

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

CONTENTS

<u>SHEET</u>	<u>DESCRIPTION</u>
1	TITLE
2	LEGEND
3	GEOTECHNICAL REPORT
4	SITE PLAN
5	PROFILE
6	CROSS SECTIONS
7-8	BORE LOG
9	SOIL TEST RESULTS
10	SCOUR REPORT
11	SITE PHOTOGRAPH

STRUCTURE
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 33596.1.1 F.A. PROJ. BRZ-2627(1)
 COUNTY ROCKINGHAM
 PROJECT DESCRIPTION BRIDGE NO. 89 ON -L- (SR 2627) OVER
ROSE CREEK AT -L- STATION 18+00

CAUTION NOTICE

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

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

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

PROJECT: 33596.1.1 ID: B-4254

PERSONNEL

- J.L. PEDRO
- W.N. CHERRY
- R.E. SMITH
- M.L. REEDER

INVESTIGATED BY J.L. PEDRO
 CHECKED BY N.T. ROBERSON
 SUBMITTED BY N.T. ROBERSON
 DATE JUNE 2006



DRAWN BY: J. L. PEDRO

NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IT IS CONSIDERED TO BE PART OF THE PLANS, SPECIFICATIONS, OR CONTRACT FOR THE PROJECT.

NOTE - BY HAVING REQUESTED THIS INFORMATION THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT
SUBSURFACE INVESTIGATION

