

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

STRUCTURE
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 34866.1.1(U-2810) F.A. PROJ. STP-1003(22)
 COUNTY CUMBERLAND

PROJECT DESCRIPTION SR 1003 (CAMDEN RD.) FROM NC 59
(HOPE MILLS RD.) TO NORTH OF SR 1007 (OWEN RD.)

SITE DESCRIPTION BRIDGE NO.102 ON -L- (CAMDEN RD., SR 1003)
OVER LITTLE ROCKFISH CREEK AT -L- STATION 27+70

INVENTORY

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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.

ST #1

PERSONNEL

C. D. CZAJKA

W. N. CHERRY

R. E. SMITH

INVESTIGATED BY J.J. MILKOVITS, JR.

CHECKED BY N.T. ROBERSON

SUBMITTED BY N.T. ROBERSON

DATE DECEMBER 2006



12-14-06

PROJECT: 34866.1.1 ID: U-2810A

DRAWN BY: T.T. WALKER / W.D. FIELDS

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

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

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS																																																																																																																																																																																																							
<p>SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:</p> <p style="text-align: center;"><i>VERY STIFF, GRAN. SKTY CLM. MOST WITH INTERBEDDED FINE SAND LAYERS, HIGH 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)</p> <p>GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.</p> <p>ANGULARITY OF GRAINS</p> <p>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: <u>ANGULAR</u>, <u>SUBANGULAR</u>, <u>SUBROUNDED</u>, OR <u>ROUNDED</u>.</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.</p> <p>ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p> <p>WEATHERED ROCK (WR) - NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.</p> <p>CRYSTALLINE ROCK (CR) - FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.</p> <p>NON-CRYSTALLINE ROCK (NCR) - FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.</p> <p>COASTAL PLAIN SEDIMENTARY ROCK (CP) - COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.</p>	<p>ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.</p> <p>AQUIFER - A WATER BEARING FORMATION OR STRATA.</p> <p>ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.</p> <p>ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.</p> <p>ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.</p> <p>CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.</p> <p>COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.</p> <p>CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.</p> <p>DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.</p> <p>DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.</p> <p>DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.</p> <p>FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.</p> <p>FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.</p> <p>FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.</p> <p>FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.</p> <p>FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.</p> <p>JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.</p> <p>LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.</p> <p>LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.</p> <p>MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.</p> <p>PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.</p> <p>RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.</p> <p>ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.</p> <p>SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.</p> <p>SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.</p> <p>SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.</p> <p>STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (IN OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.</p> <p>STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.</p> <p>STRATA ROCK QUALITY DESIGNATION (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.</p> <p>TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>																																																																																																																																																																																																							
<p>SOIL LEGEND AND AASHTO CLASSIFICATION</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>GENERAL CLASS.</th> <th colspan="7">GRANULAR MATERIALS (<= 35% PASSING #200)</th> <th colspan="7">SILT-CLAY MATERIALS (> 35% PASSING #200)</th> <th colspan="3">ORGANIC MATERIALS</th> </tr> <tr> <th>GROUP CLASS.</th> <th colspan="2">A-1</th> <th colspan="2">A-3</th> <th colspan="3">A-2</th> <th colspan="2">A-4</th> <th colspan="2">A-5</th> <th colspan="3">A-6</th> <th colspan="2">A-7</th> <th colspan="3">A-1, A-2, A-3</th> <th colspan="3">A-4, A-5, A-6, A-7</th> </tr> <tr> <th>SYMBOL</th> <td colspan="2">[Symbol]</td> <td colspan="2">[Symbol]</td> <td colspan="3">[Symbol]</td> <td colspan="2">[Symbol]</td> <td colspan="2">[Symbol]</td> <td colspan="3">[Symbol]</td> <td colspan="2">[Symbol]</td> <td colspan="3">[Symbol]</td> <td colspan="3">[Symbol]</td> </tr> <tr> <th>% PASSING</th> <td colspan="2">10</td> <td colspan="2">40</td> <td colspan="3">200</td> <td colspan="2">10</td> <td colspan="2">40</td> <td colspan="3">200</td> <td colspan="2">10</td> <td colspan="3">40</td> <td colspan="3">200</td> </tr> <tr> <th>LIQUID LIMIT</th> <td colspan="2">6 MX</td> <td colspan="2">NP</td> <td colspan="3">40 MX, 41 MN, 40 MX, 41 MN, 40 MX, 41 MN</td> <td colspan="2">10 MX, 10 MN, 10 MX, 11 MN</td> <td colspan="2">10 MX, 12 MX, 15 MX, 16 MN</td> <td colspan="3">No MX</td> <td colspan="2">No MX</td> <td colspan="3">No MX</td> <td colspan="3">No MX</td> </tr> <tr> <th>GROUP INDEX</th> <td colspan="2">0</td> <td colspan="2">0</td> <td colspan="3">0</td> <td colspan="2">4 MX</td> <td colspan="2">8 MX</td> <td colspan="3">12 MX</td> <td colspan="2">16 MX</td> <td colspan="3">No MX</td> <td colspan="3">No MX</td> </tr> <tr> <th>USUAL TYPES OF MAJOR MATERIALS</th> <td colspan="2">STONE FRAGS, GRAVEL, AND SAND</td> <td colspan="2">FINE SAND</td> <td colspan="3">SILTY OR CLAYEY GRAVEL AND SAND</td> <td colspan="2">SILTY SOILS</td> <td colspan="3">CLAYEY SOILS</td> <td colspan="3">CLAYEY SOILS</td> <td colspan="3">CLAYEY SOILS</td> <td colspan="3">CLAYEY SOILS</td> </tr> <tr> <th>GENERATING AS A SUBGRADE</th> <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> <td colspan="3">UNSATURABLE</td> </tr> </thead> </table> <p>PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30</p>	GENERAL CLASS.	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ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.</p> <p>COMPRESSIBILITY</p> <p>SLIGHTLY COMPRESSIBLE MODERATELY COMPRESSIBLE HIGHLY COMPRESSIBLE</p> <p>LIQUID LIMIT LESS THAN 31 LIQUID LIMIT EQUAL TO 31-50 LIQUID LIMIT GREATER THAN 50</p> <p>PERCENTAGE OF MATERIAL</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <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</td> </tr> <tr> <td>LITTLE ORGANIC MATTER</td> <td>3 - 5%</td> <td>5 - 12%</td> <td>LITTLE</td> </tr> <tr> <td>MODERATELY ORGANIC</td> <td>5 - 10%</td> <td>12 - 20%</td> <td>SOME</td> </tr> <tr> <td>HIGHLY ORGANIC</td> <td>>10%</td> <td>>20%</td> <td>HIGHLY</td> </tr> </tbody> </table> <p>GROUND WATER</p> <p>▽ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING</p> <p>▽ STATIC WATER LEVEL AFTER 24 HOURS</p> <p>▽ PW PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA</p> <p>○ SPRING OR SEEP</p>		GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	HIGHLY ORGANIC	>10%	>20%	HIGHLY	<p>WEATHERING</p> <p>FRESH - 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 ALL 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>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 GROUDED OR GOUGED 0.05 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.</p> <p>SOFT - CAN BE GROUDED 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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<p>BENCH MARK: BL-2 AT -L- STATION 28+32.35, 41.13' RT</p> <p style="text-align: right;">ELEVATION: 112.22 FT.</p>			<p>NOTES:</p> <p>-</p>																																																																																																																																																																																																							



