

REFERENCE: HB-0035

PROJECT: 50639

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

**STRUCTURE**  
**SUBSURFACE INVESTIGATION**

COUNTY ROCKINGHAM  
PROJECT DESCRIPTION REPLACE BRIDGE #780177 ON  
SR 1535 (PRICE ROAD) OVER MATRIMONY CREEK

SITE DESCRIPTION BRIDGE #780177 ON  
SR 1535 (PRICE ROAD) OVER MATRIMONY CREEK

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	HB-0035	1	

**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) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT 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 PERFORM INDEPENDENT SUBSURFACE INVESTIGATIONS AND MAKE INTERPRETATIONS AS NECESSARY TO CONFIRM CONDITIONS ENCOUNTERED ON THE 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.

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

PERSONNEL

J. SWARTLEY

T.J. WILLIAMS

INVESTIGATED BY S&ME, INC.

DRAWN BY C. CHANDLER

CHECKED BY L. CAMPOS

SUBMITTED BY S. MITCHELL

DATE JUNE, 2025



8848 RED OAK BLVD  
SUITE A  
CHARLOTTE, NC 28217  
(704) 523-4726



DocuSigned by:  
Stacie Mitchell 07/10/2025  
BBC611B64F19458  
SIGNATURE DATE

**DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED**

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
 DIVISION OF HIGHWAYS  
**GEOTECHNICAL ENGINEERING UNIT**  
**SUBSURFACE INVESTIGATION**  
 SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS																																																																																
SOIL IS CONSIDERED 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 THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, <i>VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i>	<b>WELL GRADED</b> - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. <b>UNIFORMLY GRADED</b> - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. <b>GAP-GRADED</b> - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. 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:	<b>ALLUVIUM (ALLUV.)</b> - SOILS THAT 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, SUCH AS SHALE, SLATE, ETC. <b>ARTESIAN</b> - 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. <b>CALCAREOUS (CALC.)</b> - SOILS THAT 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 (FP)</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 (RES.) SOIL</b> - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. <b>ROCK QUALITY DESIGNATION (RQD)</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 THAT 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, THAT HAS BEEN EMPLACED 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 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. <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 (SRQD)</b> - 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. <b>TOPSOIL (TS.)</b> - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.																																																																																
<b>SOIL LEGEND AND AASHTO CLASSIFICATION</b> <table border="1" style="width: 100%; border-collapse: collapse; font-size: 6px;"> <thead> <tr> <th>GENERAL CLASS.</th> <th colspan="3">GRANULAR MATERIALS (≤ 35% PASSING #200)</th> <th colspan="3">SILT-CLAY MATERIALS (&gt; 35% PASSING #200)</th> <th colspan="3">ORGANIC MATERIALS</th> </tr> <tr> <th>GROUP CLASS.</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-1, A-2</th> <th>A-4, A-5</th> <th>A-6, A-7</th> </tr> </thead> <tbody> <tr> <td>SYMBOL</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>% PASSING #10 #40 #200</td> <td>50 MX 30 MX 15 MX</td> <td>50 MX 25 MX 10 MX</td> <td>51 MN 35 MX 35 MX</td> <td>35 MX 35 MX 35 MX</td> <td>36 MN 36 MN 36 MN</td> <td>36 MN 36 MN 36 MN</td> <td></td> <td></td> <td></td> </tr> <tr> <td>MATERIAL PASSING #40 LL PI</td> <td>-</td> <td>-</td> <td>40 MX 41 MN 10 MX 10 MX</td> <td>40 MX 41 MN 11 MN 11 MN</td> <td>40 MX 41 MN 10 MX 10 MX</td> <td>40 MX 41 MN 11 MN 11 MN</td> <td></td> <td></td> <td></td> </tr> <tr> <td>GROUP INDEX</td> <td>0</td> <td>0</td> <td>0</td> <td>4 MX</td> <td>8 MX</td> <td>12 MX</td> <td>16 MX</td> <td>NO MX</td> <td></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> </tr> <tr> <td>GEN. RATING AS SUBGRADE</td> <td colspan="3">EXCELLENT TO GOOD</td> <td colspan="3">FAIR TO POOR</td> <td>FAIR TO POOR</td> <td>POOR</td> <td>UNSATURABLE</td> </tr> </tbody> </table>	GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)			SILT-CLAY MATERIALS (> 35% PASSING #200)			ORGANIC MATERIALS			GROUP CLASS.	A-1	A-3	A-2	A-4	A-5	A-6	A-1, A-2	A-4, A-5	A-6, A-7	SYMBOL										% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX 10 MX	51 MN 35 MX 35 MX	35 MX 35 MX 35 MX	36 MN 36 MN 36 MN	36 MN 36 MN 36 MN				MATERIAL PASSING #40 LL PI	-	-	40 MX 41 MN 10 MX 10 MX	40 MX 41 MN 11 MN 11 MN	40 MX 41 MN 10 MX 10 MX	40 MX 41 MN 11 MN 11 MN				GROUP INDEX	0	0	0	4 MX	8 MX	12 MX	16 MX	NO MX		USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND	FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND	SILTY SOILS	CLAYEY SOILS					GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD			FAIR TO POOR			FAIR TO POOR	POOR	UNSATURABLE	<b>ANGULARITY OF GRAINS</b> THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: <b>ANGULAR</b> , <b>SUBANGULAR</b> , <b>SUBROUNDED</b> , OR <b>ROUNDED</b> .	<b>WEATHERED ROCK (WR)</b> 	<b>NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES &gt; 100 BLOWS PER FOOT IF TESTED.</b>
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<b>MINERALOGICAL COMPOSITION</b> MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	<b>CRYSTALLINE ROCK (CR)</b> 	<b>FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.</b>	<b>NON-CRYSTALLINE ROCK (INCR)</b> 	<b>FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLITE, SLATE, SANDSTONE, ETC.</b>																																																																															
<b>COMPRESSION</b> SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50	<b>COASTAL PLAIN SEDIMENTARY ROCK (CP)</b> 	<b>COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.</b>	<b>WEATHERING</b> <b>FRESH</b> - ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE. <b>VERY SLIGHT (V SLI.)</b> - 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. <b>SLIGHT (SLI.)</b> - 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. <b>MODERATE (MOD.)</b> - 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. <b>MODERATELY SEVERE (MOD. SEV.)</b> - ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i> <b>SEVERE (SEV.)</b> - 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, WOULD YIELD SPT N VALUES &gt; 100 BPF</i> <b>VERY SEVERE (V SEV.)</b> - ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <i>IF TESTED, WOULD YIELD SPT N VALUES &lt; 100 BPF</i> <b>COMPLETE</b> - ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.																																																																																
<b>PERCENTAGE OF MATERIAL</b> <table border="1" style="width: 100%; border-collapse: collapse; font-size: 6px;"> <thead> <tr> <th></th> <th>GRANULAR SOILS</th> <th>SILT - CLAY SOILS</th> <th>OTHER MATERIAL</th> </tr> </thead> <tbody> <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> </tbody> </table>		GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE 1 - 10%	LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE 10 - 20%	MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME 20 - 35%	HIGHLY ORGANIC	> 10%	> 20%	HIGHLY 35% AND ABOVE	<b>GROUND WATER</b> WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING STATIC WATER LEVEL AFTER 24 HOURS PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA SPRING OR SEEP	<b>MISCELLANEOUS SYMBOLS</b> ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY DIP & DIP DIRECTION OF ROCK STRUCTURES TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION CONE PENETROMETER TEST SOUNDING ROD TEST BORING WITH CORE SPT N-VALUE	<b>ROCK HARDNESS</b> <b>VERY HARD</b> - CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. <b>HARD</b> - CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN. <b>MODERATELY HARD</b> - 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. <b>MEDIUM HARD</b> - CAN BE GROOVED OR GOUGED 0.25 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. <b>SOFT</b> - CAN BE GROOVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE. <b>VERY SOFT</b> - 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.																																																												
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**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
GEOTECHNICAL ENGINEERING UNIT**

