

PROJECT: 33370.1.1 ID: B-4002

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	33370.1.1 (B-4002)	1	17

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STRUCTURE
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 33370.1.1 (B-4002) F.A. PROJ. BRZ-2116(1)
COUNTY ALAMANCE
PROJECT DESCRIPTION BRIDGE NO. 96 ON -L- (SR 2116) OVER
VARNALS CREEK AT STATION 18+77.5

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.

PERSONNEL

J. L. PEDRO

H. R. CONLEY

D. W. DIXON

M. L. REEDER

INVESTIGATED BY J. L. PEDRO

CHECKED BY N. T. ROBERSON

SUBMITTED BY N. T. ROBERSON

DATE OCTOBER 2006



10-10-06

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

PROJECT REFERENCE NO. 33370.II (B-4002)	SHEET NO. 2
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SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS																																																																																																																																																																																																																																			
<p>SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (ASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, ASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:</p> <p style="text-align: center;"><i>VERY STIFF, GRN./SLTY CLM. MOST WITH INTERBEDDED FINE SAND LAYERS, HARD PLASTIC, A-7-6</i></p>	<p>WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED) GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.</p> <p style="text-align: center;">ANGULARITY OF GRAINS</p> <p>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.</p>	<p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p>	<p>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 IMPERVIORUS 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 (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. STRATA CORE RECOVERY (SREC) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>																																																																																																																																																																																																																																			
<p style="text-align: center;">SOIL LEGEND AND AASHTO CLASSIFICATION</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th rowspan="2">GENERAL CLASS.</th> <th colspan="7">GRANULAR MATERIALS (≤ 35% PASSING #200)</th> <th colspan="7">SILT-CLAY MATERIALS (> 35% PASSING #200)</th> <th colspan="3">ORGANIC MATERIALS</th> </tr> <tr> <th>A-1</th><th>A-1-a</th><th>A-1-b</th><th>A-2</th><th>A-2-4</th><th>A-2-5</th><th>A-2-6</th><th>A-2-7</th><th>A-4</th><th>A-5</th><th>A-6</th><th>A-7</th><th>A-1, A-2</th><th>A-3</th><th>A-4, A-5</th><th>A-6, A-7</th><th></th><th></th><th></th> </tr> <tr> <td>GROUP CLASS.</td> <td colspan="7">A-1-a</td><td colspan="7">A-2-4</td><td colspan="7">A-4</td><td colspan="3">A-1, A-2</td> </tr> <tr> <td>SYMBOL</td> <td colspan="7">[Symbol]</td><td colspan="7">[Symbol]</td><td colspan="7">[Symbol]</td><td colspan="3">[Symbol]</td> </tr> <tr> <td>% PASSING</td> <td colspan="7">50 MX</td><td colspan="7">30 MX</td><td colspan="7">15 MX</td><td colspan="3">10 MN</td> </tr> <tr> <td>LIQUID LIMIT PLASTIC INDEX</td> <td colspan="7">6 MX</td><td colspan="7">NP</td><td colspan="7">40 MX</td><td colspan="3">11 MN</td> </tr> <tr> <td>GROUP INDEX</td> <td colspan="7">0</td><td colspan="7">0</td><td colspan="7">4 MX</td><td colspan="3">8 MX</td> </tr> <tr> <td>USUAL TYPES OF MAJOR MATERIALS</td> <td colspan="7">STONE FRAGS, GRAVEL, AND SAND</td><td colspan="7">FINE SAND</td><td colspan="7">SILTY OR CLAYEY GRAVEL AND SAND</td><td colspan="3">SILTY SOILS</td> </tr> <tr> <td>GENERAL RATING AS A SUBGRADE</td> <td colspan="7">EXCELLENT TO GOOD</td><td colspan="7">FAIR TO POOR</td><td colspan="3">FAIR TO POOR</td><td colspan="3">POOR</td> </tr> </table> <p style="text-align: center;">PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30</p>	GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)							ORGANIC MATERIALS			A-1	A-1-a	A-1-b	A-2	A-2-4	A-2-5	A-2-6	A-2-7	A-4	A-5	A-6	A-7	A-1, A-2	A-3	A-4, A-5	A-6, A-7				GROUP CLASS.	A-1-a							A-2-4							A-4							A-1, A-2			SYMBOL	[Symbol]							[Symbol]							[Symbol]							[Symbol]			% PASSING	50 MX							30 MX							15 MX							10 MN			LIQUID LIMIT PLASTIC INDEX	6 MX							NP							40 MX							11 MN			GROUP INDEX	0							0							4 MX							8 MX			USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS, GRAVEL, AND SAND							FINE SAND							SILTY OR CLAYEY GRAVEL AND SAND							SILTY SOILS			GENERAL RATING AS A SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR							FAIR TO POOR			POOR			<p style="text-align: center;">MINERALOGICAL COMPOSITION</p> <p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.</p> <p style="text-align: center;">COMPRESSIBILITY</p> <p>SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50</p> <p style="text-align: center;">PERCENTAGE OF MATERIAL</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>ORGANIC MATERIAL</th> <th>GRANULAR SOILS</th> <th>SILT - CLAY SOILS</th> <th>OTHER MATERIAL</th> </tr> <tr> <td>TRACE OF ORGANIC MATTER</td> <td>2 - 3%</td> <td>3 - 5%</td> <td>1 - 10%</td> </tr> <tr> <td>LITTLE ORGANIC MATTER</td> <td>3 - 5%</td> <td>5 - 12%</td> <td>LITTLE 10 - 20%</td> </tr> <tr> <td>MODERATELY ORGANIC</td> <td>5 - 10%</td> <td>12 - 20%</td> <td>SOME 20 - 35%</td> </tr> <tr> <td>HIGHLY ORGANIC</td> <td>>10%</td> <td>>20%</td> <td>HIGHLY 35% AND ABOVE</td> </tr> </table> <p style="text-align: center;">GROUND WATER</p> <p>▽ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING ▽ STATIC WATER LEVEL AFTER 24 HOURS ▽ PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA ○ SPRING OR SEEP</p>	ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	1 - 10%	LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE 10 - 20%	MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME 20 - 35%	HIGHLY ORGANIC	>10%	>20%	HIGHLY 35% AND ABOVE	<p style="text-align: center;">WEATHERING</p> <p>FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE.</p> <p>VERY SLIGHT (V SLI.) ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY, ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.</p> <p>SLIGHT (SLI.) ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH, OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED, CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.</p> <p>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.</p> <p>MODERATELY SEVERE (MOD. SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. <i>IF TESTED, WOULD YIELD SPT REFUSAL.</i></p> <p>SEVERE (SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPARS ARE KAOLINIZED TO SOME EXTENT, SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. <i>IF TESTED, YIELDS SPT N VALUES > 100 BPF.</i></p> <p>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></p> <p>COMPLETE ROCK REDUCED TO SOIL, ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS, SAPROLITE IS ALSO AN EXAMPLE.</p> <p style="text-align: center;">ROCK HARDNESS</p> <p>VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.</p> <p>HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.</p> <p>MODERATELY HARD 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.</p> <p>MEDIUM HARD 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.</p> <p>SOFT 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.</p> <p>VERY SOFT 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.</p>
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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

October 5, 2006

STATE PROJECT: 33370.1.1 (B-4002)
F.A. PROJECT: BRZ-2116(1)
COUNTY: Alamance

DESCRIPTION: Bridge No. 96 on -L- (SR 2116) over Varnals Creek at Station 18+77.5

SUBJECT: Geotechnical Report – Structure Inventory

Project Description

A three-span bridge, 145-feet in length with a 90° skew, is proposed on -L- (SR 2116) over Varnals Creek. The project is located in central Alamance County about 5 miles south of Burlington.

The subsurface investigation was conducted during August and September of 2006 using an ATV-mounted CME-550X drill machine. Two Standard Penetration Test borings were performed at each of the four proposed bent locations. In addition, one location at each interior bent was cored using NXWL core equipment. All borings were advanced to crystalline rock using hollow stem augers or N-casing with advancer. 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. Two rock core samples were submitted to the Materials and Tests Unit to determine Unit Weight and Compressive Strength.

