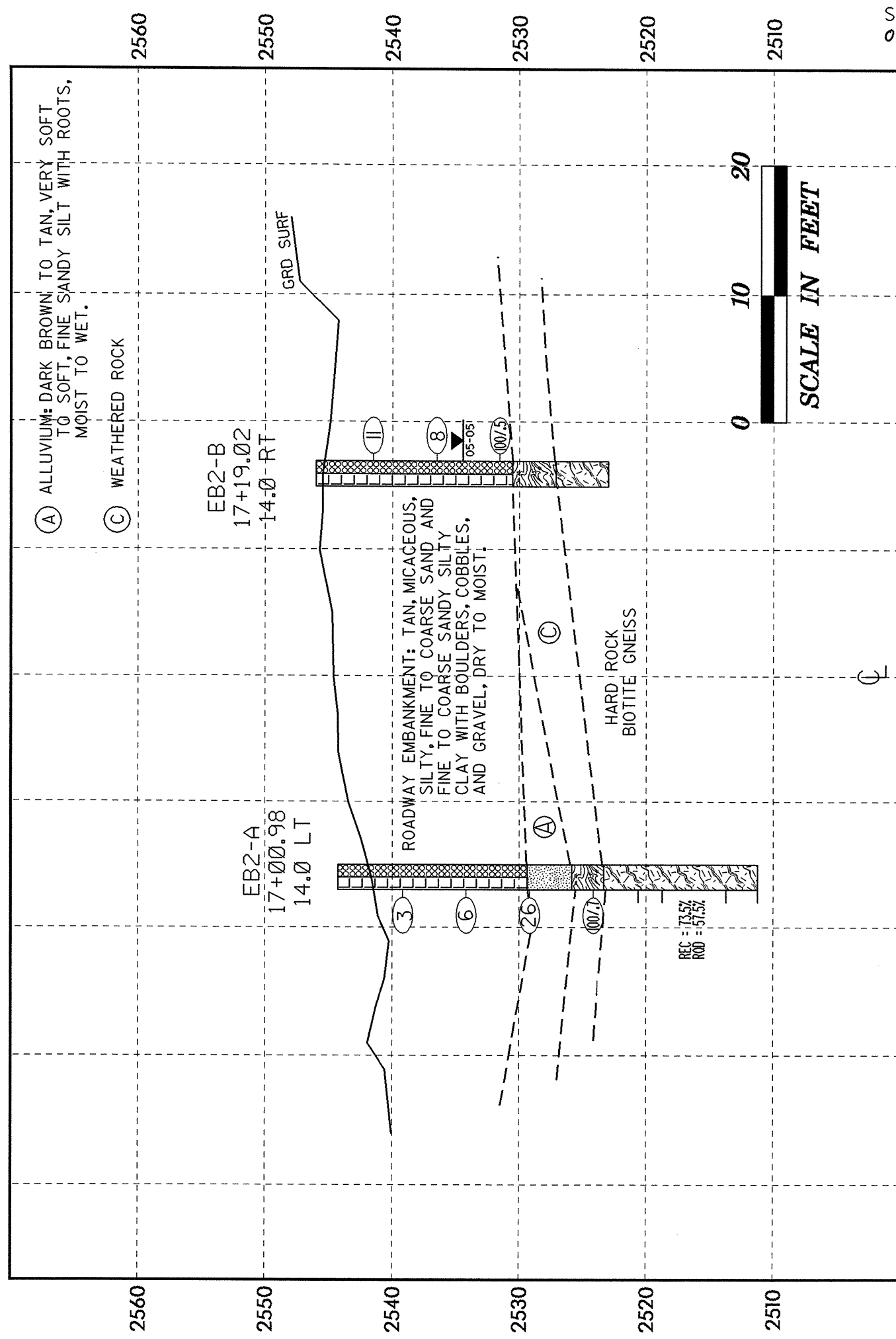
CROSS SECTION THROUGH EB1 ALONG SKEW

BRIDGE NO. 36, 33206.1.1(B-3661)



CROSS SECTION THROUGH EB2 ALONG SKEW

BRIDGE NO. 36, 33206.1.1(B-3661)







NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
 GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33206.1.1		ID B-3661		COUNTY HAYWOOD		GEOLOGIST M.M. HAGER						
SITE DESCRIPTION BRIDGE NO. 36 ON SR-1503 OVER CRABTREE CREEK						GND WATER						
BORING NO EB1-B		NORTHING 0.00		EASTING 0.00		0 HR N/A						
ALIGNMENT -L-		BORING LOCATION 16+27.840		OFFSET 12.00ft RT		24 HR 5.10ft						
COLLAR ELEV 2534.08ft		TOTAL DEPTH 14.60ft		START DATE 5/05/05		COMPLETION DATE 05/05/05						
DRILL MACHINE CME-550			DRILL METHOD CASING ADVANCEMENT			HAMMER TYPE AUTOMATIC						
SURFACE WATER DEPTH			DEPTH TO ROCK 5.30ft			Log EB1-B, Page 1 of 1						
ELEV	DEPTH	BLOW CT			PEN (ft)	BLOWS PER FOOT				SAMPLE NO	LOG	SOIL AND ROCK DESCRIPTION
		6in	6in	6in		0	25	50	75			
2534.08												Ground Surface
2530.00	4.60	4	38	62	0.6				100			ALLUVIUM: BROWN TO TAN, FINE SANDY SILT WITH ROOTS. ORANGE TO GREY, MICACEOUS, SILTY CLAYEY FINE SAND WITH ROOTS WEATHERED ROCK HARD ROCK
2519.48												BORING TERMINATED AT 14.6' IN HARD ROCK.

### CORE BORING REPORT

PROJECT: 33206.1.1 I. D. NO: B-3661 BORING NO: EB1-B GEOLOGIST: J.W. MANN

DESCRIPTION: BRIDGE NO. 36 ON SR-1503 OVER CRABTREE CREEK

COUNTY: HAYWOOD COLLAR ELEVATION: 2534.1 FT. TOTAL DEPTH: 14.6 FT.

ELEV. (FEET)	DEPTH (FEET)	DRILL RATE MIN./FT.	RUN (FEET)	REC. FEET %	RQD. FEET %	SAMP. #	FIELD CLASSIFICATION AND REMARKS
2527.8	6.3		3.3	3.3	2.9		GRAY, MEDIUM- TO COARSE-GRAINED, SLIGHTLY WEATHERED TO PREDOMINANTLY FRESH, HARD BIOTITE GNEISS. FRACTURE SPACING CLOSE TO WIDE WITH JOINT ANGLES VARYING FROM 40-70°.
2524.5	9.6			98	89		
2524.5	9.6		5.0	4.6	4.1		
2519.5	14.6			92	81		
CORING TERMINATED AT ELEVATION 2519.5 FT.							
DRILLER: D.O. CHEEK		CORE SIZE: NXWL		EQUIPMENT: CME-550			



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
 GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33206.1.1		ID B-3661		COUNTY HAYWOOD		GEOLOGIST M.M. HAGER								
SITE DESCRIPTION BRIDGE NO. 36 ON SR-1503 OVER CRABTREE CREEK						GND WATER								
BORING NO EB2-A		NORTHING 0.00		EASTING 0.00		0 HR N/A								
ALIGNMENT -L-		BORING LOCATION 17+15.900		OFFSET 16.00ft LT		24 HR N/A								
COLLAR ELEV 2544.25ft		TOTAL DEPTH 33.00ft		START DATE 5/02/05		COMPLETION DATE 05/02/05								
DRILL MACHINE CME-550			DRILL METHOD CASING ADVANCEMENT			HAMMER TYPE AUTOMATIC								
SURFACE WATER DEPTH			DEPTH TO ROCK 20.90ft			Log EB2-A, Page 1 of 1								
ELEV	DEPTH	BLOW CT			PEN (ft)	BLOWS PER FOOT					SAMPLE NO	LOG	SOIL AND ROCK DESCRIPTION	
		6in	6in	6in		0	25	50	75	100				
2544.25														Ground Surface
2540.00	5.10	4	2	1	1.0	3								EMBANKMENT: BROWN, MICACEOUS, CLAYEY FINE TO COARSE SANDY SILT WITH GRAVEL, COBBLES, BOULDERS, AND SILT SEEMS.
	10.10	2	2	4	1.0	6								
2530.00	15.10	40	14	12	1.0	26								ALLUVIUM: GRAY TO BROWN, INTERLAYERED SAND AND SANDY SILT WITH INTERMITTENT GRAVEL AND WEATHERED ROCK FRAGMENTS, MOIST.
	20.10	33	67		0.7									
2520.00														WEATHERED ROCK
														HARD ROCK
2511.25														BORING TERMINATED AT 33.0' IN HARD ROCK