# **SUBSURFACE INVESTIGATION**

**SUPPLEMENTAL LEGEND, GEOLOGICAL STRENGTH INDEX (GSI) TABLES  
FROM AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS**

AASHTO LRFD Figure 10.4.6.4-1 — Determination of GSI for Jointed Rock Mass (Marinos and Hoek, 2000)

AASHTO LRFD Figure 10.4.6.4-2 — Determination of GSI for Tectonically Deformed Heterogeneous Rock Masses (Marinos and Hoek, 2000)

<p><b>GEOLOGICAL STRENGTH INDEX (GSI) FOR JOINTED ROCKS (Hoek and Marinos, 2000)</b></p> <p>From the lithology, structure and surface conditions of the discontinuities, estimate the average value of GSI. Do not try to be too precise. Quoting a range from 33 to 37 is more realistic than stating that GSI = 35. Note that the table does not apply to structurally controlled failures. Where weak planar structural planes are present in an unfavorable orientation with respect to the excavation face, these will dominate the rock mass behaviour. The shear strength of surfaces in rocks that are prone to deterioration as a result of changes in moisture content will be reduced if water is present. When working with rocks in the fair to very poor categories, a shift to the right may be made for wet conditions. Water pressure is dealt with by effective stress analysis.</p>	SURFACE CONDITIONS																							
<p><b>STRUCTURE</b></p>	SURFACE CONDITIONS	VERY GOOD	GOOD	FAIR	POOR	VERY POOR						VERY GOOD	GOOD	FAIR	POOR	VERY POOR								
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<p><b>INTACT OR MASSIVE</b> - intact rock specimens or massive in situ rock with few widely spaced discontinuities</p>	DECREASING INTERLOCKING OF ROCK PIECES	90	80	70	60	50	40	30	20	10	N/A	N/A						70	60	50	40	30	20	10
<p><b>BLOCKY</b> - well interlocked undisturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets</p>	DECREASING INTERLOCKING OF ROCK PIECES	90	80	70	60	50	40	30	20	10	N/A	N/A						70	60	50	40	30	20	10
<p><b>VERY BLOCKY</b> - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets</p>	DECREASING INTERLOCKING OF ROCK PIECES	90	80	70	60	50	40	30	20	10	N/A	N/A						70	60	50	40	30	20	10
<p><b>BLOCKY/DISTURBED/SEAMY</b> - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity</p>	DECREASING INTERLOCKING OF ROCK PIECES	90	80	70	60	50	40	30	20	10	N/A	N/A						70	60	50	40	30	20	10
<p><b>DISINTEGRATED</b> - poorly interlocked, heavily broken rock mass with mixture of angular and rounded rock pieces</p>	DECREASING INTERLOCKING OF ROCK PIECES	90	80	70	60	50	40	30	20	10	N/A	N/A						70	60	50	40	30	20	10
<p><b>LAMINATED/SHEARED</b> - Lack of blockiness due to close spacing of weak schistosity or shear planes</p>	DECREASING INTERLOCKING OF ROCK PIECES	90	80	70	60	50	40	30	20	10	N/A	N/A						70	60	50	40	30	20	10

**GSI FOR HETEROGENEOUS ROCK MASSES SUCH AS FLYSCH (Marinos, P and Hoek E., 2000)**

From a description of the lithology, structure and surface conditions (particularly of the bedding planes), choose a box in the chart. Locate the position in the box that corresponds to the condition of the discontinuities and estimate the average value of GSI from the contours. Do not attempt to be too precise. Quoting a range from 33 to 37 is more realistic than giving GSI = 35. Note that the Hoek-Brown criterion does not apply to structurally controlled failures. Where unfavourably oriented continuous weak planar discontinuities are present, these will dominate the behaviour of the rock mass. The strength of some rock masses is reduced by the presence of groundwater and this can be allowed for by a slight shift to the right in the columns for fair, poor and very poor conditions. Water pressure does not change the value of GSI and it is dealt with by using effective stress analysis.

**COMPOSITION AND STRUCTURE**

**A.** Thick bedded, very blocky sandstone. The effect of pelitic coatings on the bedding planes is minimized by the confinement of the rock mass. In shallow tunnels or slopes these bedding planes may cause structurally controlled instability.

**B.** Sandstone with thin inter-layers of siltstone

**C.** Sandstone and siltstone in similar amounts

**D.** Siltstone or silty shale with sandstone layers

**E.** Weak siltstone or clayey shale with sandstone layers

**F.** Tectonically deformed, intensively folded/faulted, sheared clayey shale or siltstone with broken and deformed sandstone layers forming an almost chaotic structure

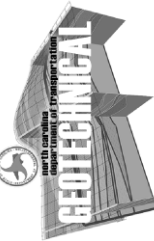
**G.** Undisturbed silty or clayey shale with or without a few very thin sandstone layers

**H.** Tectonically deformed silty or clayey shale forming a chaotic structure with pockets of clay. Thin layers of sandstone are transformed into small rock pieces.

— Means deformation after tectonic disturbance



Prepared For:



# TIP PROJECT: HB-0035

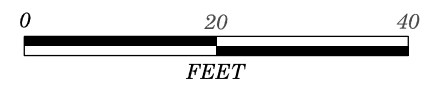
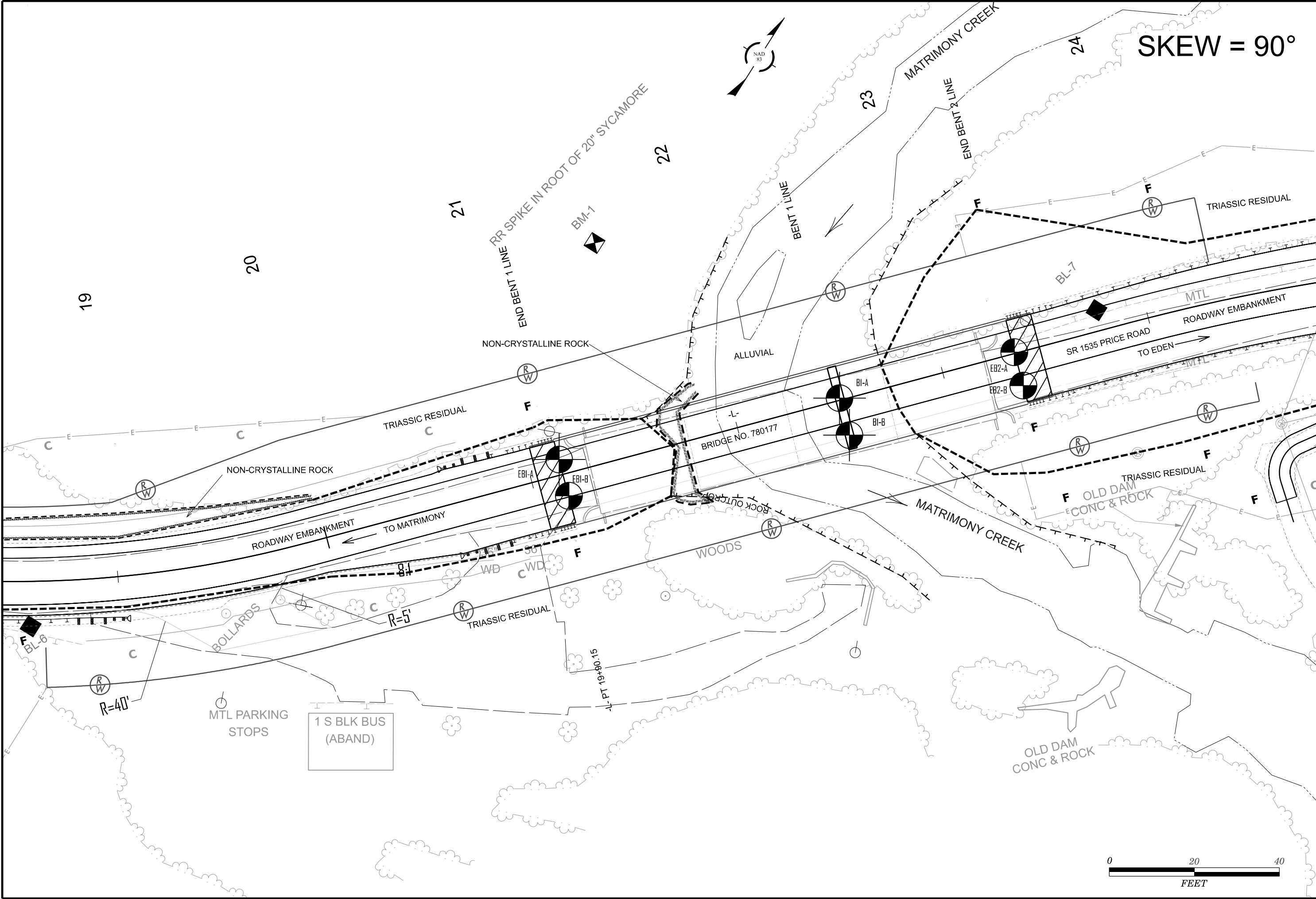
REPLACE BRIDGE #780177 ON SR 1535 (PRICE ROAD) OVER MATRIMONY CREEK IN EDEN