Physiography and Geology

The project is located in the gently rolling terrain of the Piedmont Physiographic province. The area consists of a mixture of woods, pastures, and scattered homes. Geologically, the site is underlain by mafic, metavolcanic rock of the Carolina Slate Belt.

Soil Properties

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

Roadway embankment soils were encountered at both end bent locations. The embankment soils range in thickness from 3.5 to 7.5 feet. These soils consist of red and brown, soft to stiff, moist, sandy silt (A-4) and sandy clay (A-6). Alluvial soils at End Bent 1 and residual soils at End Bent 2 underlie roadway embankment soils.

Alluvial soils range from 1.5 to 11.5 feet in thickness. These soils predominantly consist of red, orange, and brown, soft to medium stiff, moist, sandy clay (A-6) and silty clay (A-7-6), and tan, orange, red, and brown, very soft to very stiff, moist to wet, sandy silt (A-4). Other soils present in smaller quantities are tan, orange, and brown, medium to very dense, moist to wet, coarse sand (A-1-b) with cobbles and weathered rock fragments. The alluvial soils were deposited on residual soil and weathered rock.

Residual soils were encountered at all bent locations except for Bent 2, and are 1.4 to 5.4 feet thick. These soils consist of orange-brown, very stiff, moist, saprolitic, sandy silt (A-4) with weathered rock. The residual soils are underlain by weathered rock.

Rock Properties

Weathered rock was derived from the underlying mafic, metavolcanic rock and ranges in thickness from 0.6 feet at EB1-B, to as much as 8.3 feet at boring B1-A. Weathered rock was encountered in all of the borings. The top of weathered rock ranges in elevation from 447.3 feet at B1-B to 457.4 feet at EB2-B.

Crystalline rock was encountered at all bent locations and cored at B1-A and B2-A. Rock present at the site predominantly consists of green, fresh, hard, closely fractured, thickly bedded, mafic, metavolcanic rock. Lesser amounts of brown, severely to moderately severely weathered, medium to moderately hard, very closely fractured, metavolcanic rock are also present. Core Recovery (REC) values range from 10% to 100%, and Rock Quality Designation (RQD) values range from 0% to 100%. Laboratory tests show compressive strengths from 23.1 ksi to 27.1 ksi and unit weights ranging from 180.8 lb/ft³ to 183.1 lb/ft³. More detailed rock descriptions can be found in the Core Boring Reports. The top of crystalline rock ranges in elevation from 441.6 feet at B1-A to 456.3 feet at B2-A.

Groundwater

Groundwater was encountered at each of the bent locations except for End Bent 2. The groundwater elevations range from 452.4 feet at EB1-B to 454.6 feet at B1-B and B2-A. The water in Varnals Creek was at an elevation of 454.6 feet (9-7-06).

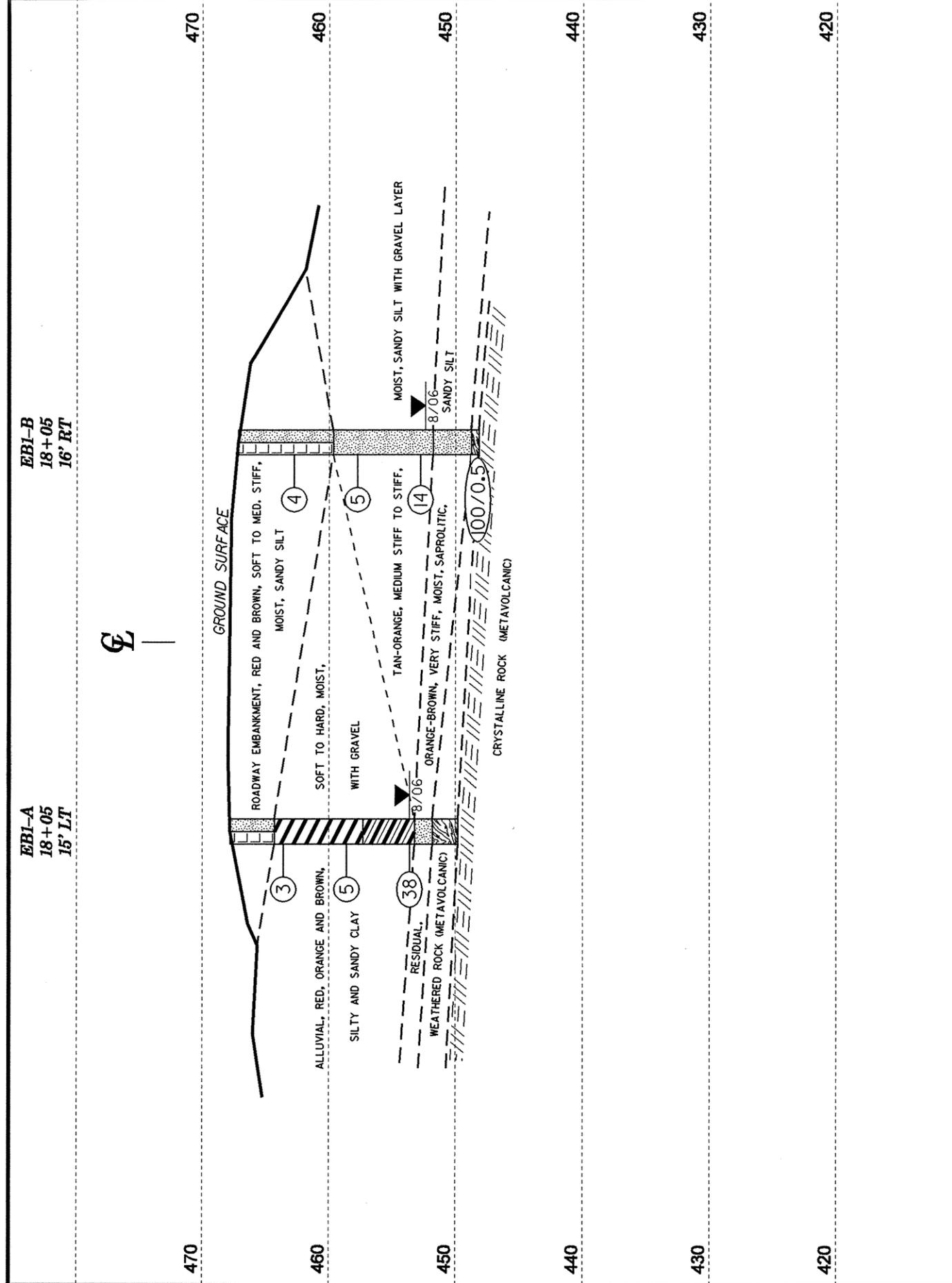
Notice

This Geotechnical foundation report is based on the Preliminary General Drawing dated March, 2006 and the Hydraulics Bridge Report dated February 15, 2006. If significant changes are made in the design or location of the proposed structure, the subsurface information should be reviewed and modified as necessary.