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

December 8, 2006

STATE PROJECT: 34866.1.1 (U-2810)
F.A. PROJECT: STP-1003 (22)
COUNTY: Cumberland

DESCRIPTION: Bridge No. 102 on -L- (SR 1003, Camden Road) over Little Rockfish Creek at
-L- Station 27+70.00

SUBJECT: Geotechnical Report – Structure Inventory

Project Description

A four-span bridge, 231.1 feet in length with a 90° skew, is proposed on -L- (SR 1003, Camden Road) over Little Rockfish Creek. The project is located in southwestern Cumberland County between Fayetteville and Hope Mills.

The subsurface investigation was conducted during October and November of 2006 using an ATV-mounted CME-45B drill machine. Borings EB1-B and B3-A were drilled during the roadway investigation performed by the Raleigh Field Office of the Geotechnical Engineering Unit in March 2005. Standard Penetration Test borings were performed at each of the proposed bent locations. All borings were advanced using rotary with bentonite drilling fluid. Representative soil samples were obtained for visual classification in the field and selected samples were submitted to the Materials and Tests Unit for laboratory analysis.

Physiography and Geology

The project is located in the flat to gently rolling terrain of the Coastal Plain Physiographic Province. The area consists of a mixture of woods and scattered homes. Geologically, sands and clays from the Cape Fear Formation underlie the site. The Coastal Plain soils were deposited by multiple transgressions and regressions of sea level during the Cretaceous period.

Soil Properties

Soils encountered at the project site include roadway embankment, alluvial soils and Coastal Plain materials.

Roadway embankment soils were encountered at both end bent locations and at bent B3-B. The embankment soils range in thickness from 3.0 to 7.5 feet. These soils consist of tan-brown to brown and

gray, very loose to loose, dry to moist, silty and fine sand (A-2-4, A-3). Alluvial soils underlie roadway embankment soils.

Alluvial soils range from 2.0 to 10.9 feet in thickness. These soils predominantly consist of white to brown and gray, very loose to medium dense, wet, coarse and fine sand (A-1-b, A-3). The alluvial soils were deposited on Coastal Plain soils.

Coastal Plain soils of the Cape Fear Formation were encountered in all borings. The soils are comprised of dark gray to blue-gray, moist, loose to very dense, coarse sand, silty and clayey sand (A-1-b, A-2-4, A-2-6, A-2-7). Dark gray to blue-gray and red, moist, stiff to hard, sandy silt, sandy and silty clay (A-4, A-6, A-7) were also present.

Groundwater

Groundwater was encountered at all bent locations. The groundwater elevation ranges from 101.5 feet to 105.8 feet. The water in Little Rockfish Creek was measured at elevation of 101.9 feet in September 2004.