PROJECT REFERENCE NO. 33596.11(B-4254)	SHEET NO. 2
---	----------------

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION		GRADATION		ROCK DESCRIPTION		TERMS AND DEFINITIONS																																																																																																														
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T296, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE: <i>VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i>		WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED) GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES. ANGULARITY OF GRAINS THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.		HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 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: NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED. FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC. FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC. COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.		ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOGGED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (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. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SREC) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.																																																																																																														
SOIL LEGEND AND AASHTO CLASSIFICATION		MINERALOGICAL COMPOSITION		WEATHERING		GROUND WATER																																																																																																														
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2">GENERAL CLASS.</th> <th colspan="5">GRANULAR MATERIALS (≤ 35% PASSING #200)</th> <th colspan="5">SILT-CLAY MATERIALS (> 35% PASSING #200)</th> <th colspan="3">ORGANIC MATERIALS</th> </tr> <tr> <th>GROUP CLASS.</th> <th>SYMBOL</th> <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-4, A-5</th> <th>A-6, A-7</th> <th>A-1, A-2</th> <th>A-3</th> <th>A-4, A-5</th> <th>A-6, A-7</th> </tr> <tr> <td></td> <td></td> <td>50 MX</td> <td>30 MX 50 MX</td> <td>51 MN</td> <td>35 MX 35 MX</td> <td>35 MX 35 MX</td> <td>35 MX 35 MX</td> <td>35 MN 35 MN</td> </tr> <tr> <td></td> <td></td> <td>15 MX 25 MX</td> <td>10 MX 10 MX</td> <td>11 MN 11 MN</td> <td>10 MX 10 MX</td> </tr> <tr> <td></td> <td></td> <td>6 MX</td> <td>NP</td> <td>4 MX</td> <td>8 MX</td> <td>12 MX</td> <td>16 MX</td> <td>No MX</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>EXCELLENT TO GOOD</td> <td colspan="5">FAIR TO POOR</td> <td colspan="3">FAIR TO POOR</td> <td colspan="3">POOR</td> <td>UNSUITABLE</td> </tr> </table>		GENERAL CLASS.		GRANULAR MATERIALS (≤ 35% PASSING #200)					SILT-CLAY MATERIALS (> 35% PASSING #200)					ORGANIC MATERIALS			GROUP CLASS.	SYMBOL	A-1	A-3	A-2	A-4	A-5	A-6	A-7	A-1, A-2	A-4, A-5	A-6, A-7	A-1, A-2	A-3	A-4, A-5	A-6, A-7			50 MX	30 MX 50 MX	51 MN	35 MX 35 MX	35 MX 35 MX	35 MX 35 MX	35 MN 35 MN	35 MN 35 MN	35 MN 35 MN	35 MN 35 MN	35 MN 35 MN	35 MN 35 MN	35 MN 35 MN	35 MN 35 MN			15 MX 25 MX	10 MX 10 MX	11 MN 11 MN	10 MX 10 MX	11 MN 11 MN	10 MX 10 MX	11 MN 11 MN	10 MX 10 MX	11 MN 11 MN	10 MX 10 MX	11 MN 11 MN	10 MX 10 MX	11 MN 11 MN	10 MX 10 MX			6 MX	NP	4 MX	8 MX	12 MX	16 MX	No MX										EXCELLENT TO GOOD	FAIR TO POOR					FAIR TO POOR			POOR			UNSUITABLE	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.		COMPRESSIBILITY SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50		PERCENTAGE OF MATERIAL 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		WEATHERING FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE. VERY SLIGHT (V SLJ) ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN. CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE. SLIGHT (SLJ) ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS. MODERATE (MOD.) SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK. MODERATELY SEVERE (MOD. SEV) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNKY" SOUND WHEN STRUCK. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i> SEVERE (SEV) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. <i>IF TESTED, YIELDS SPT N VALUES > 100 BPF</i> VERY SEVERE (V SEV) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. <i>IF TESTED, YIELDS SPT N VALUES < 100 BPF</i> COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.		GROUND WATER WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING STATIC WATER LEVEL AFTER 24 HOURS PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA SPRING OR SEEP												
GENERAL CLASS.		GRANULAR MATERIALS (≤ 35% PASSING #200)					SILT-CLAY MATERIALS (> 35% PASSING #200)					ORGANIC MATERIALS																																																																																																								
GROUP CLASS.	SYMBOL	A-1	A-3	A-2	A-4	A-5	A-6	A-7	A-1, A-2	A-4, A-5	A-6, A-7	A-1, A-2	A-3	A-4, A-5	A-6, A-7																																																																																																					
		50 MX	30 MX 50 MX	51 MN	35 MX 35 MX	35 MX 35 MX	35 MX 35 MX	35 MN 35 MN	35 MN 35 MN	35 MN 35 MN	35 MN 35 MN	35 MN 35 MN	35 MN 35 MN	35 MN 35 MN	35 MN 35 MN																																																																																																					
		15 MX 25 MX	10 MX 10 MX	11 MN 11 MN	10 MX 10 MX	11 MN 11 MN	10 MX 10 MX	11 MN 11 MN	10 MX 10 MX	11 MN 11 MN	10 MX 10 MX	11 MN 11 MN	10 MX 10 MX	11 MN 11 MN	10 MX 10 MX																																																																																																					
		6 MX	NP	4 MX	8 MX	12 MX	16 MX	No MX																																																																																																												
		EXCELLENT TO GOOD	FAIR TO POOR					FAIR TO POOR			POOR			UNSUITABLE																																																																																																						
CONSISTENCY OR DENSENESS		MISCELLANEOUS SYMBOLS		ROCK HARDNESS		FRACTURE SPACING																																																																																																														
<table border="1" style="width: 100%; border-collapse: collapse;"> <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/FT²)</th> </tr> <tr> <td>GENERALLY GRANULAR MATERIAL (NON-COHESIVE)</td> <td>VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE</td> <td><4 4 TO 10 10 TO 30 30 TO 50 >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><2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 >30</td> <td><0.25 0.25 TO 0.50 0.5 TO 1.0 1 TO 2 2 TO 4 >4</td> </tr> </table>		PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)	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 0.50 0.5 TO 1.0 1 TO 2 2 TO 4 >4	ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRERD SOIL BOUNDARY INFERRERD ROCK LINE ALLUVIAL SOIL BOUNDARY DIP & DIP DIRECTION OF ROCK STRUCTURES SOUNDING ROD SPT TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION SPT N-VALUE SPT REFUSAL 		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>VERY HARD</th> <th>HARD</th> <th>MODERATELY HARD</th> <th>MEDIUM HARD</th> <th>SOFT</th> <th>VERY SOFT</th> </tr> <tr> <td>CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.</td> <td>CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.</td> <td>CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.</td> <td>CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.</td> <td>CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.</td> <td>CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.</td> </tr> </table>		VERY HARD	HARD	MODERATELY HARD	MEDIUM HARD	SOFT	VERY SOFT	CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.	CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.	CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.	CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.	CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.	<table border="1" style="width: 100%; border-collapse: collapse;"> <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>> 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>< 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																																																									
PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)																																																																																																																	