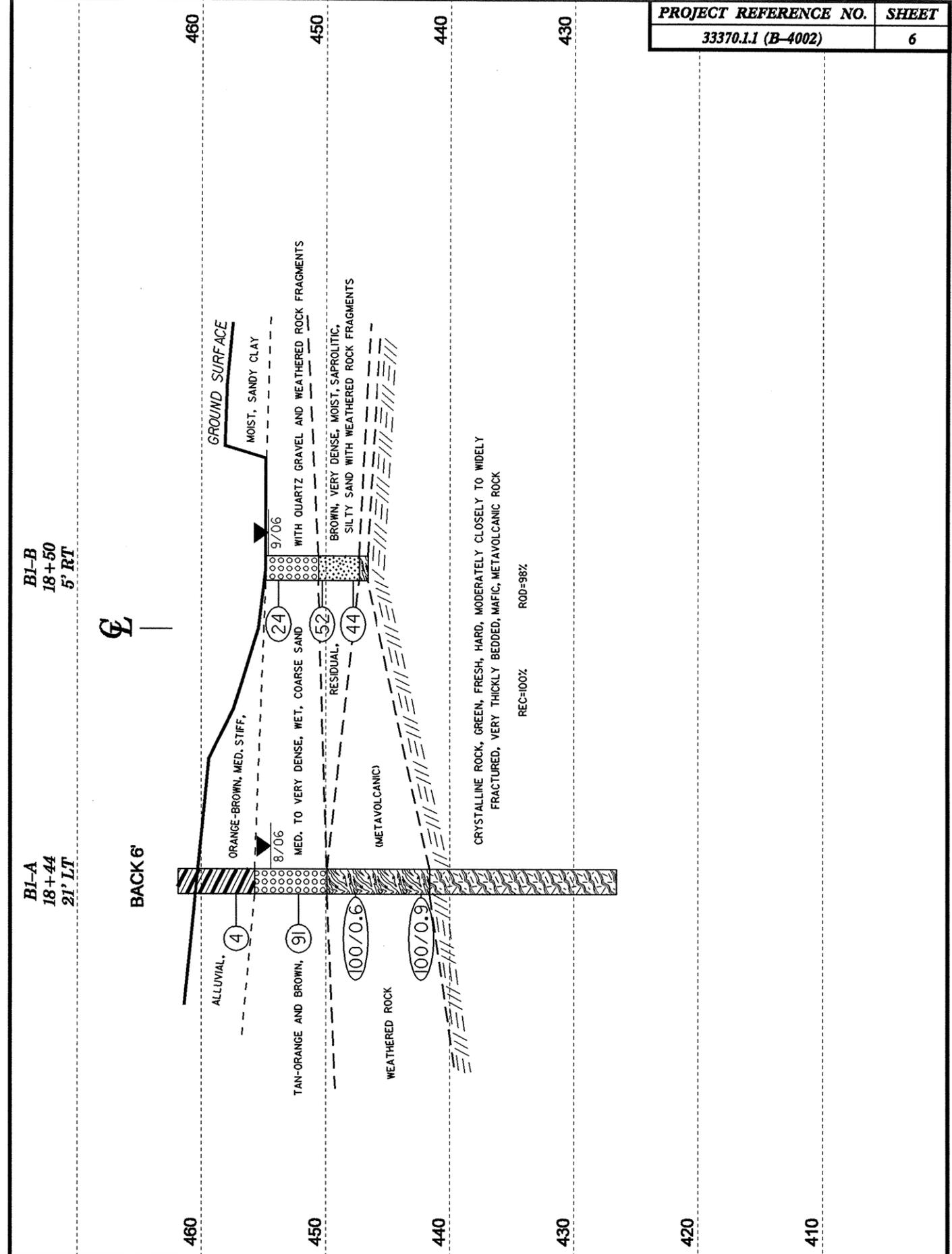
Prepared by,

Jaime Love Pedro

Jaime Love Pedro
Engineering Geologist



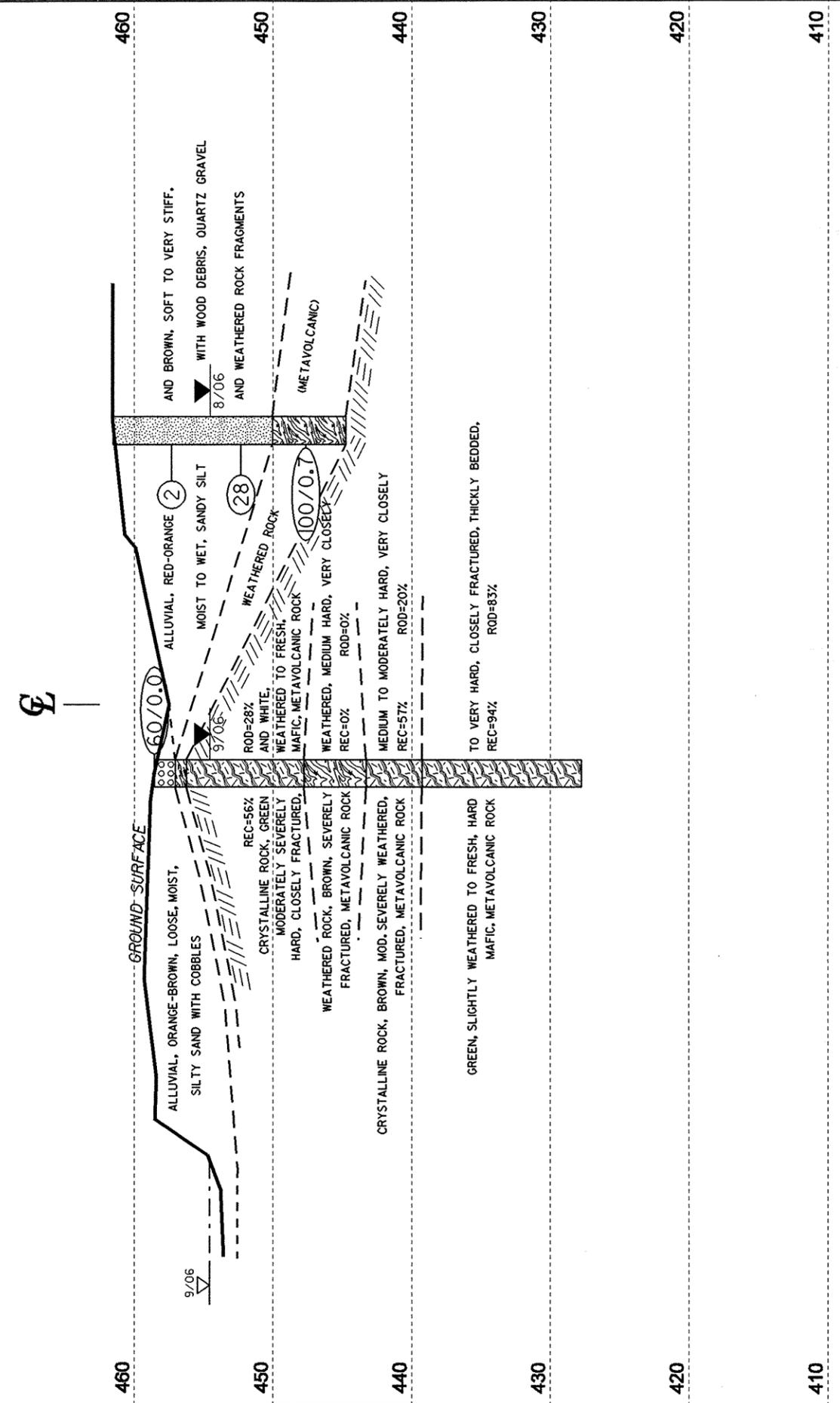
HORIZ. SCALE 0 10 20 (FEET) VE = 1:1 CROSS SECTIONS THROUGH END BENT 1



HORIZ. SCALE 0 10 20 (FEET) VE = 1:1 CROSS SECTION THROUGH BENT 1

B2-A
19+10
5' LT

HORIZ. SCALE 0 10 20
(FEET)