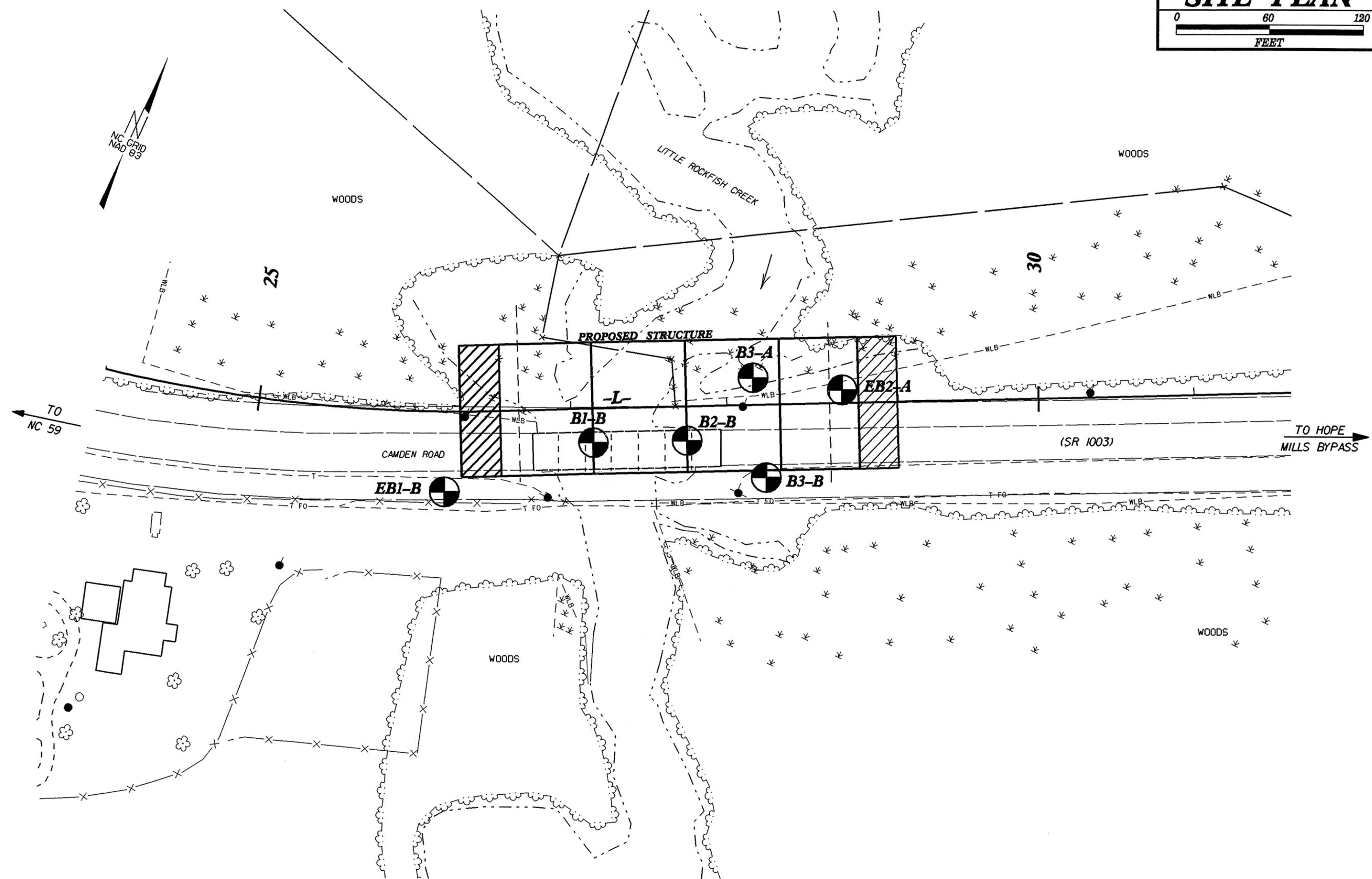
Notice

This Geotechnical foundation report is based on the Preliminary General Drawing dated July 2006 and the Hydraulics Bridge Report dated October 18, 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.

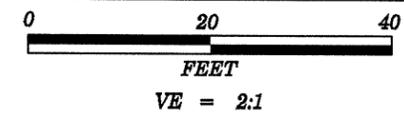
Prepared by,

A handwritten signature in black ink, appearing to read "Joseph I. Milkovits, Jr.", written over a white background.