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 0.50 0.5 TO 1.0 1 TO 2 2 TO 4 >4																																																																																																																	
VERY HARD	HARD	MODERATELY HARD	MEDIUM HARD	SOFT	VERY SOFT																																																																																																															
CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.	CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.	CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.	CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.	CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.																																																																																																															
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																																																																																																																	
TEXTURE OR GRAIN SIZE		ABBREVIATIONS		EQUIPMENT USED ON SUBJECT PROJECT		BEDDING																																																																																																														
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>U.S. STD. SIEVE SIZE</th> <th>4</th> <th>10</th> <th>40</th> <th>60</th> <th>200</th> <th>270</th> </tr> <tr> <th>OPENING (MM)</th> <td>4.75</td> <td>2.00</td> <td>0.42</td> <td>0.25</td> <td>0.075</td> <td>0.053</td> </tr> </table>		U.S. STD. SIEVE SIZE	4	10	40	60	200	270	OPENING (MM)	4.75	2.00	0.42	0.25	0.075	0.053	<table border="1" style="width: 100%; border-collapse: collapse;"> <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 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>		BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE, SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)	GRAIN MM 305	75	2.0	0.25	0.05	0.005		SIZE IN. 12	3						<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>AR</th> <th>BT</th> <th>CL</th> <th>CPT</th> <th>CSE</th> <th>DMT</th> <th>DPT</th> <th>F</th> <th>FOSS.</th> <th>FRAC.</th> <th>FRAGS.</th> <th>HL</th> <th>MD.</th> <th>MIC.</th> <th>MOD.</th> <th>NP</th> <th>ORG.</th> <th>PMT</th> <th>SAP.</th> <th>SD.</th> <th>SL.</th> <th>SLI.</th> <th>TCR</th> <th>V</th> <th>VST</th> <th>WEA.</th> <th>W</th> <th>W_d</th> </tr> <tr> <td>AUGER REFUSAL</td> <td>BORING TERMINATED</td> <td>CLAY</td> <td>CONE PENETRATION TEST</td> <td>COARSE</td> <td>DILATOMETER TEST</td> <td>DYNAMIC PENETRATION TEST</td> <td>VOID RATIO</td> <td>FOSILIFEROUS</td> <td>FRACTURED, FRACTURES</td> <td>FRAGMENTS</td> <td>HIGHLY</td> <td>MEDIUM</td> <td>MICACEOUS</td> <td>MODERATELY</td> <td>NON PLASTIC</td> <td>ORGANIC</td> <td>PRESSUREMETER TEST</td> <td>SAPROLITIC</td> <td>SAND, SANDY</td> <td>SILT, SILTY</td> <td>SLIGHTLY</td> <td>TRICONE REFUSAL</td> <td>MOISTURE CONTENT</td> <td>VERY</td> <td>VANE SHEAR TEST</td> <td>WEATHERED</td> <td>UNIT WEIGHT</td> <td>DRY UNIT WEIGHT</td> </tr> </table>		AR	BT	CL	CPT	CSE	DMT	DPT	F	FOSS.	FRAC.	FRAGS.	HL	MD.	MIC.	MOD.	NP	ORG.	PMT	SAP.	SD.	SL.	SLI.	TCR	V	VST	WEA.	W	W _d	AUGER REFUSAL	BORING TERMINATED	CLAY	CONE PENETRATION TEST	COARSE	DILATOMETER TEST	DYNAMIC PENETRATION TEST	VOID RATIO	FOSILIFEROUS	FRACTURED, FRACTURES	FRAGMENTS	HIGHLY	MEDIUM	MICACEOUS	MODERATELY	NON PLASTIC	ORGANIC	PRESSUREMETER TEST	SAPROLITIC	SAND, SANDY	SILT, SILTY	SLIGHTLY	TRICONE REFUSAL	MOISTURE CONTENT	VERY	VANE SHEAR TEST	WEATHERED	UNIT WEIGHT	DRY UNIT WEIGHT	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>DRILL UNITS:</th> <th>ADVANCING TOOLS:</th> <th>HAMMER TYPE:</th> <th>CORE SIZE:</th> <th>HAND TOOLS:</th> </tr> <tr> <td><input type="checkbox"/> MOBILE B-</td> <td><input type="checkbox"/> CLAY BITS <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER <input type="checkbox"/> 8" HOLLOW AUGERS <input type="checkbox"/> HARD FACED FINGER BITS <input type="checkbox"/> TUNG-CARBIDE INSERTS <input type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER <input type="checkbox"/> TRICONE * STEEL TEETH <input type="checkbox"/> TRICONE * TUNG-CARB. <input type="checkbox"/> CORE BIT</td> <td><input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL</td> <td><input type="checkbox"/> -B <input type="checkbox"/> -N <input type="checkbox"/> -H</td> <td><input type="checkbox"/> POST HOLE DIGGER <input type="checkbox"/> HAND AUGER <input type="checkbox"/> SOUNDING ROD <input type="checkbox"/> VANE SHEAR TEST</td> </tr> </table>		DRILL UNITS:	ADVANCING TOOLS:	HAMMER TYPE:	CORE SIZE:	HAND TOOLS:	<input type="checkbox"/> MOBILE B-	<input type="checkbox"/> CLAY BITS <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER <input type="checkbox"/> 8" HOLLOW AUGERS <input type="checkbox"/> HARD FACED FINGER BITS <input type="checkbox"/> TUNG-CARBIDE INSERTS <input type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER <input type="checkbox"/> TRICONE * STEEL TEETH <input type="checkbox"/> TRICONE * TUNG-CARB. <input type="checkbox"/> CORE BIT	<input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL	<input type="checkbox"/> -B <input type="checkbox"/> -N <input type="checkbox"/> -H	<input type="checkbox"/> POST HOLE DIGGER <input type="checkbox"/> HAND AUGER <input type="checkbox"/> SOUNDING ROD <input type="checkbox"/> VANE SHEAR TEST	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</th> </tr> <tr> <td>FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</td> </tr> <tr> <td>MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</td> </tr> <tr> <td>INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</td> </tr> <tr> <td>EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</td> </tr> </table>		FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.	EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.
U.S. STD. SIEVE SIZE	4	10	40	60	200	270																																																																																																														
OPENING (MM)	4.75	2.00	0.42	0.25	0.075	0.053																																																																																																														
BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE, SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)																																																																																																														
GRAIN MM 305	75	2.0	0.25	0.05	0.005																																																																																																															
SIZE IN. 12	3																																																																																																																			
AR	BT	CL	CPT	CSE	DMT	DPT	F	FOSS.	FRAC.	FRAGS.	HL	MD.	MIC.	MOD.	NP	ORG.	PMT	SAP.	SD.	SL.	SLI.	TCR	V	VST	WEA.	W	W _d																																																																																									
AUGER REFUSAL	BORING TERMINATED	CLAY	CONE PENETRATION TEST	COARSE	DILATOMETER TEST	DYNAMIC PENETRATION TEST	VOID RATIO	FOSILIFEROUS	FRACTURED, FRACTURES	FRAGMENTS	HIGHLY	MEDIUM	MICACEOUS	MODERATELY	NON PLASTIC	ORGANIC	PRESSUREMETER TEST	SAPROLITIC	SAND, SANDY	SILT, SILTY	SLIGHTLY	TRICONE REFUSAL	MOISTURE CONTENT	VERY	VANE SHEAR TEST	WEATHERED	UNIT WEIGHT	DRY UNIT WEIGHT																																																																																								
DRILL UNITS:	ADVANCING TOOLS:	HAMMER TYPE:	CORE SIZE:	HAND TOOLS:																																																																																																																
<input type="checkbox"/> MOBILE B-	<input type="checkbox"/> CLAY BITS <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER <input type="checkbox"/> 8" HOLLOW AUGERS <input type="checkbox"/> HARD FACED FINGER BITS <input type="checkbox"/> TUNG-CARBIDE INSERTS <input type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER <input type="checkbox"/> TRICONE * STEEL TEETH <input type="checkbox"/> TRICONE * TUNG-CARB. <input type="checkbox"/> CORE BIT	<input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL	<input type="checkbox"/> -B <input type="checkbox"/> -N <input type="checkbox"/> -H	<input type="checkbox"/> POST HOLE DIGGER <input type="checkbox"/> HAND AUGER <input type="checkbox"/> SOUNDING ROD <input type="checkbox"/> VANE SHEAR TEST																																																																																																																
FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.																																																																																																																				
FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.																																																																																																																				
MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.																																																																																																																				
INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.																																																																																																																				
EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.																																																																																																																				
SOIL MOISTURE - CORRELATION OF TERMS		FRACTURE SPACING		INDURATION		COLOR																																																																																																														
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>SOIL MOISTURE SCALE (ATTERBERG LIMITS)</th> <th>FIELD MOISTURE DESCRIPTION</th> <th>GUIDE FOR FIELD MOISTURE DESCRIPTION</th> </tr> <tr> <td>LL - LIQUID LIMIT</td> <td>- SATURATED - (SAT.)</td> <td>USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE</td> </tr> <tr> <td>PL - PLASTIC LIMIT</td> <td>- WET - (W)</td> <td>SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE</td> </tr> <tr> <td>OM - OPTIMUM MOISTURE</td> <td>- MOIST - (M)</td> <td>SOLID; AT OR NEAR OPTIMUM MOISTURE</td> </tr> <tr> <td>SL - SHRINKAGE LIMIT</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	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE	PL - PLASTIC LIMIT	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE	OM - OPTIMUM MOISTURE	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE	SL - SHRINKAGE LIMIT	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	<table border="1" style="width: 100%; border-collapse: collapse;"> <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>> 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>< 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	<table border="1" style="width: 100%; border-collapse: collapse;"> <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																																																					
SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION																																																																																																																		
LL - LIQUID LIMIT	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE																																																																																																																		
PL - PLASTIC LIMIT	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE																																																																																																																		
OM - OPTIMUM MOISTURE	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE																																																																																																																		
SL - SHRINKAGE LIMIT	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE																																																																																																																		
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																																																																																																																		
PLASTICITY		EQUIPMENT USED ON SUBJECT PROJECT		INDURATION		COLOR																																																																																																														
<table border="1" style="width: 100%; border-collapse: collapse;"> <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	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>DRILL UNITS:</th> <th>ADVANCING TOOLS:</th> <th>HAMMER TYPE:</th> <th>CORE SIZE:</th> <th>HAND TOOLS:</th> </tr> <tr> <td><input type="checkbox"/> MOBILE B-</td> <td><input type="checkbox"/> CLAY BITS <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER <input type="checkbox"/> 8" HOLLOW AUGERS <input type="checkbox"/> HARD FACED FINGER BITS <input type="checkbox"/> TUNG-CARBIDE INSERTS <input type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER <input type="checkbox"/> TRICONE * STEEL TEETH <input type="checkbox"/> TRICONE * TUNG-CARB. <input type="checkbox"/> CORE BIT</td> <td><input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL</td> <td><input type="checkbox"/> -B <input type="checkbox"/> -N <input type="checkbox"/> -H</td> <td><input type="checkbox"/> POST HOLE DIGGER <input type="checkbox"/> HAND AUGER <input type="checkbox"/> SOUNDING ROD <input type="checkbox"/> VANE SHEAR TEST</td> </tr> </table>		DRILL UNITS:	ADVANCING TOOLS:	HAMMER TYPE:	CORE SIZE:	HAND TOOLS:	<input type="checkbox"/> MOBILE B-	<input type="checkbox"/> CLAY BITS <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER <input type="checkbox"/> 8" HOLLOW AUGERS <input type="checkbox"/> HARD FACED FINGER BITS <input type="checkbox"/> TUNG-CARBIDE INSERTS <input type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER <input type="checkbox"/> TRICONE * STEEL TEETH <input type="checkbox"/> TRICONE * TUNG-CARB. <input type="checkbox"/> CORE BIT	<input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL	<input type="checkbox"/> -B <input type="checkbox"/> -N <input type="checkbox"/> -H	<input type="checkbox"/> POST HOLE DIGGER <input type="checkbox"/> HAND AUGER <input type="checkbox"/> SOUNDING ROD <input type="checkbox"/> VANE SHEAR TEST	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</th> </tr> <tr> <td>FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</td> </tr> <tr> <td>MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</td> </tr> <tr> <td>INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</td> </tr> <tr> <td>EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</td> </tr> </table>		FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.	EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.	<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>																																																																																
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																																																																																																																		
DRILL UNITS:	ADVANCING TOOLS:	HAMMER TYPE:	CORE SIZE:	HAND TOOLS:																																																																																																																
<input type="checkbox"/> MOBILE B-	<input type="checkbox"/> CLAY BITS <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER <input type="checkbox"/> 8" HOLLOW AUGERS <input type="checkbox"/> HARD FACED FINGER BITS <input type="checkbox"/> TUNG-CARBIDE INSERTS <input type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER <input type="checkbox"/> TRICONE * STEEL TEETH <input type="checkbox"/> TRICONE * TUNG-CARB. <input type="checkbox"/> CORE BIT	<input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL	<input type="checkbox"/> -B <input type="checkbox"/> -N <input type="checkbox"/> -H	<input type="checkbox"/> POST HOLE DIGGER <input type="checkbox"/> HAND AUGER <input type="checkbox"/> SOUNDING ROD <input type="checkbox"/> VANE SHEAR TEST																																																																																																																
FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.																																																																																																																				
FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.																																																																																																																				
MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.																																																																																																																				
INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.																																																																																																																				
EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.																																																																																																																				
BENCH MARK: BL-3, -L - STATION 17+57.11 (5.67' LT)		ELEVATION: 663.35 FT.		NOTES:		NOTES:																																																																																																														