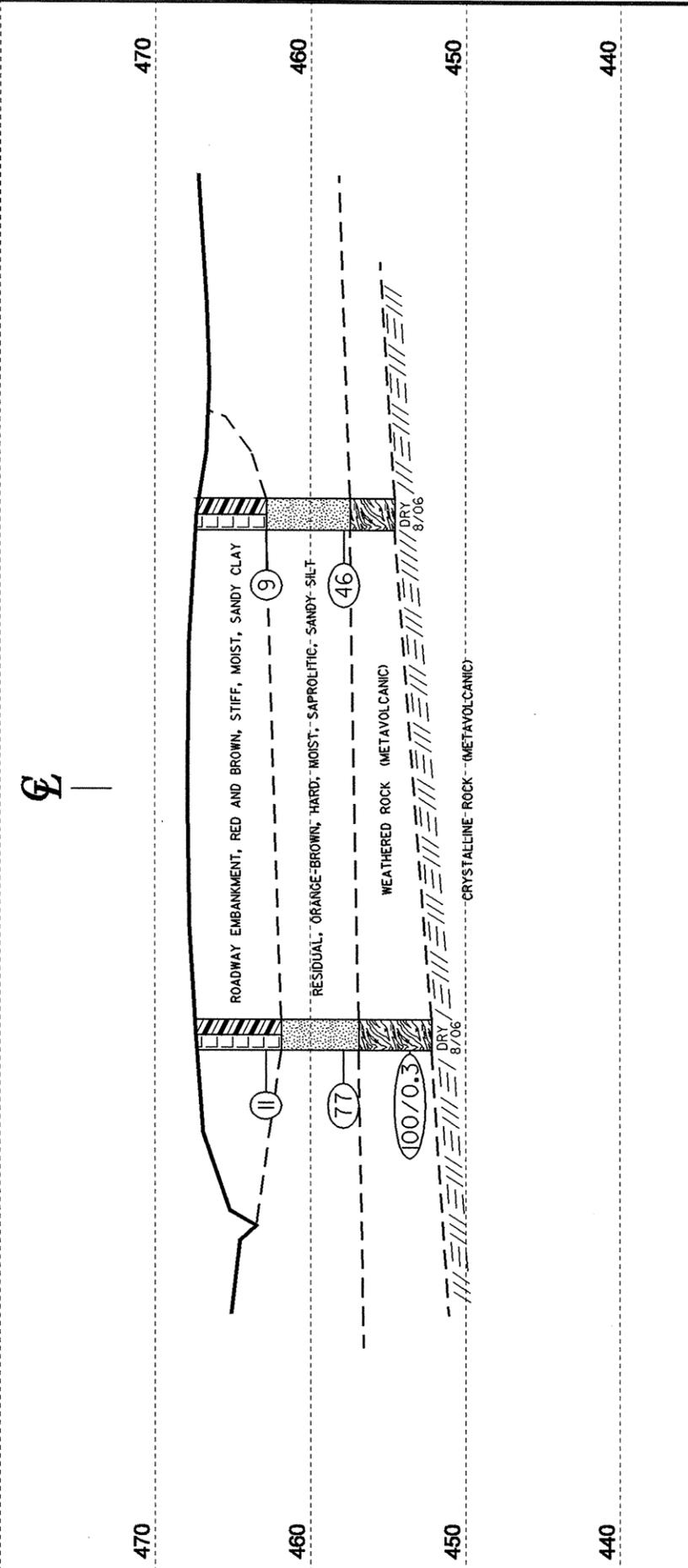


VE = 1:1

CROSS SECTION THROUGH BENT 2

EB2-B
19+50
18' RT

HORIZ. SCALE 0 10 20
(FEET)