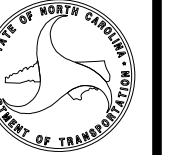
GEOTECHNICAL UNIT

PREPARED BY

8848 RED OAK BLVD  
SUITE A  
CHARLOTTE, NC 28217

## SKEW = 90°





Prepared For:



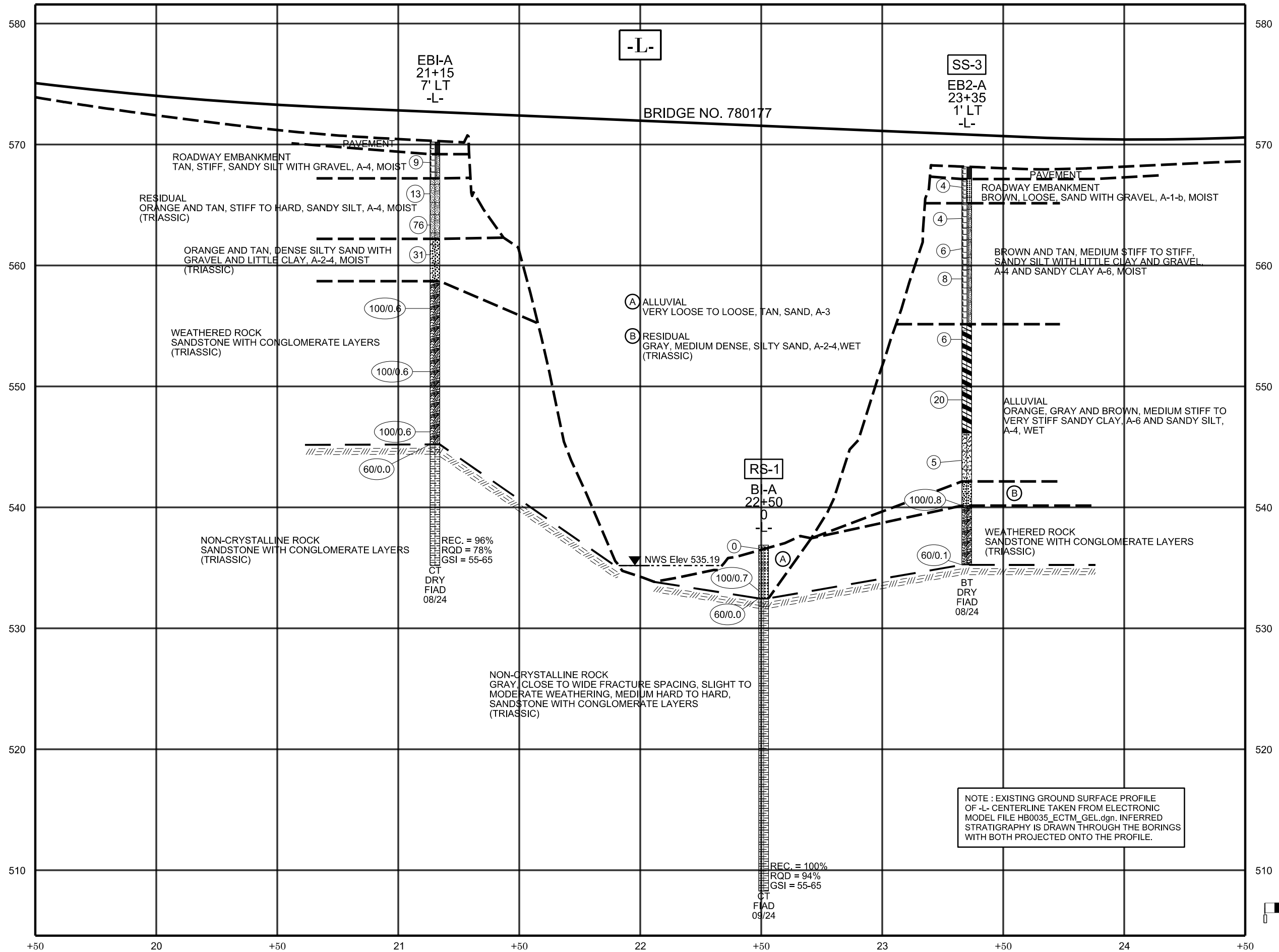
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GEOTECHNICAL UNIT