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

June 8, 2006

STATE PROJECT: 33596.1.1 (B-4254)
F.A. PROJECT: BRZ-2627(1)
COUNTY: Rockingham

DESCRIPTION: Bridge No. 89 on -L- (SR 2627) over Rose Creek at Station 18+00

SUBJECT: Geotechnical Report – Structure Inventory

Project Description

A single-span bridge, 100-feet in length with a 105° skew, is proposed on -L- (SR 2627) over Rose Creek. The project is located in southeastern Rockingham County about 5 miles south of Reidsville.

The subsurface investigation was conducted during May of 2006 using a CME-45B. Standard Penetration Test borings were performed at each of the proposed bent locations. All borings were advanced to weathered and/or crystalline rock using hollow stem augers. Representative soil samples were obtained for visual classification in the field and selected samples were sent to the Materials and Tests Unit for laboratory analysis.

Physiography and Geology

The project is located in the gently rolling terrain of the Piedmont Physiographic province. Geologically, the site is underlain by intrusive granitic rock of the Charlotte and Milton belts. The area consists of a mixture of woods, farmland, and scattered homes.

Soil Properties

Soils encountered at the project site include roadway embankment, alluvial and residual soils.

Roadway embankment soils were encountered at all bent locations. The embankment soils range in thickness from 4.5 to 9.3 feet. These soils consist of tan, orange, brown, and white, very soft to medium stiff, moist, silty clay (A-7-6) and sandy clay (A-6). Alluvial soils underlie roadway embankment soils.