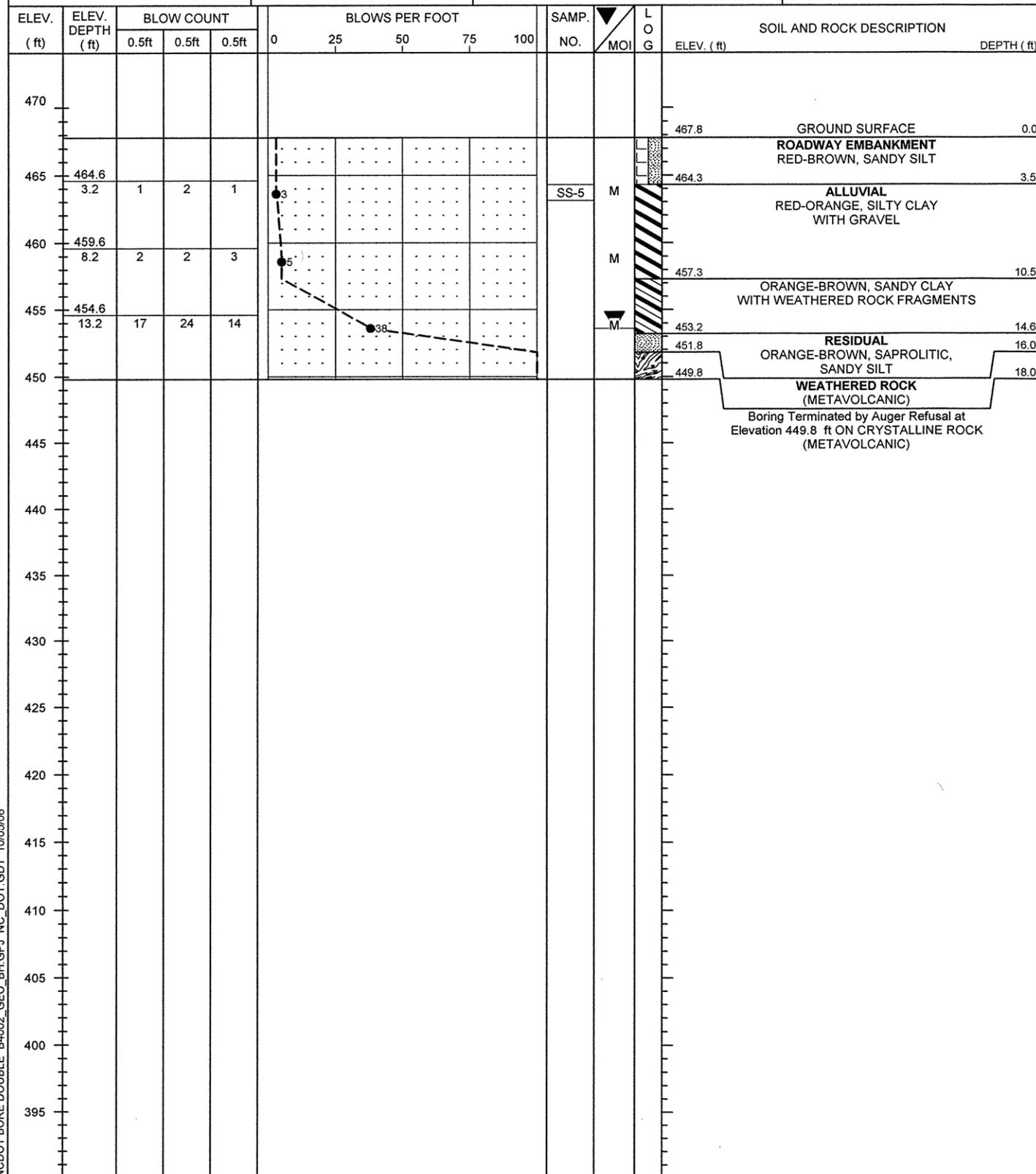


VE = 1:1

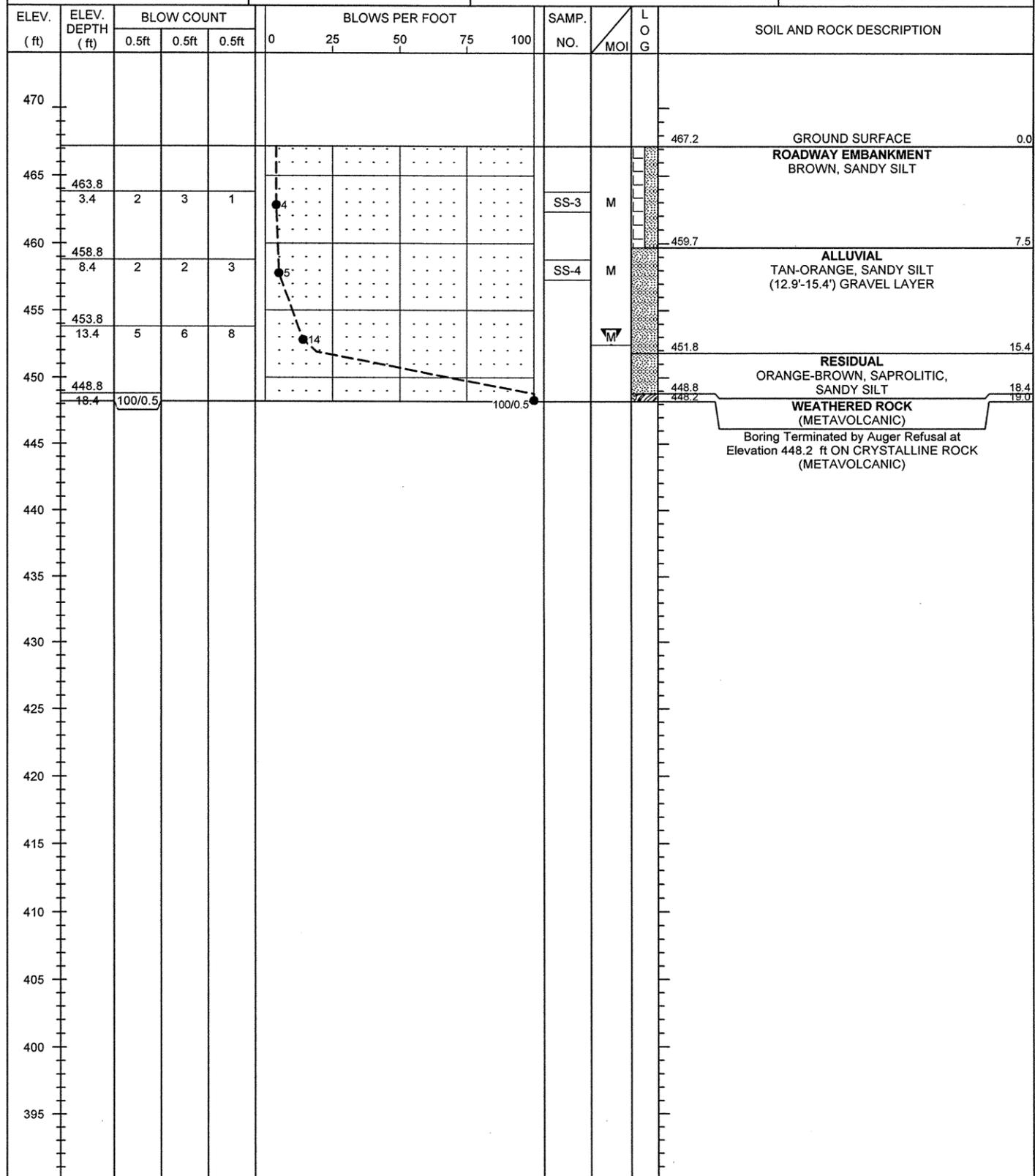
CROSS SECTION THROUGH END BENT 2



PROJECT NO. 33370.1.1	ID. B-4002	COUNTY Alamance	GEOLOGIST Pedro, J. L.
SITE DESCRIPTION Bridge No. 96 on -L- (SR 2116) over Varnals Creek			GROUND WTR (ft)
BORING NO. EB1-A	STATION 18+05	OFFSET 15 ft LT	ALIGNMENT -L-
COLLAR ELEV. 467.8 ft	TOTAL DEPTH 18.0 ft	NORTHING 814,443	EASTING 1,893,785
DRILL MACHINE CME-550X	DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
START DATE 08/29/06	COMP. DATE 08/29/06	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 18.0



PROJECT NO. 33370.1.1	ID. B-4002	COUNTY Alamance	GEOLOGIST Pedro, J. L.
SITE DESCRIPTION Bridge No. 96 on -L- (SR 2116) over Varnals Creek			GROUND WTR (ft)
BORING NO. EB1-B	STATION 18+05	OFFSET 16 ft RT	ALIGNMENT -L-
COLLAR ELEV. 467.2 ft	TOTAL DEPTH 19.0 ft	NORTHING 814,420	EASTING 1,893,807
DRILL MACHINE CME-550X	DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
START DATE 08/28/06	COMP. DATE 08/28/06	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 19.0



NCDOT BORE DOUBLE B4002_GEO_BH.GPJ NC_DOT.GDT 10/05/06



NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 33370.1.1		ID. B-4002		COUNTY Alamance		GEOLOGIST Pedro, J. L.								
SITE DESCRIPTION Bridge No. 96 on -L- (SR 2116) over Varnals Creek							GROUND WTR (ft)							
BORING NO. B1-A		STATION 18+44		OFFSET 21 ft LT		ALIGNMENT -L-								
COLLAR ELEV. 461.9 ft		TOTAL DEPTH 35.3 ft		NORTHING 814,477		EASTING 1,893,815								
DRILL MACHINE CME-550X		DRILL METHOD NW Casing w/ SPT Core			HAMMER TYPE Automatic									
START DATE 08/29/06		COMP. DATE 08/30/06		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 20.3								
ELEV. (ft)	ELEV. DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
		0.5ft	0.5ft	0.5ft	0	25	50	75	100					
465													GROUND SURFACE	0.0
460	458.2 3.7	1	1	3							SS-6	M	ALLUVIAL ORANGE-BROWN, SANDY CLAY	
455	453.2 8.7	17	53	38							W		TAN-ORANGE, COARSE SAND WITH QUARTZ GRAVEL AND WEATHERED ROCK FRAGMENTS	6.2
450	448.2 13.7	70	30/0.1										WEATHERED ROCK (METAVOLCANIC)	12.0
445	443.2 18.7	26	74/0.4										CRYSTALLINE ROCK GREEN, FRESH, HARD, MODERATELY CLOSELY TO WIDELY FRACTURED, VERY THICKLY BEDDED, MAFIC, METAVOLCANIC ROCK	20.3
440											RS-1		REC=100% RQD=98%	
435														
430														
425														
420														
415														
410														
405														
400														
395														
390														
Boring Terminated at Elevation 426.6 ft IN CRYSTALLINE ROCK (METAVOLCANIC)														35.3

CORE BORING REPORT

PROJECT: 33370.1.1 ID: B-4002 COUNTY: Alamance BORING NO: B1-A

DESCRIPTION: Bridge No. 96 on -L- (SR 2116) over Varnals Creek

LOCATION OF BORING: -L- Sta. 18+44, 21' LT COMPLETION DATE: 8/30/06

COLLAR or GROUND ELEVATION: 461.9 ft CORE SIZE: NXWL GEOLOGIST: J. L. Pedro

CORE EQUIPMENT: CME-550X, N-casing, NXWL DRILLER: H. R. Conley

ELEV (ft)	DEPTH (ft)	DRILL RATE (min/ft)	RUN (ft)	REC (%)	RQD (%)	SAMPLE NUMBER	FIELD CLASSIFICATION and REMARKS
441.6	20.3	5:32					Green, fresh, hard, moderately close fractured, very thickly bedded, mafic, metavolcanic rock
		3:06		5.0	4.7		
		2:35	5.0	(100%)	(94%)		
		2:30					
436.6	25.3	2:51					Green, fresh, hard, wide fractured, very thickly bedded, mafic, metavolcanic rock
436.6	25.3	1:58		5.0	5.0		
		2:16	5.0	(100%)	(100%)	RS-1	
		2:31				27.3-27.9	
431.6	30.3	3:38					Green, fresh, hard, wide fractured, very thickly bedded, mafic, metavolcanic rock
431.6	30.3	2:31		5.0	5.0		
		2:36	5.0	(100%)	(100%)		
		3:12					
426.6	35.3	2:57					