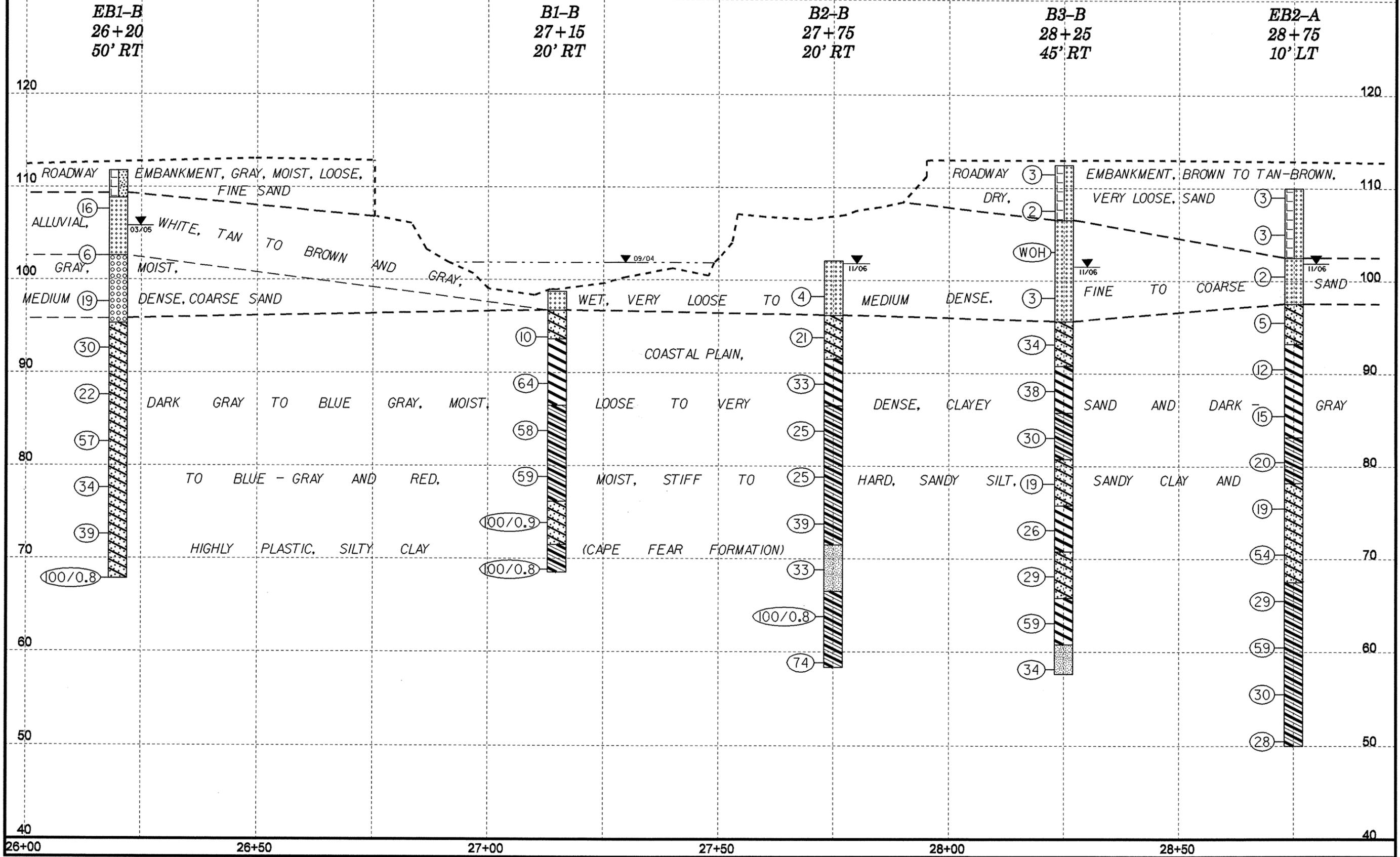
Joseph I. Milkovits, Jr.
Project Engineering Geologist