Alluvial soils range from 10.7 to 15.9 feet in thickness. These soils predominantly consist of gray, brown and tan, very soft to medium stiff, moist to saturated, sandy silt (A-4). Other soils present in smaller quantities are tan-brown, loose to medium dense, wet, coarse sand (A-1-b) and fine sand (A-3), and gray

and brown, stiff, moist, silty clay (A-7-6). The alluvial soils were deposited on residual soil and weathered rock.

Residual soils were encountered at all boring locations except for EB2-B, and are 2.3 to 7.5 feet thick. These soils consist of brown, orange, green and white, dense to very dense, moist, saprolitic, silty sand (A-2-4) and sand (A-1-b). The residual soils are underlain by weathered rock.

Rock Properties

Weathered rock was derived from the underlying intrusive granitic rock, and ranges in thickness from 6.5 feet at EB2-A, to as much as 12.2 feet at boring EB2-B. Weathered rock was encountered in all of the borings. The top of weathered rock ranges in elevation from 636.2 feet at EB1-B to 642.5 feet at EB2-B.

Crystalline rock was encountered at the left side of both bent locations. Rock present at the site predominantly consists of orange-brown and white, severely weathered to slightly weathered, moderately hard to hard, granite. The top of crystalline rock ranges in elevation from 631.5 feet at EB1-A to 634.7 feet at EB2-A.

Groundwater

Groundwater was encountered at each of the bent locations. The groundwater elevations range from 650.6 feet at EB2-B to 652.4 feet at EB1-A. The water in Rose Creek was at an elevation of 650.0 feet (11-05).

Notice

This Geotechnical foundation report is based on the Preliminary General Drawing dated January, 2006 and the Hydraulics Bridge Report dated November 30, 2005. If significant changes are made in the design or location of the proposed structure, the subsurface information should be reviewed and modified as necessary.

Prepared by,

Jaime Love Pedro

Jaime Love Pedro
Engineering Geologist

TEST SITE PLAN



17+00

18+00

19+00

EBI-A

EB2-A

-L-

SR 2627 (CANDY CREEK RD.)

← US 29

BRIDGE 89

NC 150 →

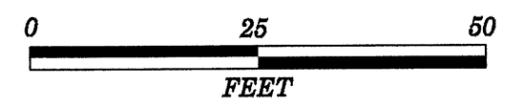
EBI-B

EB2-B

WOODS

ROSE CREEK

WOODS

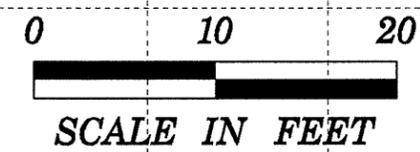
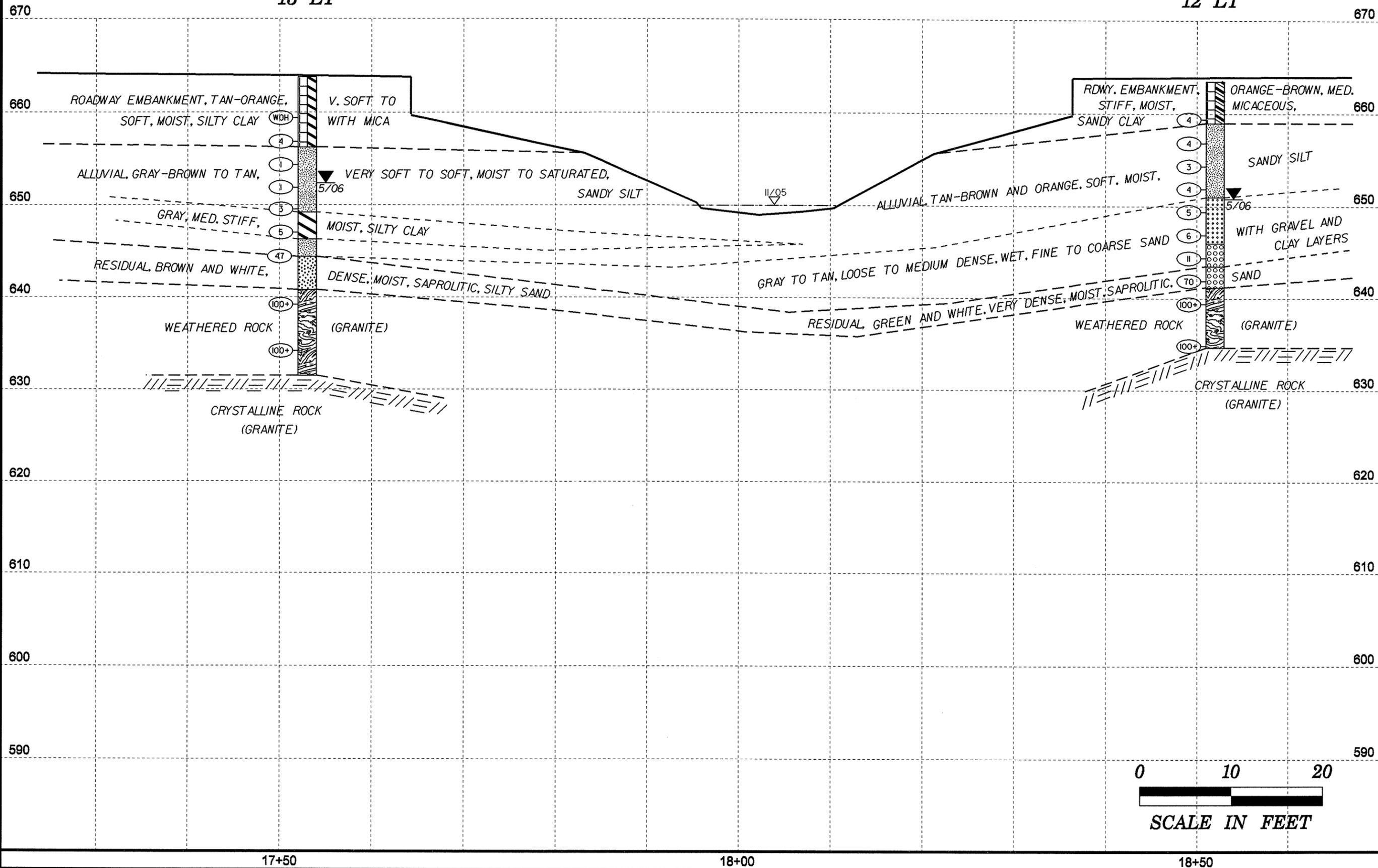