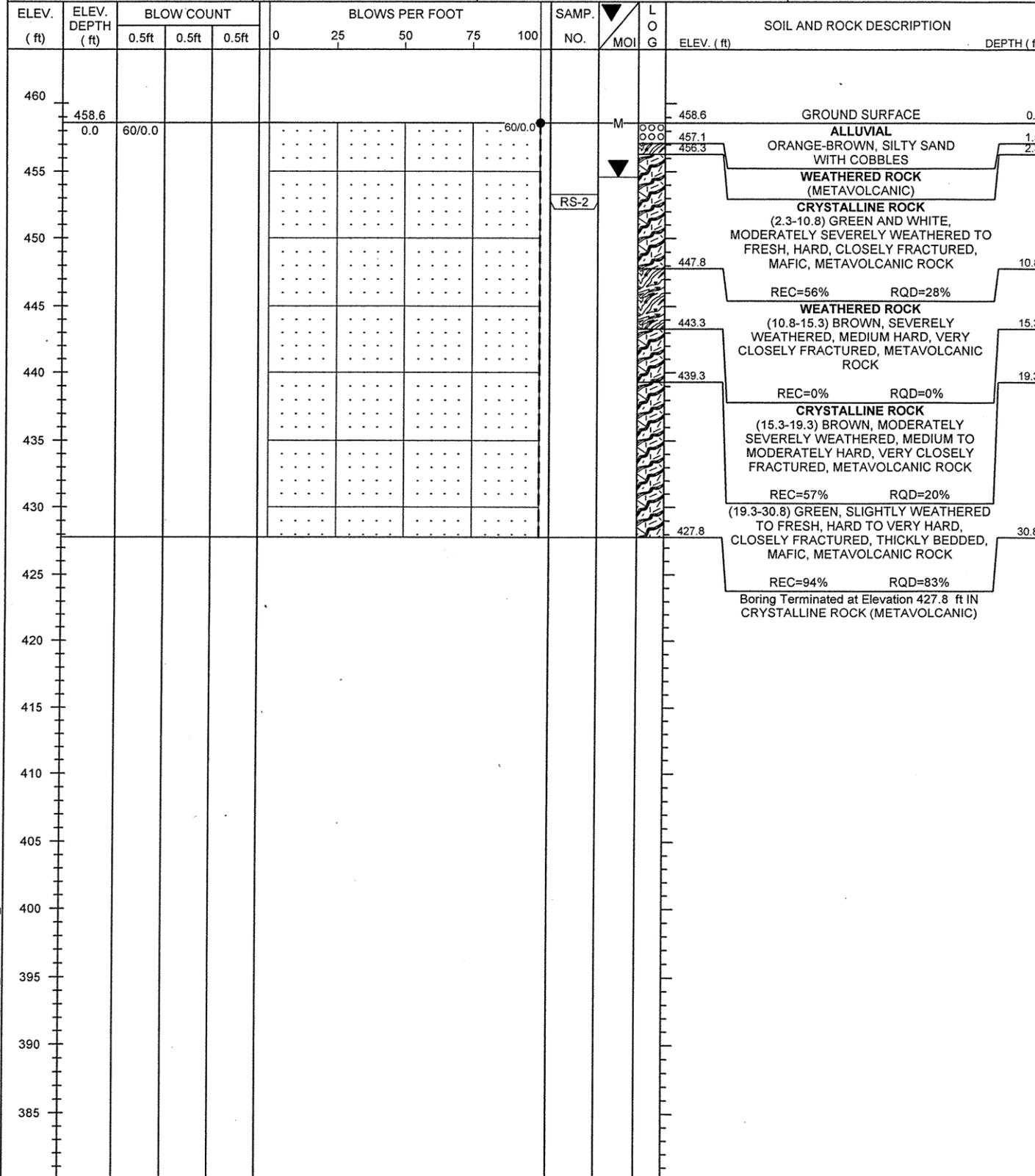
BOREHOLE TERMINATED AT ELEVATION OF 426.6 FEET, IN METAVOLCANIC ROCK.

NCDOT BORE DOUBLE B4002.GEO.BH.GPJ NC_DOT.GDT 10/05/06

PROJECT NO. 33370.1.1		ID. B-4002		COUNTY Alamance		GEOLOGIST Pedro, J. L.									
SITE DESCRIPTION Bridge No. 96 on -L- (SR 2116) over Varnals Creek							GROUND WTR (ft)								
BORING NO. B1-B		STATION 18+50		OFFSET 5 ft RT		ALIGNMENT -L-									
COLLAR ELEV. 454.8 ft		TOTAL DEPTH 8.2 ft		NORTHING 814,460		EASTING 1,893,831									
DRILL MACHINE CME-550X		DRILL METHOD NW Casing w/ SPT				HAMMER TYPE Automatic									
START DATE 09/07/06		COMP. DATE 09/07/06		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 8.2									
ELEV. (ft)	ELEV. DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION		
		0.5ft	0.5ft	0.5ft	0	25	50	75	100						
455	454.8													GROUND SURFACE	0.0
	0.0	9	9	15						SS-8	W		ALLUVIAL BROWN, COARSE SAND WITH QUARTZ GRAVEL AND WEATHERED ROCK FRAGMENTS	4.2	
	451.3														
	3.5	14	18	34											
450	448.8									SS-9	M		RESIDUAL BROWN, SAPROLITIC, SILTY SAND WITH WEATHERED ROCK FRAGMENTS	7.5	
	6.0	11	14	30						SS-10	M		WEATHERED ROCK (METAVOLCANIC)	8.2	
445														Boring Terminated at Elevation 446.6 ft ON CRYSTALLINE ROCK (METAVOLCANIC)	
440															
435															
430															
425															
420															
415															
410															
405															
400															
395															
390															
385															
380															



PROJECT NO. 33370.1.1	ID. B-4002	COUNTY Alamance	GEOLOGIST Pedro, J. L.
SITE DESCRIPTION Bridge No. 96 on -L- (SR 2116) over Varnals Creek			GROUND WTR (ft)
BORING NO. B2-A	STATION 19+10	OFFSET 5 ft LT	ALIGNMENT -L-
COLLAR ELEV. 458.6 ft	TOTAL DEPTH 30.8 ft	NORTHING 814,509	EASTING 1,893,867
DRILL MACHINE CME-550X	DRILL METHOD NW Casing w/ SPT Core	HAMMER TYPE Automatic	
START DATE 09/06/06	COMP. DATE 09/06/06	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 2.3



CORE BORING REPORT

PROJECT: 33370.1.1 ID: B-4002 COUNTY: Alamance BORING NO: B2-A

DESCRIPTION: Bridge No. 96 on -L- (SR 2116) over Varnals Creek

LOCATION OF BORING: -L- Sta. 19+10, 5' LT COMPLETION DATE: 9/6/06

COLLAR or GROUND ELEVATION: 458.6 ft CORE SIZE: NXWL GEOLOGIST: J. L. Pedro

CORE EQUIPMENT: CME-550X, N-casing, NXWL DRILLER: H. R. Conley

ELEV (ft)	DEPTH (ft)	DRILL RATE (min/ft)	RUN (ft)	REC (ft) (%)	RQD (ft) (%)	SAMPLE NUMBER	FIELD CLASSIFICATION and REMARKS
456.3	2.3	0:34/0.5		2.7	1.6		(2.3-4.2) Green, moderately severely weathered to slightly weathered, hard, close fractured, thickly bedded, mafic, metavolcanic rock
		1:09	3.5	(77%)	(46%)	RS-2	(4.2-5.8) Green, fresh, very hard, thinly bedded, mafic, metavolcanic rock
		1:27					
		1:30					
452.8	5.8	-					
452.8	5.8	0:35		2.1	0.8		Green and white, slightly weathered to fresh, hard, close fractured, metavolcanic rock, soil zones throughout the entire run
		0:34	5.0	(42%)	(16%)		
		0:53					
		0:51					
447.8	10.8	0:26					
447.8	10.8	0:25		0.5	0.0		(10.8-15.3) Brown, severely weathered, medium hard, very close fractured, metavolcanic rock
		0:33	5.0	(10%)	(0%)		(15.3-15.8) Brown, moderately severely weathered, moderately hard, very close fractured, metavolcanic rock
		0:31					
		0:18					
442.8	15.8	0:36					
442.8	15.8	0:28		4.0	1.2		(15.8-19.3) Brown, moderately severely weathered, moderately hard, very close fractured, metavolcanic rock
		0:48	5.0	(80%)	(24%)		(19.3-20.8) Green, slightly weathered, hard, close fractured, mafic, metavolcanic rock
		0:49					
		0:52					
437.8	20.8	0:54					
437.8	20.8	0:52		4.8	4.5		Green, fresh, very hard, moderately close fractured, thickly bedded, mafic, metavolcanic rock
		2:01	5.0	(96%)	(90%)		
		2:06					
		2:14					
432.8	25.8	1:53					
432.8	25.8	1:18		5.0	5.0		Green, fresh, very hard, thickly bedded, mafic, metavolcanic rock
		1:12	5.0	(100%)	(100%)		
		1:10					
		1:08					
427.8	30.8	1:06					

BOREHOLE TERMINATED AT ELEVATION OF 427.8 FEET, IN METAVOLCANIC ROCK.