CORE BORING REPORT							DATE 7/11/2005
PROJECT:	33206.1.1	I. D. NO:	B-3661	BORING NO:	EB2-A	GEOLOGIST:	J.W. MANN
DESCRIPTION:	BRIDGE NO. 36 ON SR-1503 OVER CRABTREE CREEK						
COUNTY:	HAYWOOD	COLLAR ELEVATION:	2544.3 FT.	TOTAL DEPTH:	33.0	FT.	
ELEV. (FEET)	DEPTH (FEET)	DRILL RATE MIN./FT.	RUN (FEET)	REC. FEET %	RQD. FEET %	SAMP. #	FIELD CLASSIFICATION AND REMARKS
2520.7	23.6		1.9	1.5	1.0		GRAY, MEDIUM- TO COARSE-GRAINED, FRESH, HARD BIOTITE GNEISS WITH CLOSE TO MODERATELY CLOSE FRACTURE SPACING.
2518.8	25.5		5.0	4.1	4.0		
2518.8	25.5			82	80		* CORE BARREL MALFUNCTIONED ON LAST RUN RESULTING IN POOR RECOVERY AND ROCK QUALITY VALUES.
2513.8	30.5		2.5	1.3	0.4		
2513.8	30.5			52	16		
2511.3	33.0						
							CORING TERMINATED AT ELEVATION 2511.3 FT.
DRILLER: D.O. CHEEK		CORE SIZE: NXWL		EQUIPMENT: CME-550			



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

T.I.P. ID #: B-3661

REPORT ON SAMPLES OF: Soils for Classification

PROJECT:	33206.1.1	COUNTY:	Haywood	Owner:	--
DATE SAMPLED:	5-5	DATE RECEIVED:	5-18-05	DATE REPORTED:	5-24-05
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				
Lab Sample No. A	149071	149072	149073				
HiCAMS Sample #	--	--	--				
Retained #4 Sieve %	--	--	--				
Passing #10 Sieve %	60	98	84				
Passing #40 Sieve %	51	90	78				
Passing #200 Sieve %	24	40	52				

**MINUS #10 FRACTION**

Soil Mortar - 100%							
Coarse Sand -Ret. #60	29	22	15				
Fine Sand - Ret. #270	36	44	31				
Silt 0.05-0.005 mm %	21	20	28				
Clay < 0.005 mm %	14	14	26				
Passing # 40 Sieve %	--	--	--				
Passing # 200 Sieve %	--	--	--				

Liquid Limit	28	30	36				
Plastic Index	NP	NP	4				
AASHTO Classification	A-2-4 (0)	A-4 (1)	A-4 (3)				
Quantity							
Texture							
Station	16+10.98	16+27.84	17+26				
Hole No.							
Depth (ft) From:	3.6	4.6	9.5				
To:	4.6	5.3	11.0				

Remarks:  
A-149071 - 149073

CC:  
J. W. Mann  
File

SOILS ENGINEER:

PROJECT: 33206.1.1 ID: B-3661 COUNTY: Haywood

DESCRIPTION(1): Bridge No. 36 on SR-1503 over Crabtree Creek

**INFORMATION ON EXISTING BRIDGE**

Information obtained from:  field inspection  
 microfilm (Reel: \_\_\_\_\_ Pos: \_\_\_\_\_)  
 other: hydraulics report

BR. NO.: 36 BR. LENGTH: 90' NO. BENTS: 4 NO. BENTS IN: CHANNEL: 0 FLOODPLAIN: 4

FOUNDATION TYPE: Timber Piles on Concrete Footings

**EVIDENCE OF SCOUR(2):**

ABUTMENTS OR END BENT SLOPES: None Noted

INTERIOR BENTS: None Noted

CHANNEL BED: None Noted

CHANNEL BANKS: None Noted

**EXISTING SCOUR PROTECTION:**

TYPE(3): Boulders on End Bent Slopes

EXTENT(4): \_\_\_\_\_

EFFECTIVENESS(5): Fair

OBSTRUCTIONS(6) (DAMS,DEBRIS,ETC.): None

**DESIGN INFORMATION**

CHANNEL BED MATERIAL(7): Sand, Cobbles, and Boulders

CHANNEL BANK MATERIAL(8): Sandy Silt, Silty Clayey Sand, and Basal Gravel

CHANNEL BANK COVER(9): Trees, Grass, and Bushes

FLOOD PLAIN WIDTH(10): 100', River Mainly Incised

FLOOD PLAIN COVER(11): Trees, Grass, and Bushes

**DESIGN INFORMATION CONT.**

STREAM IS: X DEGRADING        AGGRADING (12)