PROFILE THROUGH BORINGS PROJECTED ALONG -L-

PROJECT REFERENCE NO.	SHEET
33596.1.1 (B-4254)	5

EB1-A
17+53
13' LT

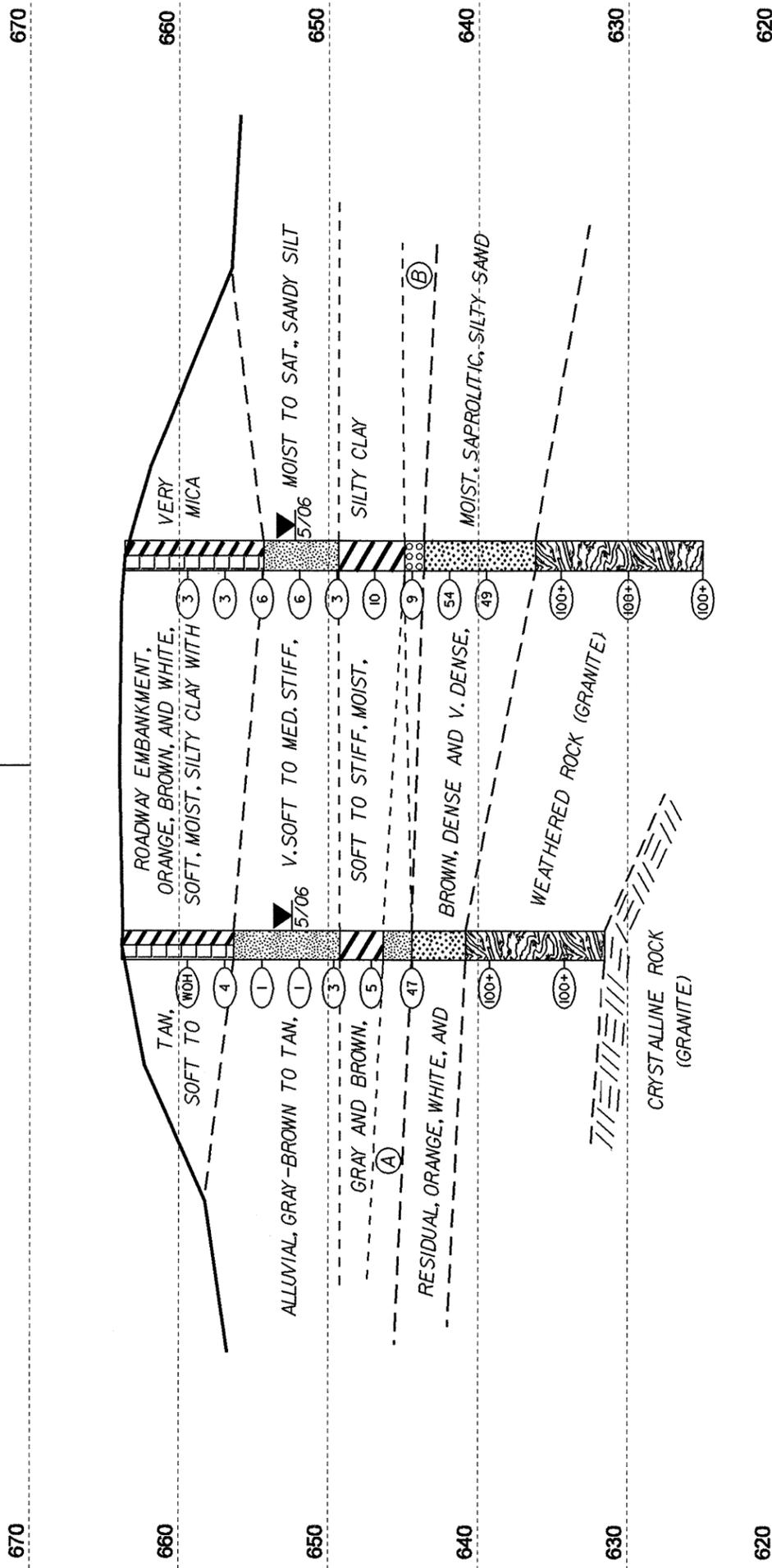
EB2-A
18+52
12' LT



CROSS SECTION THROUGH END BENT 1

EB1-A
17+53
13' LT

EB1-B
17+47
13' RT

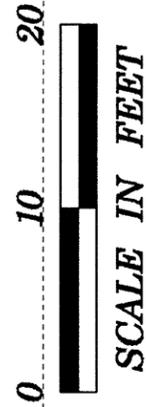
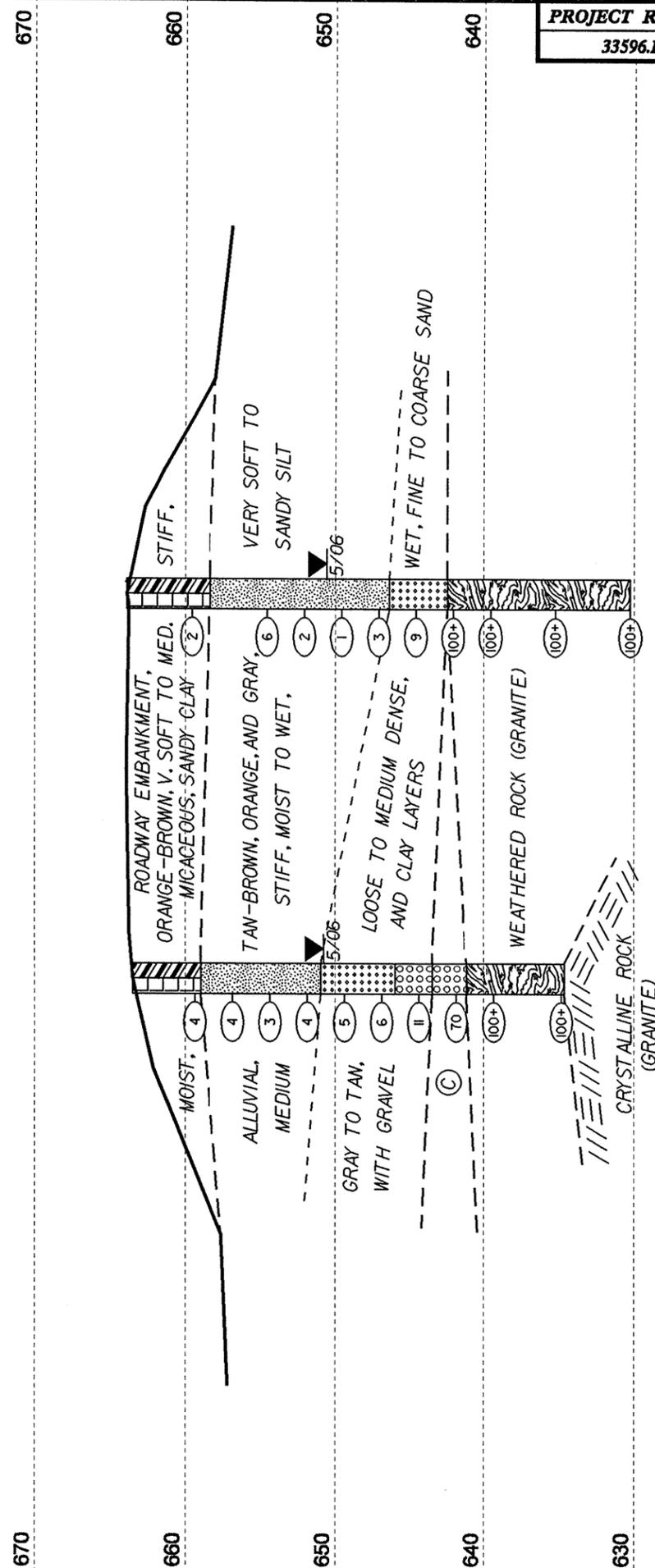


- (A) ALLUVIAL, TAN-BROWN, MEDIUM STIFF, SATURATED, SANDY SILT WITH PEA-SIZED GRAVEL
- (B) ALLUVIAL, TAN-BROWN, LOOSE, SATURATED, COARSE SAND

CROSS SECTION THROUGH END BENT 2

EB2-A
18+52
12' LT

EB2-B
18+47
12' RT



- (C) RESIDUAL, GREEN AND WHITE, VERY DENSE, MOIST, SAPROLITIC, SAND

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 33596.1.1		ID. B-4254		COUNTY ROCKINGHAM		GEOLOGIST J. L. PEDRO	
SITE DESCRIPTION BRIDGE NO. 89 ON -L- (SR 2627) OVER ROSE CREEK							GROUND WATER
BORING NO. EBI-A		BORING LOCATION 17+53		OFFSET 13' LT		ALIGNMENT -L-	
COLLAR ELEVATION 663.8'		NORTHING 913461		EASTING 1819084		0 HR. 12.6'	
TOTAL DEPTH 32.3'		DRILL MACHINE CME-45B		DRILL METHOD H.S. AUGERS		HAMMER TYPE AUTOMATIC	
START DATE 5/9/06		COMPLETION DATE 5/9/06		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 32.3'	
ELEV. (FT.)	DEPTH (FT.)	BLOW COUNT	PEN. (FT.)	BLOWS PER FOOT	SAMPLE NUMBER	LOG	SOIL AND ROCK DESCRIPTION
663.8							
660.0	3.4	WOH	1.0	X 0	SS-14	M	ROADWAY EMBANKMENT, TAN-ORANGE, SILTY CLAY WITH MICA
	5.9	WOH 2	1.0	X 4		M	
655.0	8.4	WOH	1.0	X 1	SS-15	M	
	10.9	WOH	1.0	X 1	SS-16	M	ALLUVIAL, GRAY-BROWN TO TAN, SANDY SILT
650.0	13.4	1	1.0	X 3		S	
	15.9	2	1.0	X 5	SS-17	M	GRAY, SILTY CLAY
645.0	18.4	1	1.0	X 47		S	TAN-BROWN, SANDY SILT WITH GRAVEL
						M	RESIDUAL, BROWN AND WHITE, SAPROLITIC, SILTY SAND
640.0	23.4	10	0.9	100+ X			
635.0	28.4	100	0.4	100+ X			WEATHERED ROCK (GRANITE)
630.0	AUGER REFUSAL AT ELEVATION 631.5 FEET ON CRYSTALLINE ROCK (GRANITE)						
625.0							
620.0							
615.0							
610.0							
605.0							
600.0							
595.0							
590.0							
585.0							