NCDOT BORE DOUBLE B4002_GEO_BH.GPJ NC_DOT.GDT 10/05/06



PROJECT NO. 33370.1.1	ID. B-4002	COUNTY Alamance	GEOLOGIST Pedro, J. L.
SITE DESCRIPTION Bridge No. 96 on -L- (SR 2116) over Varnals Creek			GROUND WTR (ft)
BORING NO. EB2-A	STATION 19+50	OFFSET 16 ft LT	ALIGNMENT -L-
COLLAR ELEV. 467.4 ft	TOTAL DEPTH 15.2 ft	NORTHING 814,545	EASTING 1,893,887
DRILL MACHINE CME-550X	DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
START DATE 08/28/06	COMP. DATE 08/28/06	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 15.2

ELEV. (ft)	ELEV. DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
		0.5ft	0.5ft	0.5ft	0	25	50	75	100					
470													GROUND SURFACE	0.0
467.4													ROADWAY EMBANKMENT RED-BROWN, SANDY CLAY	
465	463.9 3.5	5	5	6										5.5
460	458.9 8.5	6	14	63									RESIDUAL ORANGE-BROWN, SAPROLITIC, SANDY SILT WITH WEATHERED ROCK FRAGMENTS	10.5
455	453.9 13.5	100/0.3											WEATHERED ROCK (METAVOLCANIC)	15.2
452.2													Boring Terminated by Auger Refusal at Elevation 452.2 ft ON CRYSTALLINE ROCK (METAVOLCANIC)	

PROJECT NO. 33370.1.1	ID. B-4002	COUNTY Alamance	GEOLOGIST Pedro, J. L.
SITE DESCRIPTION Bridge No. 96 on -L- (SR 2116) over Varnals Creek			GROUND WTR (ft)
BORING NO. EB2-B	STATION 19+50	OFFSET 18 ft RT	ALIGNMENT -L-
COLLAR ELEV. 467.3 ft	TOTAL DEPTH 12.8 ft	NORTHING 814,521	EASTING 1,893,912
DRILL MACHINE CME-550X	DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
START DATE 08/28/06	COMP. DATE 08/28/06	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 12.8

ELEV. (ft)	ELEV. DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
		0.5ft	0.5ft	0.5ft	0	25	50	75	100					
470													GROUND SURFACE	0.0
467.3													ROADWAY EMBANKMENT RED-BROWN, SANDY CLAY	
465	463.8 3.5	4	5	4										4.5
460	458.8 8.5	5	8	38									RESIDUAL ORANGE-BROWN, SAPROLITIC, SANDY SILT WITH MICA AND WEATHERED ROCK FRAGMENTS	9.9
455													WEATHERED ROCK (METAVOLCANIC)	12.8
454.5													Boring Terminated by Auger Refusal at Elevation 454.5 ft ON CRYSTALLINE ROCK (METAVOLCANIC)	

NCDOT BORE DOUBLE B4002_GEO_BH.GPJ NC_DOT.GDT 10/05/06

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-5	15 LT	18+05	3.5-4.7	A-7-6(13)	41	19	10.9	20.9	29.8	38.5	98	92	73	-	-

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-3	16 RT	18+05	3.4-4.9	A-4(2)	25	6	7.5	33.6	44.7	14.2	97	94	69	-	-
SS-4	16 RT	18+05	8.4-9.9	A-4(0)	19	NP	17.0	36.8	30.0	16.2	100	94	55	-	-

B1-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-6	21 LT	18+44	3.7-5.2	A-6(10)	36	18	10.7	27.7	27.1	34.4	100	96	68	-	-

B1-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-8	5 RT	18+50	0.0-1.5	A-1-b(0)	23	3	44.1	23.7	16.0	16.2	69	49	25	-	-
SS-9	5 RT	18+50	4.2-5.0	A-2-4(0)	25	4	40.3	31.6	20.0	8.1	93	70	32	-	-
SS-10	5 RT	18+50	6.0-7.5	A-2-4(0)	30	7	45.3	23.3	23.3	8.1	92	63	34	-	-

B2-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-7	20 RT	19+10	3.2-4.7	A-4(1)	26	7	24.1	29.6	22.1	24.3	94	81	50	-	-

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	18 RT	19+50	3.5-4.5	A-6(2)	38	17	37.9	23.5	24.5	14.2	93	70	37	-	-
SS-2	18 RT	19+50	8.5-10.0	A-4(2)	35	5	20.0	31.8	27.9	20.2	100	90	55	-	-

B1-A

ROCK TEST RESULTS							
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	ROCK TYPE	UNIT WT LB/FT ³	UNCONFINED COMP. STRENGTH, KSI	SECTION MOD. @ 40% MPSI
RS-1	21 LT	18+44	27.3-27.9	METAVOLCANIC	180.8	23.1	11.46

B2-A

ROCK TEST RESULTS							
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	ROCK TYPE	UNIT WT LB/FT ³	UNCONFINED COMP. STRENGTH, KSI	SECTION MOD. @ 40% MPSI
RS-2	5 LT	19+10	5.3-5.8	METAVOLCANIC	183.1	27.1	0.344



**FIELD
SCOUR REPORT**

WBS: 33370.1.1 TIP: B-4002 COUNTY: Alamance

DESCRIPTION(1): Bridge No. 96 on -L- (SR 2116) over Varnals Creek

EXISTING BRIDGE

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

Bridge No.: 96 Length: 75' Total Bents: 4 Bents in Channel: 2 Bents in Floodplain: 2
Foundation Type: Timber Piles on Spread footings

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: None

Interior Bents: Local scour at both bents, top of footer is exposed in the creek

Channel Bed: None

Channel Bank: Bank at End Bent 2 has been scoured

EXISTING SCOUR PROTECTION

Type(3): End Bents have wooden wing walls and interior bents have concrete encasements

Extent(4): Walls are 40' L x 8' H; Concrete 25' L x 3' W x 3' H

Effectiveness(5): Effective

Obstructions(6): Bent 2 has several large trees caught on the upstream side

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, brown, medium dense, sand with quartz gravel and weathered rock fragments (SS-8)

Channel Bank Material(8): Alluvial, red-orange-brown, very loose to loose, silty sand (SS-6 and SS-7)

Channel Bank Cover(9): Grass and trees

Floodplain Width(10): +/- 200 feet

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

Stream is(12): Aggrading _____ Degrading Static _____

Channel Migration Tend.(13): Northeast towards End Bent 2

Observations and Other Comments: Concrete encasement around piles on up stream side is in poor condition

DESIGN SCOUR ELEVATIONS(14)

Feet Meters _____

	LT	RT
Bent 1	452.8	452.8
Bent 2	454.0	449.0

Comparison of DSE to Hydraulics Unit theoretical scour:

The DSE for Bent 1 and the right side of Bent 2 is the same as theoretical scour, and the left side of Bent 2 is 5' higher than theoretical scour from the Hydraulics Report (dated 2-15-06).