OTHER OBSERVATIONS AND COMMENTS: \_\_\_\_\_

CHANNEL MIGRATION TENDENCY (13): Toward Bent No. Two

GEOTECHNICALLY ADJUSTED SCOUR ELEVATIONS(14):

N/A, Single Span Proposed Structure

REPORTED BY: J.W. Mann DATE: 04/17/05

**INSTRUCTIONS**

- (1) GIVE THE DESCRIPTION OF THE SPECIFIC SITE, INCLUDING ROUTE NUMBER AND BODY OF WATER CROSSED.
- (2) NOTE ANY EVIDENCE OF SCOUR AT THE EXISTING END BENTS OR ABUTMENTS (UNDERMINING, SLOUGHING, SCOUR LOCATIONS, DEGRADATIONS, ETC.)
- (3) NOTE ANY EXISTING SCOUR PROTECTION (RIP RAP, ETC.)
- (4) DESCRIBE THE EXTENT OF ANY EXISTING SCOUR PROTECTION.
- (5) DESCRIBE WHETHER OR NOT THE SCOUR PROTECTION APPEARS TO BE WORKING.
- (6) NOTE ANY DAMS, FALLEN TREES, DEBRIS AT BENTS, ETC.
- (7) DESCRIBE THE CHANNEL BED MATERIAL BASED ON OBSERVATION AND/OR SAMPLES.
- (8) DESCRIBE THE CHANNEL BANK MATERIAL BASED ON OBSERVATION AND/OR SAMPLES.
- (9) DESCRIBE THE BANK COVERING (GRASS, TREES, RIP RAP, NONE, ETC.)
- (10) GIVE THE APPROXIMATE FLOOD PLAIN WIDTH (ESTIMATE).
- (11) DESCRIBE THE FLOOD PLAIN COVERING (GRASS, TREES, CROPS, ETC.)
- (12) CHECK THE APPROPRIATE SPACE AS TO WHETHER THE STREAM IS DEGRADING OR AGGRADING.
- (13) DESCRIBE THE POTENTIAL OF THE BODY OF WATER TO MIGRATE Laterally DURING THE LIFE OF THE BRIDGE (APPROXIMATELY 100 YEARS).
- (14) GIVE THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION EXPECTED OVER THE LIFE OF THE BRIDGE (APPROXIMATELY 100 YEARS). THIS CAN BE GIVEN AS AN ELEVATION RANGE ACROSS THE SITE, OR ON A BENT BY BENT BASIS WHERE VARIATIONS EXIST. DISCUSS THE RELATIONSHIP BETWEEN THE HYDRAULICS THEORETICAL SCOUR AND THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION. IF THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION IS DEPENDENT ON SCOUR COUNTER MEASURES, EXPLAIN. (RIPRAP ARMORING ON SLOPES, ETC.) THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION IS BASED ON THE ERODABILITY OF MATERIALS WITH CONSIDERATION FOR JOINTING, FOLIATION, BEDDING ORIENTATION AND FREQUENCY, CORE RECOVERY PERCENTAGE, PERCENTAGE RQD, DIFFERENTIAL WEATHERING, SHEAR STRENGTH, OBSERVATIONS AT EXISTING STRUCTURES, OTHER TESTS DEEMED APPROPRIATE, AND OVERALL GEOLOGIC CONDITIONS AT THE SITE.



33206.1.1 (B-3661) Haywood County Bridge No. 36 on SR-1503 over Crabtree Creek

EB1-B; -L- STA 16+27.84, 12' RT



EB2-A; -L- STA 17+15.90, 16' LT



EB2-A; -L- STA 17+15.9, 16' LT

33206.1.1 (B-3661) Haywood County Bridge No. 36 on SR-1503 over Crabtree Creek

EB1-A; -L- STA 16+10.98, 14' LT (1/2)



EB1-A; -L- STA 16+10.98, 14' LT (2/2)



EB1-A; -L- STA 16+10.98, 14' LT

**33206.1.1 (B-3661) Haywood County Bridge No. 36 on SR-1503 over Crabtree Creek**

EB2-B; -L- STA 17+26, 14' RT