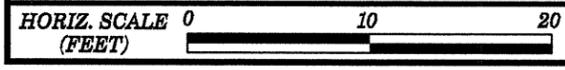
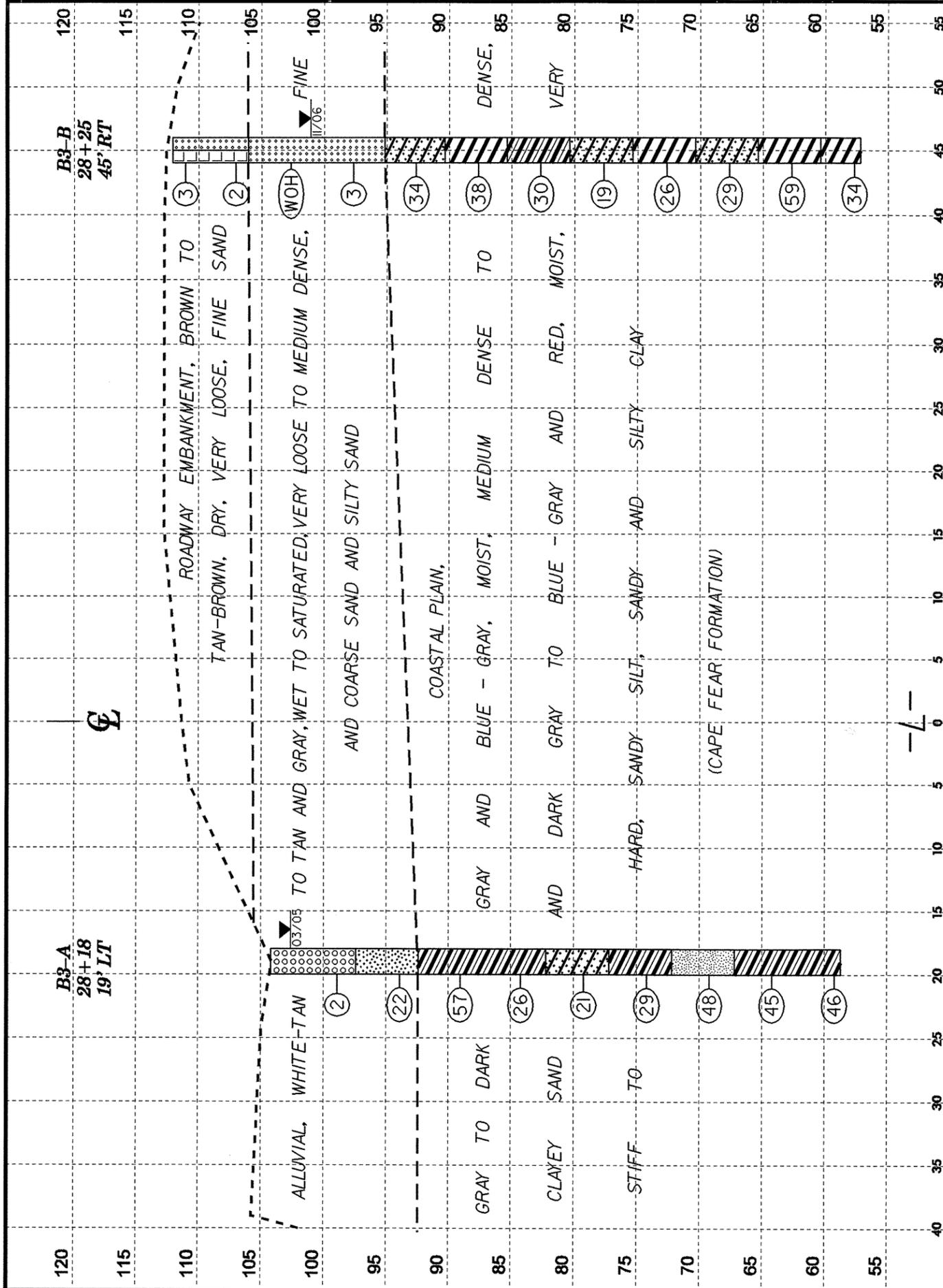