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

Bed or Bank					
Sample No.	See Sheet 14 of 17, "Soil Test Results", for samples: SS-6 and SS-7 (bank) SS-8 (bed)				
Retained #4					
Passed #10					
Passed #40					
Passed #200					
Coarse Sand					
Fine Sand					
Silt					
Clay					
LL					
PI					
AASHTO					
Station					
Offset					
Depth					

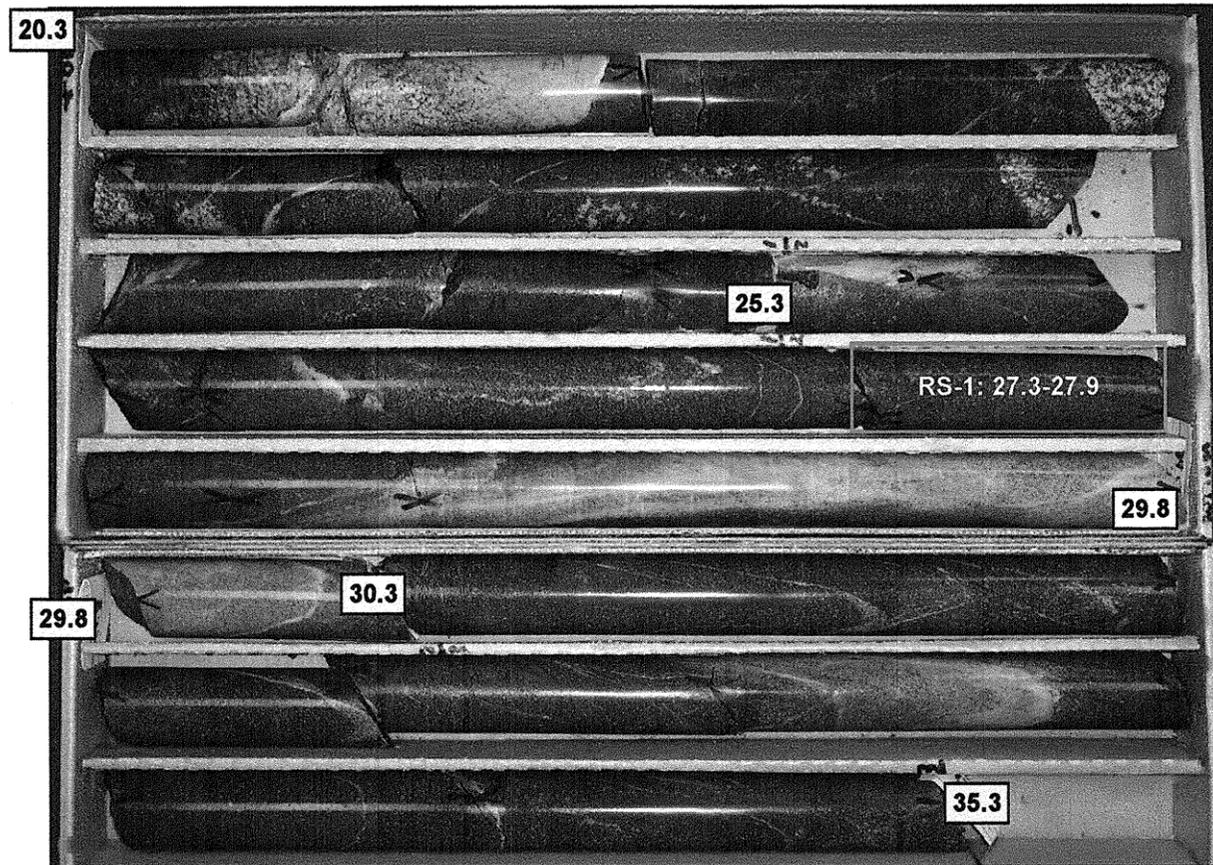
Reported by: Jaimie Love Pedro

Date: 4/4/2006

CORE PHOTOGRAPHS

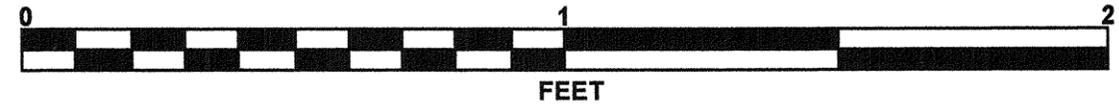
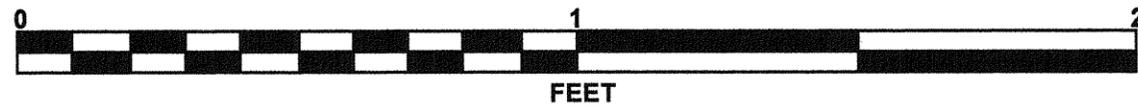
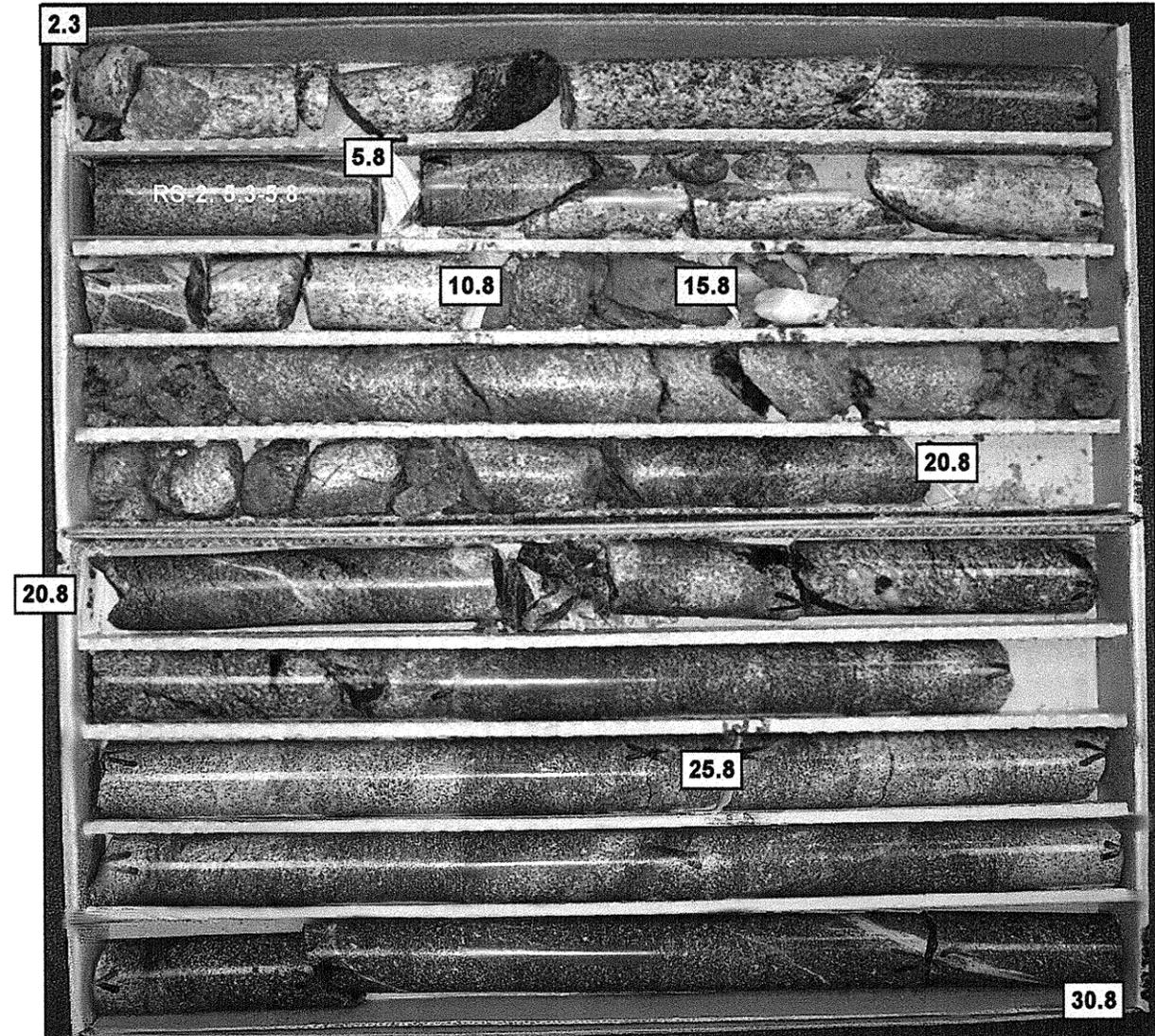
B1-A

BOXES 1 & 2: 20.3 - 35.3 FEET



B2-A

BOXES 1 & 2: 2.3 - 30.8 FEET



SITE PHOTOGRAPH

Bridge No. 96 on -L- (SR 2116) over Varnals Creek