PROJECT NO. 33596.1.1		ID. B-4254		COUNTY ROCKINGHAM		GEOLOGIST J. L. PEDRO	
SITE DESCRIPTION BRIDGE NO. 89 ON -L- (SR 2627) OVER ROSE CREEK							GROUND WATER
BORING NO. EBI-B		BORING LOCATION 17+47		OFFSET 13' RT		ALIGNMENT -L-	
COLLAR ELEVATION 663.7'		NORTHING 913435		EASTING 1819077		0 HR. 12.8'	
TOTAL DEPTH 38.7'		DRILL MACHINE CME-45B		DRILL METHOD H.S. AUGERS		HAMMER TYPE AUTOMATIC	
START DATE 5/9/06		COMPLETION DATE 5/9/06		SURFACE WATER DEPTH N/A		DEPTH TO ROCK N/A	
ELEV. (FT.)	DEPTH (FT.)	BLOW COUNT	PEN. (FT.)	BLOWS PER FOOT	SAMPLE NUMBER	LOG	SOIL AND ROCK DESCRIPTION
663.7							
660.0	3.2	2	1.0	X 3	SS-9	M	ROADWAY EMBANKMENT, ORANGE-BROWN AND WHITE, SILTY CLAY
	5.7	WOH 2	1.0	X 3	SS-10	M	
655.0	8.2	1	1.0	X 6		M	
	10.7	1	1.0	X 6	SS-11	M	ALLUVIAL, GRAY, SANDY SILT
650.0	13.2	WOH 1	1.0	X 3		M	
	15.7	2	1.0	X 10	SS-12	22%	GRAY AND BROWN, SILTY CLAY
645.0	18.2	1	1.0	X 9		S	TAN-BROWN, COARSE SAND
	20.7	3	1.0	X 54	SS-13	M	RESIDUAL, ORANGE, WHITE, AND GRAY, SAPROLITIC, SILTY SAND
640.0	23.2	6	1.0	X 49		M	
635.0	28.2	20	0.9	100+ X			
630.0	33.2	100	0.4	100+ X			WEATHERED ROCK (GRANITE)
625.0	38.2	100	0.5	100+ X			
620.0	BORING TERMINATED AT ELEVATION 625.0 FEET IN WEATHERED ROCK (GRANITE)						
615.0							
610.0							
605.0							
600.0							
595.0							
590.0							
585.0							

EB1-A

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-14	13' LT	17+53	3.4-4.9	A-7-5(11)	50	19	24.5	19.2	24.0	32.4	100	81	62	-	-
SS-15	13' LT	17+53	8.4-9.9	A-4(1)	25	7	11.7	42.5	23.6	22.2	99	93	54	-	-
SS-16	13' LT	17+53	10.9-12.4	A-4(1)	23	4	2.0	43.3	30.4	24.3	100	99	70	-	-
SS-17	13' LT	17+53	15.9-17.4	A-7-6(19)	44	22	1.6	24.5	37.5	36.4	100	100	83	-	-

EB1-B

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-9	13' RT	17+47	3.2-4.7	A-7-6(10)	43	21	25.7	19.6	18.3	36.4	98	80	58	-	-
SS-10	13' RT	17+47	5.7-7.2	A-7-6(6)	44	15	29.1	21.2	25.4	24.3	97	76	53	-	-
SS-11	13' RT	17+47	10.7-12.2	A-4(0)	20	NP	3.0	66.3	20.5	10.1	100	100	44	-	-
SS-12	13' RT	17+47	14.3-16.7	A-7-6(29)	53	28	1.2	12.7	37.5	48.5	100	100	92	22	-
SS-13	13 RT	17+47	20.7-22.2	A-2-4(0)	30	NP	30.3	44.3	21.3	4.0	92	77	31	-	-

EB2-A

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-5	12' LT	18+52	3.1-4.5	A-6(2)	38	12	29.3	33.4	19.1	18.2	96	79	41	-	-
SS-6	12' LT	18+52	5.6-7.1	A-4(0)	29	5	21.4	44.3	18.1	16.2	97	86	40	-	-
SS-7	12' LT	18+52	18.1-19.6	A-1-b(0)	24	NP	76.6	19.2	4.1	0.0	71	31	4	-	-
SS-8	12' LT	18+52	20.6-22.1	A-1-b(0)	25	NP	51.6	30.3	12.0	6.1	76	48	17	-	-

EB2-B

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-1	12' RT	18+47	3.3-4.8	A-6(7)	40	21	24.9	30.1	18.7	26.3	96	82	49	-	-
SS-2	12' RT	18+47	8.3-9.8	A-4(0)	18	2	23.3	38.4	24.2	14.2	92	80	43	-	-
SS-3	12' RT	18+47	10.8-12.3	A-4(0)	22	NP	4.0	68.4	17.5	10.1	100	100	42	-	-
SS-4	12' RT	18+47	18.3-19.8	A-3(0)	23	NP	75.8	19.2	5.0	0.0	99	52	7	-	-



**FIELD
 SCOUR REPORT**

WBS: 33596.1.1 TIP: B-4254 COUNTY: Rockingham

DESCRIPTION(1): Bridge No. 89 on -L- (SR 2627) over Rose Creek

EXISTING BRIDGE

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

Bridge No.: 89 Length: 68' Total Bents: 5 Bents in Channel: 2 Bents in Floodplain: 3
 Foundation Type: Timber Piles

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: None

Interior Bents: Some local scour at Bent 2 and 3

Channel Bed: None

Channel Bank: Contraction scour along banks

EXISTING SCOUR PROTECTION

Type(3): Concrete pieces on slopes

Extent(4): 25' x 30'

Effectiveness(5): Very effective

Obstructions(6): Some small limbs around Bent 2

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): Alluvial, gray, brown, and tan, soft, sandy silt (SS-16)

Channel Bank Material(8): Alluvial, tan, medium dense, fine sand (SS-4)

Channel Bank Cover(9): Grass, brush, and trees

Floodplain Width(10): +/- 50 feet

Floodplain Cover(11): Grass, brush, and trees

Stream is(12): Aggrading _____ Degrading Static _____

Channel Migration Tendency(13): Towards End Bent 2

Observations and Other Comments: _____

DESIGN SCOUR ELEVATIONS(14)

Feet Meters _____

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

Comparison of DSE to Hydraulics Unit theoretical scour: _____

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

Bed or Bank	Bed	Bank					
Sample No.	SS-16	SS-4					
Retained #4	-	-					
Passed #10	100	99					
Passed #40	99	52					
Passed #200	70	7					
Coarse Sand	2	75.8					
Fine Sand	43.3	19.2					
Silt	30.4	5					
Clay	24.3	0					
LL	23	23					
PI	4	NP					
AASHTO	A-4(1)	A-3(0)					
Station	17+53	18+47					
Offset	13' LT	12' RT					
Depth	10.9'-12.4'	18.3'-19.8'					

Reported by: Red Robison Date: 9-7-06

SITE PHOTOGRAPH

Bridge No. 89 on SR 2627 over Rose Creek