PREPARED BY

8848 RED OAK BLVD SUITE A CHARLOTTE, NC 28217



VE = 5

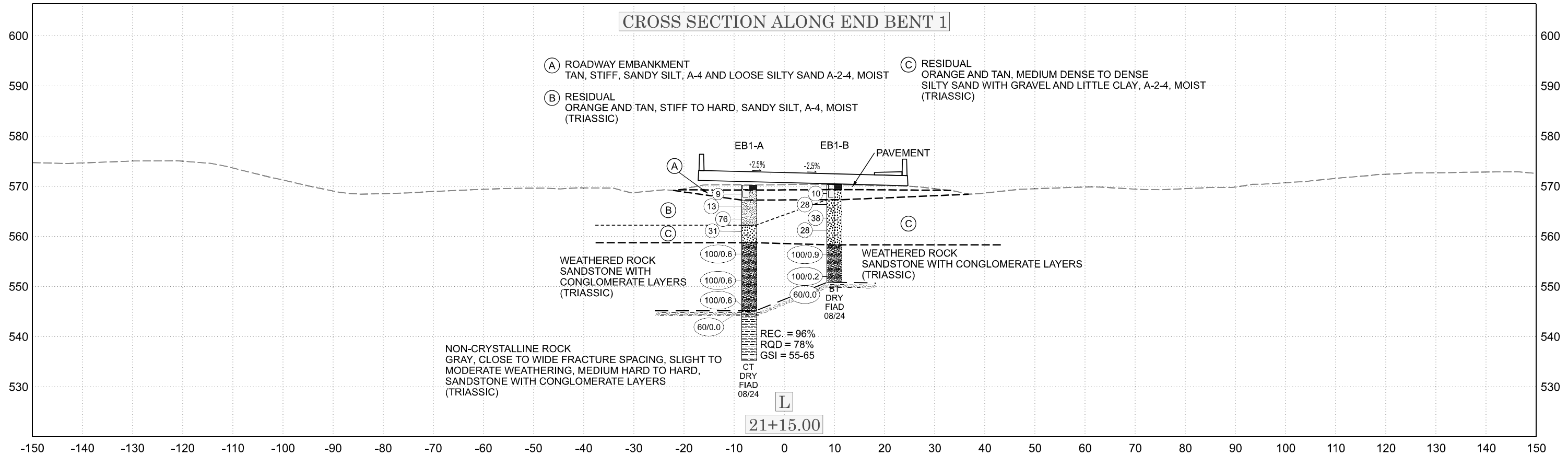


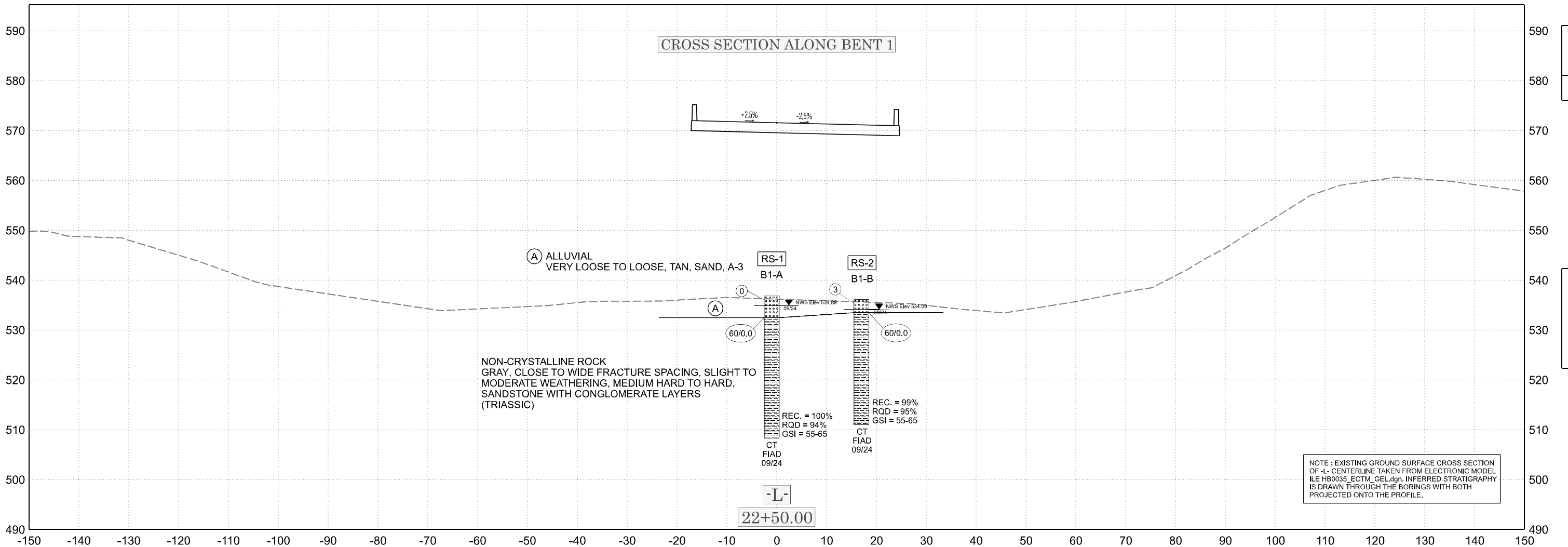
-L- X-5

HB-0035

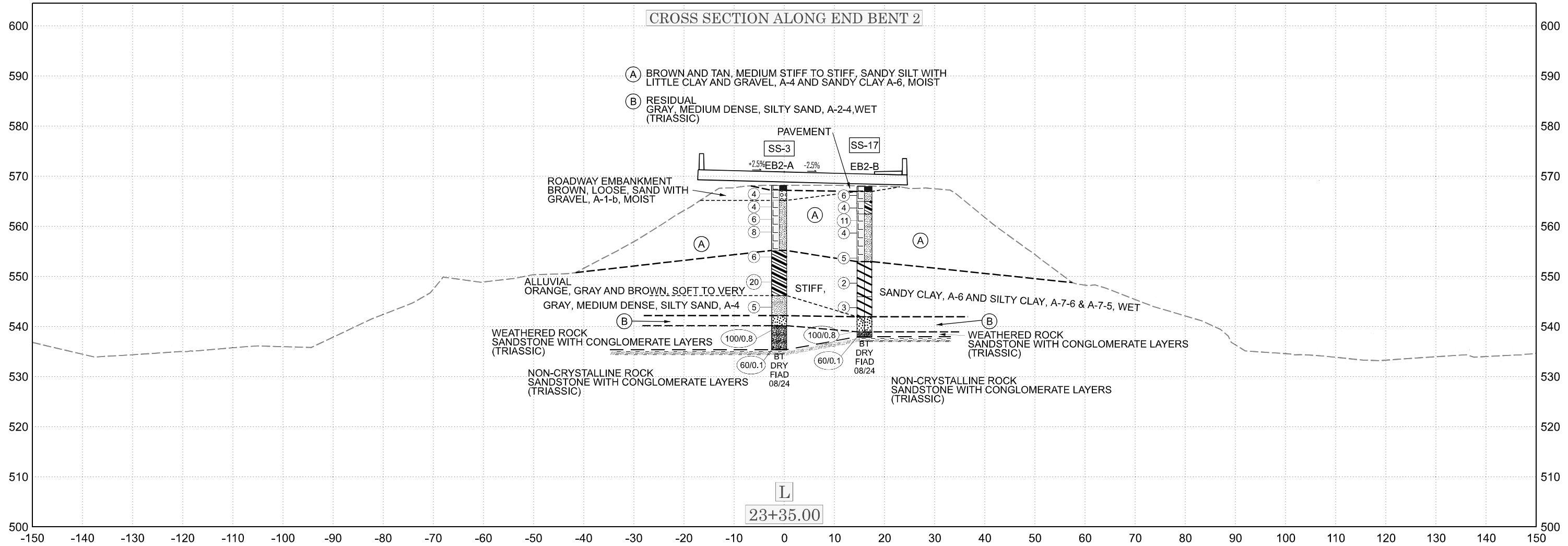
### CROSS SECTION ALONG END BENT 1

- (A) ROADWAY EMBANKMENT  
TAN, STIFF, SANDY SILT, A-4 AND LOOSE SILTY SAND A-2-4, MOIST
- (B) RESIDUAL ORANGE AND TAN, STIFF TO HARD, SANDY SILT, A-4, MOIST (TRIASSIC)
- (C) RESIDUAL ORANGE AND TAN, MEDIUM DENSE TO DENSE SILTY SAND WITH GRAVEL AND LITTLE CLAY, A-2-4, MOIST (TRIASSIC)