SKEW = 90°



PROJECT REFERENCE NO.	SHEET
34866.1.1 (U-2810)	5
PROFILE BORINGS PROJECTED ALONG -L-	





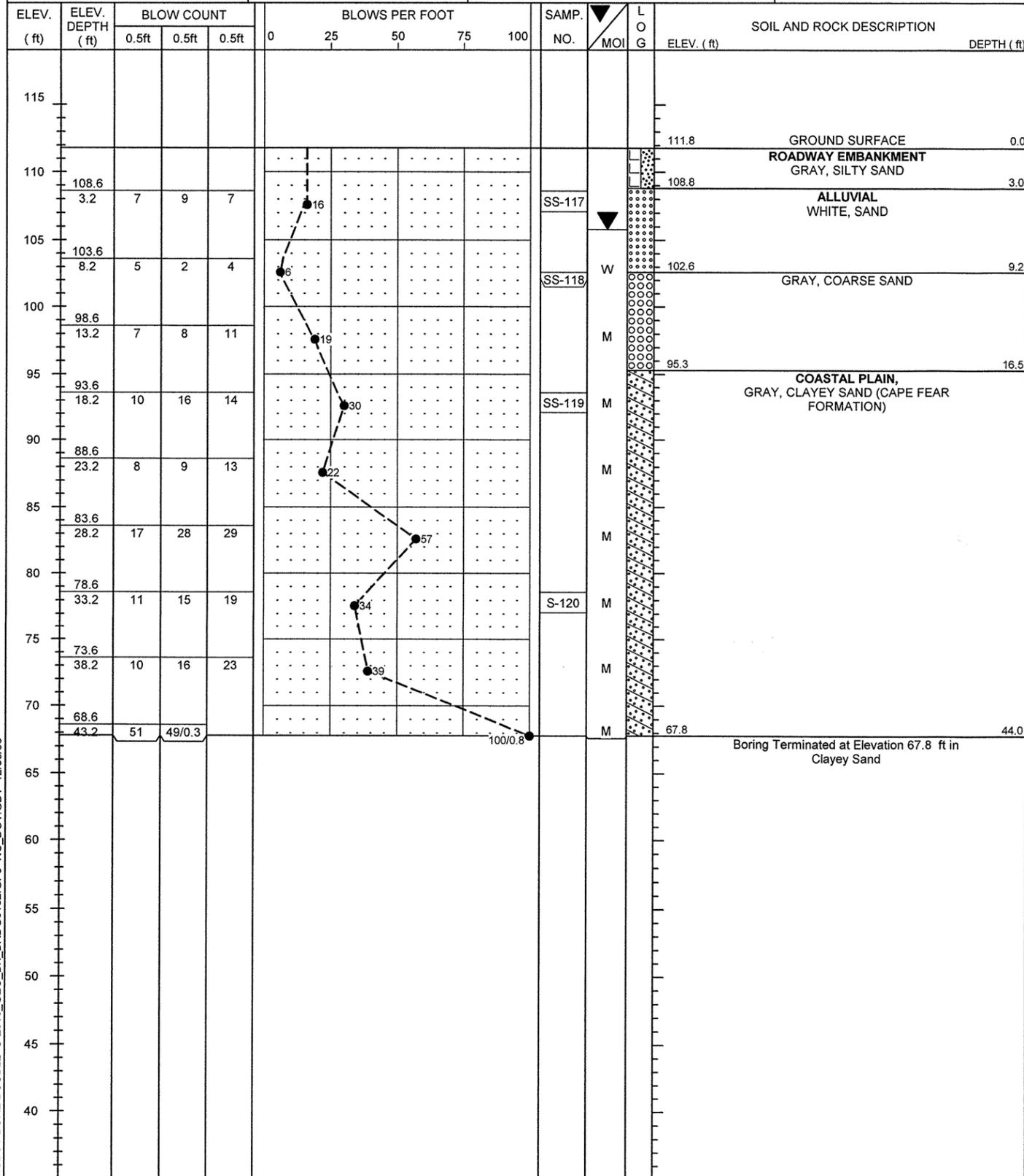
VE = 1:1

CROSS SECTION THROUGH BENT 3

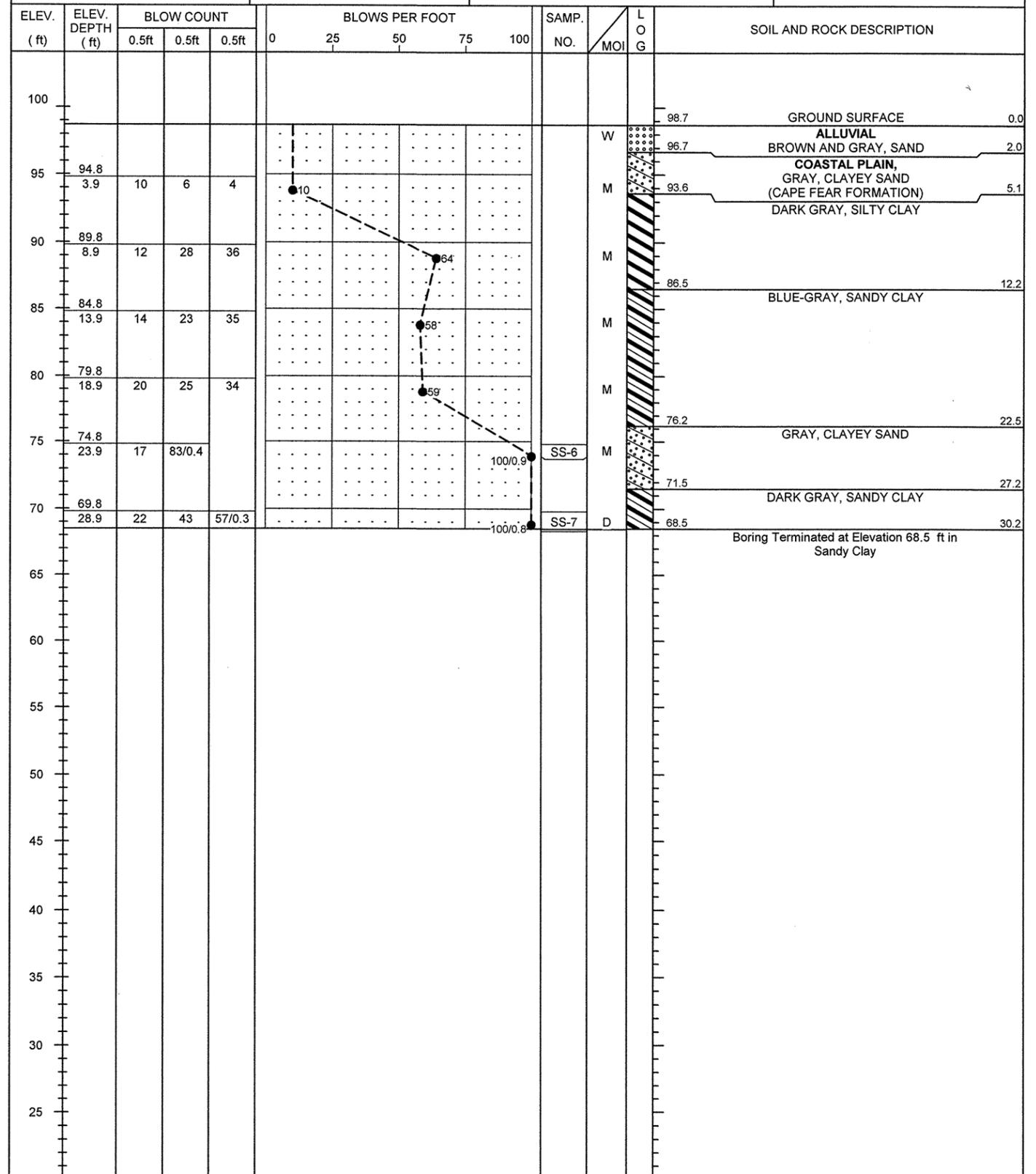
--L--



PROJECT NO. 34866.1.1	ID. U-2810	COUNTY CUMBERLAND	GEOLOGIST Mohs, N. D.
SITE DESCRIPTION BRIDGE NO. 102 ON -L- (CAMDEN RD. , SR 1003) OVER LITTLE ROCKFISH CREEK			GROUND WTR (ft)
BORING NO. EB1-B	STATION 26+20	OFFSET 50 ft RT	ALIGNMENT -L-
COLLAR ELEV. 111.8 ft	TOTAL DEPTH 44.0 ft	NORTHING 449,819	EASTING 2,011,864
DRILL MACHINE CME-45B	DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