### CROSS SECTION ALONG END BENT 2



-L- X-7

HB-0035

# GEOTECHNICAL BORING REPORT BORE LOG

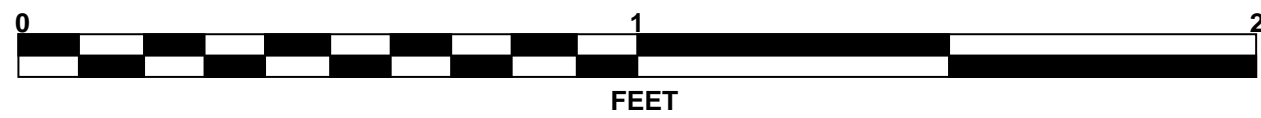
# GEOTECHNICAL BORING REPORT CORE LOG

WBS 50639.1.1		TIP HB-0035		COUNTY ROCKINGHAM		GEOLOGIST Swartley, J.									
SITE DESCRIPTION BRIDGE NO. 177 ON SR 1535 (-L-) OVER MATRIMONY CREEK							GROUND WTR (ft)								
BORING NO. EB1-A		STATION 21+15		OFFSET 7 ft LT		ALIGNMENT -L-									
COLLAR ELEV. 570.2 ft		TOTAL DEPTH 35.0 ft		NORTHING 1,000,177		EASTING 1,768,900									
DRILL RIG/HAMMER EFF./DATE SME9403 CME-550X 91% 01/03/2024				DRILL METHOD NW Casing w/ Core		HAMMER TYPE Automatic									
DRILLER Shearin, T.		START DATE 08/05/24		COMP. DATE 08/07/24		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
575															
570	569.2	1.0	3	4	5									570.2 GROUND SURFACE 0.0	
														569.2 (PAVEMENT) 1.0	
	566.7	3.5	2	5	8									567.2 ROADWAY EMBANKMENT 3.0	
														567.2 TRIASSIC RESIDUAL 3.0	
565	564.2	6.0	13	30	46									ORANGE AND TAN, STIFF TO HARD, SANDY SILT, A-4	
	561.7	8.5	13	17	14									562.2 ORANGE AND TAN, DENSE, SILTY SAND, A-2-4 8.0	
560														558.7 WEATHERED ROCK 11.5	
	556.8	13.4	60	40/0.1										(SANDSTONE WITH CONGLOMERATE LAYERS)	
555															
	551.8	18.4	7	60	40/0.1										
550															
	546.8	23.4	20	60	40/0.1										
545	545.2	25.0	60/0.0											545.2 NON-CRYSTALLINE ROCK 25.0	
														GRAY, CLOSE TO WIDE FRACTURE SPACING, SLIGHT TO MODERATE WEATHERING, MEDIUM HARD TO HARD, SANDSTONE WITH CONGLOMERATE LAYERS	
540														REC. = 96% RQD = 78% GSI = 55-65	
														35.0 Boring Terminated at Elevation 535.2 ft IN NON-CRYSTALLINE ROCK (SANDSTONE/CONGLOMERATE)	

WBS 50639.1.1		TIP HB-0035		COUNTY ROCKINGHAM		GEOLOGIST Swartley, J.						
SITE DESCRIPTION BRIDGE NO. 177 ON SR 1535 (-L-) OVER MATRIMONY CREEK							GROUND WTR (ft)					
BORING NO. EB1-A		STATION 21+15		OFFSET 7 ft LT		ALIGNMENT -L-						
COLLAR ELEV. 570.2 ft		TOTAL DEPTH 35.0 ft		NORTHING 1,000,177		EASTING 1,768,900						
DRILL RIG/HAMMER EFF./DATE SME9403 CME-550X 91% 01/03/2024				DRILL METHOD NW Casing w/ Core		HAMMER TYPE Automatic						
DRILLER Shearin, T.		START DATE 08/05/24		COMP. DATE 08/07/24		SURFACE WATER DEPTH N/A						
CORE SIZE NQ				TOTAL RUN 10.0 ft								
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	RQD (ft) %		REC. (ft) %	RQD (ft) %			
545.2	545.2	25.0	5.0	1:27 1:34 1:23 1:38 1:52	(4.6) 92%	(2.8) 56%		(9.6) 96%	(7.8) 78%		Begin Coring @ 25.0 ft NON-CRYSTALLINE ROCK	25.0
540	540.2	30.0	5.0	2:13 2:15 3:28 4:14 4:06	(5.0) 100%	(5.0) 100%					GRAY, CLOSE TO WIDE FRACTURE SPACING, SLIGHT TO MODERATE WEATHERING, MEDIUM HARD TO HARD, SANDSTONE WITH CONGLOMERATE LAYERS  GSI = 55-65	
											Boring Terminated at Elevation 535.2 ft IN NON-CRYSTALLINE ROCK (SANDSTONE/CONGLOMERATE)	35.0

# CORE PHOTOGRAPHS

**EB1-A**  
BOXES 1 & 2: 25.0 - 35.0 FEET



# GEOTECHNICAL BORING REPORT

## BORE LOG

WBS 50639.1.1		TIP HB-0035		COUNTY ROCKINGHAM		GEOLOGIST Swartley, J.										
SITE DESCRIPTION BRIDGE NO. 177 ON SR 1535 (-L-) OVER MATRIMONY CREEK							GROUND WTR (ft)									
BORING NO. EB1-B		STATION 21+15		OFFSET 10 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 570.3 ft		TOTAL DEPTH 19.5 ft		NORTHING 1,000,165		EASTING 1,768,913										
DRILL RIG/HAMMER EFF./DATE SME9403 CME-550X 91% 01/03/2024				DRILL METHOD Wash Boring		HAMMER TYPE Automatic										
DRILLER Shearin, T.		START DATE 08/06/24		COMP. DATE 08/06/24		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100			ELEV. (ft)	DEPTH (ft)		
575																
570	569.3	1.0												570.3	0.0	GROUND SURFACE
			4	4	6									569.3	1.0	(PAVEMENT)
	567.1	3.2	12	14	14									567.3	3.0	ROADWAY EMBANKMENT TAN, LOOSE, SILTY SAND WITH GRAVEL, A-2-4
565	564.3	6.0	15	14	24											TRIASSIC RESIDUAL TAN AND ORANGE, MEDIUM DENSE TO DENSE, SILTY SAND WITH LITTLE CLAY, A-2-4
	562.1	8.2	16	16	12											
560																
	557.1	13.2	19	50	50/0.4									558.3	12.0	WEATHERED ROCK (SANDSTONE WITH CONGLOMERATE LAYERS)
555																
	552.1	18.2	100/0.2													
	550.8	19.5	60/0.0											550.8	19.5	Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 550.8 ft ON NON-CRYSTALLINE ROCK (SANDSTONE/CONGLOMERATE)

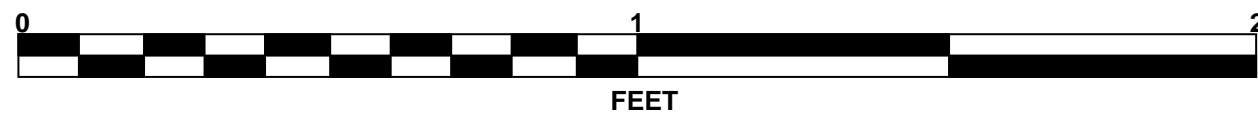
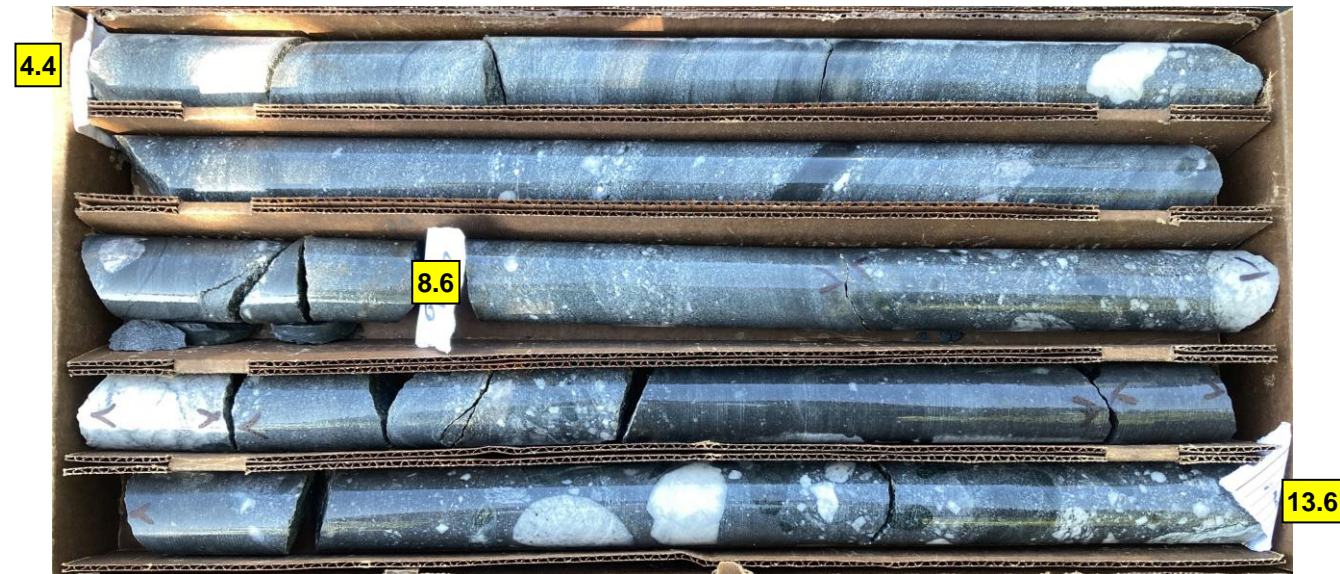
NCDOT BORE DOUBLE HB-0035\_GEO\_BRDG.GPJ NC\_DOT.GDT 10/23/24



# CORE PHOTOGRAPHS

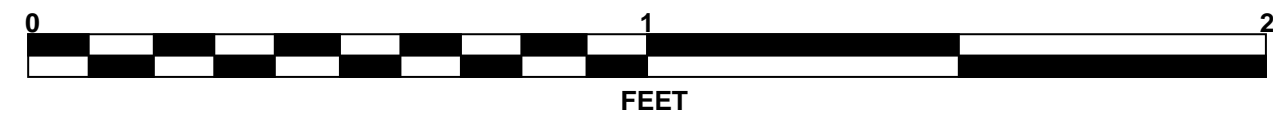
## B1-A

BOXES 1 & 2: 4.4 - 23.2 FEET



## B1-A

BOX 3: 23.2 - 28.6 FEET



# GEOTECHNICAL BORING REPORT BORE LOG

# GEOTECHNICAL BORING REPORT CORE LOG

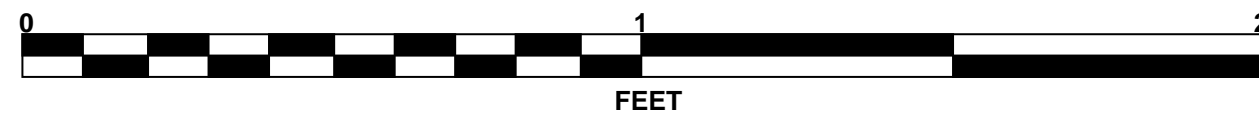
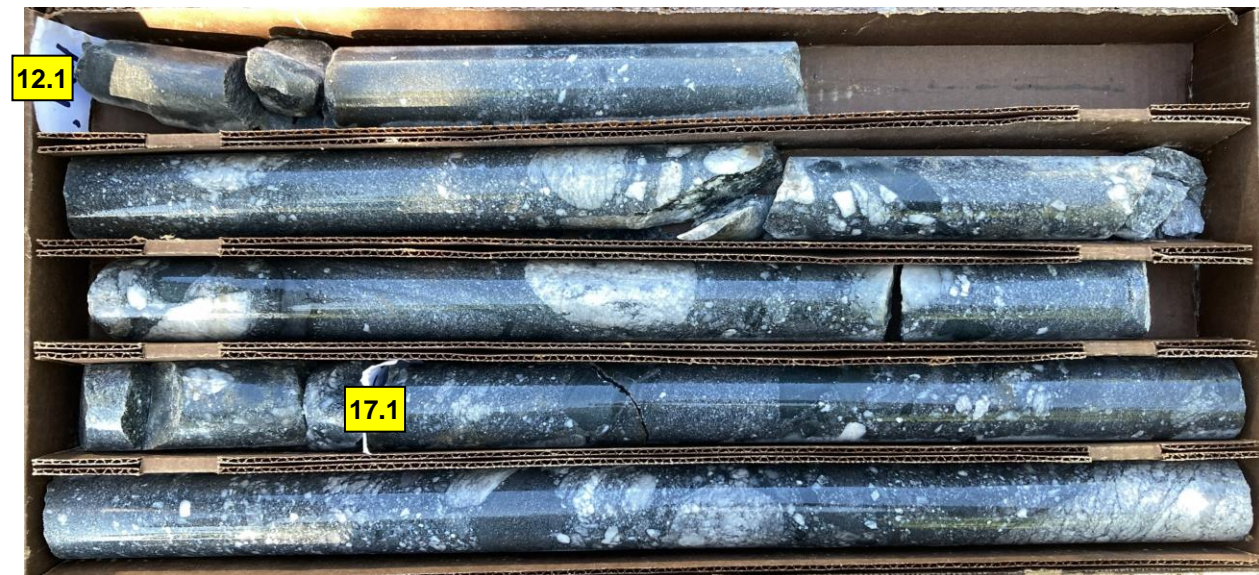
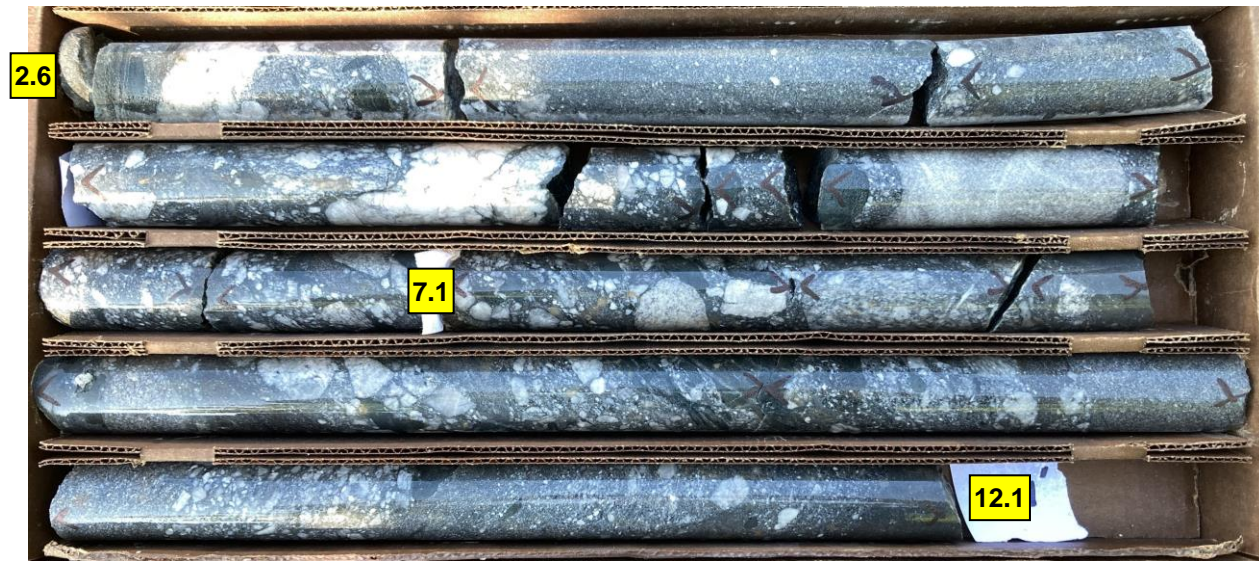
WBS 50639.1.1		TIP HB-0035		COUNTY ROCKINGHAM		GEOLOGIST Swartley, J.										
SITE DESCRIPTION BRIDGE NO. 177 ON SR 1535 (-L-) OVER MATRIMONY CREEK							GROUND WTR (ft)									
BORING NO. B1-B		STATION 22+53		OFFSET 17 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 536.1 ft		TOTAL DEPTH 25.1 ft		NORTHING 1,000,262		EASTING 1,769,011										
DRILL RIG/HAMMER EFF./DATE SME275 DIEDRICH D-50 91% 01/19/2024				DRILL METHOD NW Casing w/ Core		HAMMER TYPE Automatic										
DRILLER Williams Jr., T.		START DATE 09/05/24		COMP. DATE 09/05/24		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
540																
535	536.1	0.0	1	2	1									536.1	GROUND SURFACE	0.0
	533.5	2.6												533.5	ALLUVIAL VERY LOOSE, TAN, SAND, A-3	2.6
530																
525																
520																
515																
														511.0	NON-CRYSTALLINE ROCK GRAY AND WHITE, CLOSE TO WIDE FRACTURE SPACING, FRESH TO SLIGHT WEATHERING, HARD TO VERY HARD, SANDSTONE WITH CONGLOMERATE LAYERS  REC. = 99% RQD = 95% GSI = 55-65	25.1
Boring Terminated at Elevation 511.0 ft IN NON-CRYSTALLINE ROCK (SANDSTONE/CONGLOMERATE)																