START DATE 03/08/05	COMP. DATE 03/08/05	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

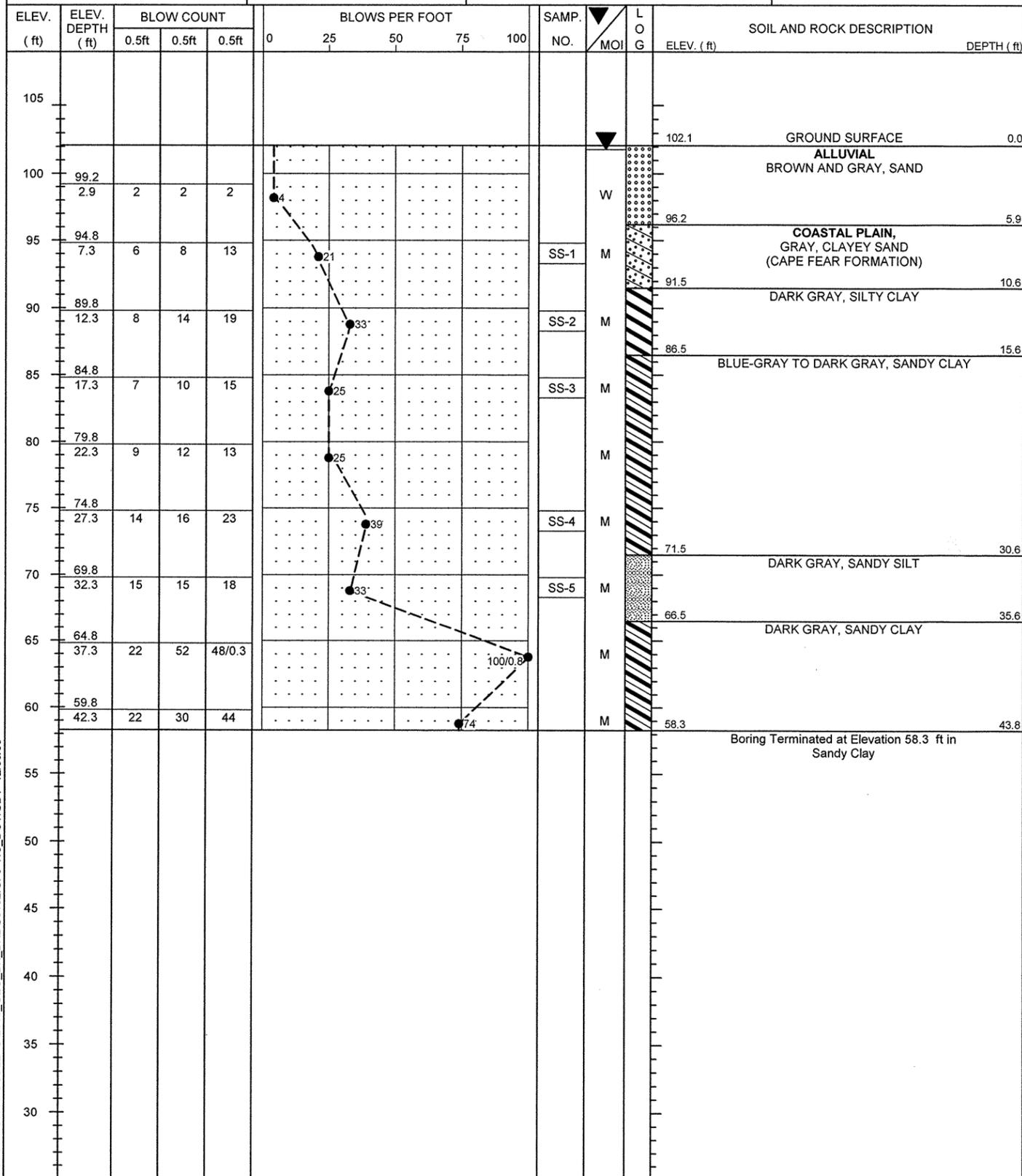


PROJECT NO. 34866.1.1	ID. U-2810	COUNTY CUMBERLAND	GEOLOGIST Czajka, C. D.
SITE DESCRIPTION BRIDGE NO. 102 ON -L- (CAMDEN RD. , SR 1003) OVER LITTLE ROCKFISH CREEK			GROUND WTR (ft)
BORING NO. B1-B	STATION 27+15	OFFSET 20 ft RT	ALIGNMENT -L-
COLLAR ELEV. 98.7 ft	TOTAL DEPTH 30.2 ft	NORTHING 449,889	EASTING 2,011,937
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 11/01/06	COMP. DATE 11/01/06	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