WBS 50639.1.1		TIP HB-0035		COUNTY ROCKINGHAM		GEOLOGIST Swartley, J.						
SITE DESCRIPTION BRIDGE NO. 177 ON SR 1535 (-L-) OVER MATRIMONY CREEK							GROUND WTR (ft)					
BORING NO. B1-B		STATION 22+53		OFFSET 17 ft RT		ALIGNMENT -L-						
COLLAR ELEV. 536.1 ft		TOTAL DEPTH 25.1 ft		NORTHING 1,000,262		EASTING 1,769,011						
DRILL RIG/HAMMER EFF./DATE SME275 DIEDRICH D-50 91% 01/19/2024				DRILL METHOD NW Casing w/ Core		HAMMER TYPE Automatic						
DRILLER Williams Jr., T.		START DATE 09/05/24		COMP. DATE 09/05/24		SURFACE WATER DEPTH N/A						
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	TOTAL RUN 22.5 ft		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	RQD (ft) %		REC. (ft) %	RQD (ft) %			
533.5	533.5	2.6	4.5	0:43/0.5 1:45 2:30 3:30	(4.4) 98%	(4.3) 96%		(22.3) 99%	(21.4) 95%			533.5
530	529.0	7.1	5.0	3:30 3:30 4:00 4:00	(5.0) 100%	(5.0) 100%						2.6
525	524.0	12.1	5.0	1:45 1:45 1:50 2:30	(5.0) 100%	(4.2) 84%	RS-2					
520	519.0	17.1	5.0	1:45 2:40 4:30 8:30	(4.9) 98%	(4.9) 98%						
515	514.0	22.1	3.0	7:00 8:15 10:30 10:00	(3.0) 100%	(3.0) 100%						
	511.0	25.1										25.1
Boring Terminated at Elevation 511.0 ft IN NON-CRYSTALLINE ROCK (SANDSTONE/CONGLOMERATE)												

# CORE PHOTOGRAPHS

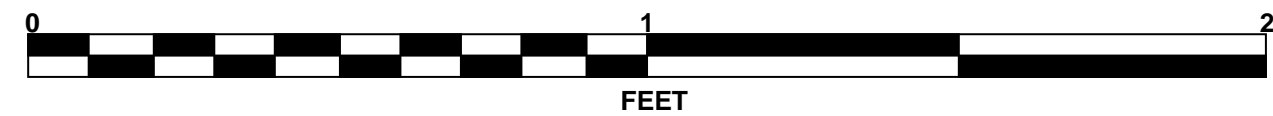
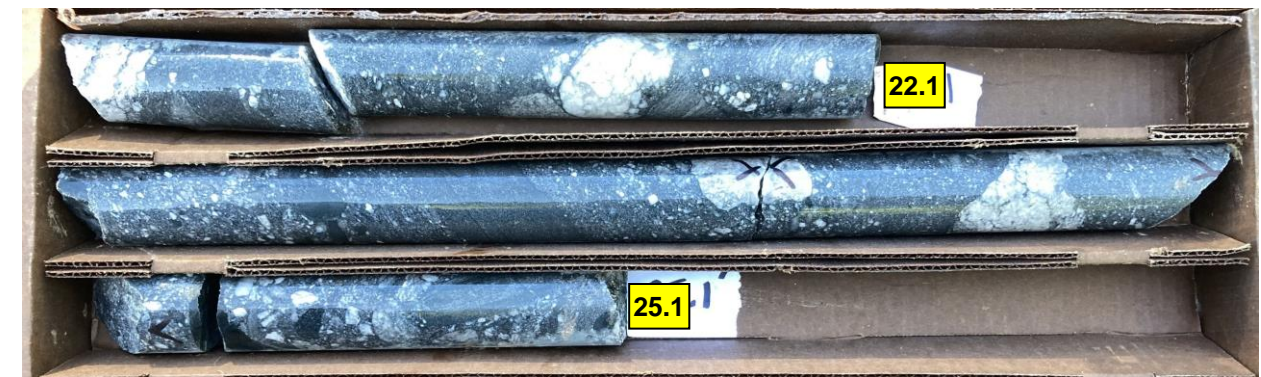
## B1-B

BOXES 1 & 2: 2.6 - 20.7 FEET



## B1-B

BOX 3: 20.7 - 25.1 FEET



# GEOTECHNICAL BORING REPORT

## BORE LOG

WBS 50639.1.1		TIP HB-0035		COUNTY ROCKINGHAM		GEOLOGIST Swartley, J.										
SITE DESCRIPTION BRIDGE NO. 177 ON SR 1535 (-L-) OVER MATRIMONY CREEK							GROUND WTR (ft)									
BORING NO. EB2-A		STATION 23+35		OFFSET 1 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 568.2 ft		TOTAL DEPTH 32.9 ft		NORTHING 1,000,334		EASTING 1,769,054										
DRILL RIG/HAMMER EFF./DATE SME9403 CME-550X 91% 01/03/2024			DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER Shearin, T.		START DATE 08/05/24		COMP. DATE 08/05/24		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
570																
	567.2	1.0	4	2	2								M	568.2 GROUND SURFACE 0.0 567.2 (PAVEMENT) 1.0		
565	564.7	3.5	2	2	2								M	565.2 ROADWAY EMBANKMENT 3.0 BROWN, LOOSE, SAND WITH GRAVEL, A-1-b		
	562.2	6.0	4	2	4								M	562.2 BROWN AND TAN, MEDIUM STIFF, SANDY SILT, A-4		
560	559.7	8.5	2	3	5								M	559.7		
	554.7	13.5	2	3	3								M	555.2 ALLUVIAL 13.0 ORANGE, MEDIUM STIFF TO VERY STIFF, SANDY CLAY, A-6		
550	549.7	18.5	8	5	15								W	549.7		
	544.7	23.5	3	2	3								W	546.2 BROWN AND GRAY, MEDIUM STIFF, SANDY SILT, A-4 22.0		
540	539.7	28.5	27	73/0.3									W	542.2 TRIASSIC RESIDUAL 26.0 GRAY, MEDIUM DENSE, SILTY SAND, A-2-4		
	535.4	32.8	60/0.1										W	540.2 WEATHERED ROCK 28.0 (SANDSTONE WITH CONGLOMERATE LAYERS)		
														535.4 NON-CRYSTALLINE ROCK 32.8 (SANDSTONE WITH CONGLOMERATE LAYERS)		
														535.3 Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 535.3 ft IN NON-CRYSTALLINE ROCK (SANDSTONE/CONGLOMERATE)		

WBS 50639.1.1		TIP HB-0035		COUNTY ROCKINGHAM		GEOLOGIST Swartley, J.										
SITE DESCRIPTION BRIDGE NO. 177 ON SR 1535 (-L-) OVER MATRIMONY CREEK							GROUND WTR (ft)									
BORING NO. EB2-B		STATION 23+35		OFFSET 16 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 567.9 ft		TOTAL DEPTH 30.1 ft		NORTHING 1,000,323		EASTING 1,769,066										
DRILL RIG/HAMMER EFF./DATE SME9403 CME-550X 91% 01/03/2024			DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER Shearin, T.		START DATE 08/06/24		COMP. DATE 08/06/24		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
570																
	566.9	1.0	5	4	2								M	567.9 GROUND SURFACE 0.0 566.9 (PAVEMENT) 1.0		
565	564.4	3.5	2	2	2								M	564.4 ROADWAY EMBANKMENT 3.0 TAN, MEDIUM STIFF, SILT WITH GRAVEL, A-4		
	561.9	6.0	1	4	7								M	561.9 ORANGE, MEDIUM STIFF, SANDY CLAY, A-6 5.5		
560	559.4	8.5	3	2	2								M	559.4 TAN AND ORANGE, MEDIUM STIFF TO STIFF, SANDY SILT WITH LITTLE CLAY, A-4		
	554.4	13.5	2	3	2								M	555.2 ALLUVIAL 15.0 ORANGE, GRAY AND BROWN, SOFT, CLAY AND SILTY CLAY, A-7-6 & A-7-5		
550	549.4	18.5	1	1	1								W	549.4		
	544.4	23.5	2	1	2								W	546.2 BROWN AND GRAY, MEDIUM STIFF, SANDY SILT, A-4 22.0		
540	539.4	28.5	8	92/0.3									W	542.2 TRIASSIC RESIDUAL 26.0 GRAY, MEDIUM DENSE, SILTY SAND, A-2-4		
	537.9	30.0	60/0.1										W	540.2 WEATHERED ROCK 28.0 (SANDSTONE WITH CONGLOMERATE LAYERS)		
														537.8 NON-CRYSTALLINE ROCK 30.1 (SANDSTONE WITH CONGLOMERATE LAYERS)		
														537.8 Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 537.8 ft IN NON-CRYSTALLINE ROCK (SANDSTONE/CONGLOMERATE)		

NCDOT BORE DOUBLE HB-0035\_GEO\_BRDG.GPJ NC\_DOT.GDT 10/23/24



### SUMMARY OF LABORATORY TEST DATA

Soil Classification and Gradation

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

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S&ME Project No.: 24350498      S&ME Project Name: Bridge No. 177 on SR 1535 (-L-) over Matrimony Creek      Date Report: 9/12/2024

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State Project No.: N/A      County: Rockingham      Date Tested: 9/5 - 9/12/24

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WBS No.: 50639.1.1      TIP No.: HB-0035

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Client Name: NCDOT Geotechnical Engineering Unit      Client Address: Raleigh, NC

Boring No.	Sample No.	Station #:	Offset	Northing	Easting	Alignment	Sample Depth (ft)	AASHTO Classification	Total % Passing Sieve #				Total Mortar Fraction (%)				LL	PL	PI	Moist. %		
									10	40	60	200	Coarse Sand	Fine Sand	Silt	Clay						
EB2-B	SS-17	23+35	16	1,000,323	1,769,066	-L-	18.5-20.0	A-7-6 (19)	99	92	88	71.7	11	21	22	46	55	29	26	38.3		
EB2-A	SS-3	23+35	-1	1,000,334	1,769,054	-L-	6.0-7.5	A-4 (1)	94	83	74	48.9	21	33	25	21	29	22	7	15.4		

References / Comments / Deviations:      NP=Not Plastic      QNS=Quantity Not Sufficient

AASHTO T88: Particle Size Analysis of Soils as Modified by the NCDOT      AASHTO T89: Determining the Liquid Limit of Soils

AASHTO T90: Determining the Plastic Limit & Plasticity Index of Soils      AASHTO T265: Laboratory Determination of Moisture Content of Soils

AASHTO M145: The Classification of Soils and Soil Aggregate Mixtures for Highway Construction Purposes

<u>Mal Krajan, ET</u>		<u>104-01-0703</u>	<u>Luis Campos, P.E.</u>
Technician Name:	Signature	Certification #	Technical Responsibility:
			<u>Project Manager</u>
			Position

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Form No. TR-43-D7012C-02

Revision No. : 0

Revision Date: 08/22/18

## UNCONFINED COMPRESSION (ASTM D7012 Method C)



S&amp;ME, Inc. - Knoxville 1413 Topside Road, Louisville, TN 37777

 Project Name: HB-0035  
 Project Number: 24350498

 Report Date: September 20, 2024  
 Reviewed By: Lindsey Deskins

Boring No.	Sample No.	Depth (ft)	Dimensions, in.		Shape (See Key)	Area (in <sup>2</sup> )	Unit Weight (lbs/ft <sup>3</sup> )	Loading Rate (psi/sec)	Maximum Load (lbs)	Strength (psi)	Moisture (%)
			Length	Diameter							
B1-A	RS-1	13.2 - 13.6	3.97	1.86	A	2.72	171.2	84	21,954	8,071	0.4
B1-B	RS-2	10.1 - 10.5	4.01	1.87	A	2.75	166.7	90	63,178	22,974	0.2

NOTES: Effective (as received) unit weight as determined by RTH 109-93.

Loading rates were selected to target reaching failure between 2 and 15 minutes.

Test results for specimens not meeting the requirements of ASTM D4543-19 may differ from a test specimen that meets the requirements of ASTM D4543.

## SHAPE KEY

ASTM D4543-19 Standard Practice for Preparing Rock Core as Cylindrical Test Specimens and Verifying Conformance to Dimensional and Shape Tolerance Section 1.2 - "Rock is a complex engineering material that can vary greatly as a function of lithology, stress history, weathering, moisture content and chemistry, and other natural geologic processes. As such, it is not always possible to obtain or prepare rock core specimens that satisfy the desirable tolerances given in this practice. Most commonly, this situation presents itself with weaker, more porous, and poorly cemented rock types and rock types containing significant or weak (or both) structural features. For rock types which are difficult to prepare, all reasonable efforts shall be made to prepare a specimen in accordance with this practice and for the intended test procedure. However, when it has been determined by trial and error that this is not possible, prepare the rock specimen to the closest tolerances practicable and consider this to be the best effort and report it as such and if allowable or necessary for the intended test, capping the ends of the specimen as discussed in this practice is permitted."

- A Test specimen measurements met the desired shape tolerances of ASTM D4543-19 (side straightness, end flatness & parallelism, and end perpendicularity to axis)
- B Test specimen measurements met the desired shape tolerances of ASTM D4543-19 for end flatness & parallelism, and end perpendicularity to axis. Specimen did not meet the desired tolerance for side straightness. Specimen prepared to closest tolerances practicable.
- C Test specimen measurements met the desired shape tolerances of ASTM D4543-19 for end flatness & parallelism. Specimen did not meet the desired tolerances for side straightness and end perpendicularity to axis. Specimen prepared to closest tolerances practicable.
- D Test specimen measurements met the desired shape tolerances of ASTM D4543-19 for end flatness. Specimen did not meet the desired tolerances for side straightness, parallelism and end perpendicularity to axis. Specimen prepared to closest tolerances practicable.
- E Test specimen measurements met the desired shape tolerances of ASTM D4543-19 for end flatness and end perpendicularity to axis. Specimen did not meet the desired tolerance for side straightness and parallelism. Specimen prepared to closest tolerances practicable.

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50639.1.1 (HB-0035)  
Rockingham Co.

# SITE PHOTOGRAPH

Bridge No. 177 on -L- (SR 1535) over Matrimony Creek



Looking South