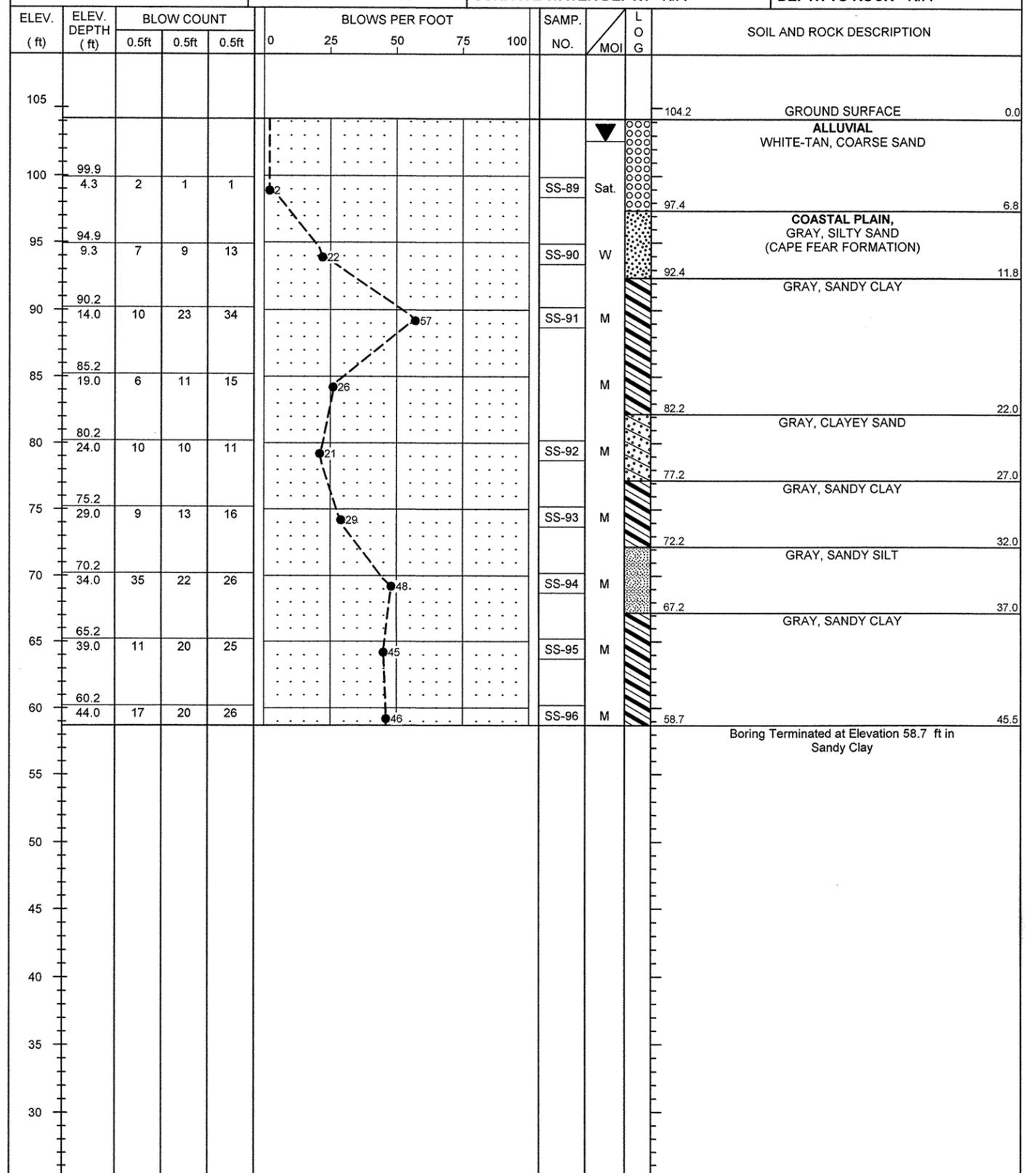


NCDOT BORE DOUBLE U-2810_GEO_BH_BRDGO102.GPJ NC_DOT_GDT 12/08/06

PROJECT NO. 34866.1.1	ID. U-2810	COUNTY CUMBERLAND	GEOLOGIST Czajka, C. D.
SITE DESCRIPTION BRIDGE NO. 102 ON -L- (CAMDEN RD., SR 1003) OVER LITTLE ROCKFISH CREEK			GROUND WTR (ft)
BORING NO. B2-B	STATION 27+75	OFFSET 20 ft RT	ALIGNMENT -L-
COLLAR ELEV. 102.1 ft	TOTAL DEPTH 43.8 ft	NORTHING 449,916	EASTING 2,011,991
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 10/31/06	COMP. DATE 10/31/06	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A



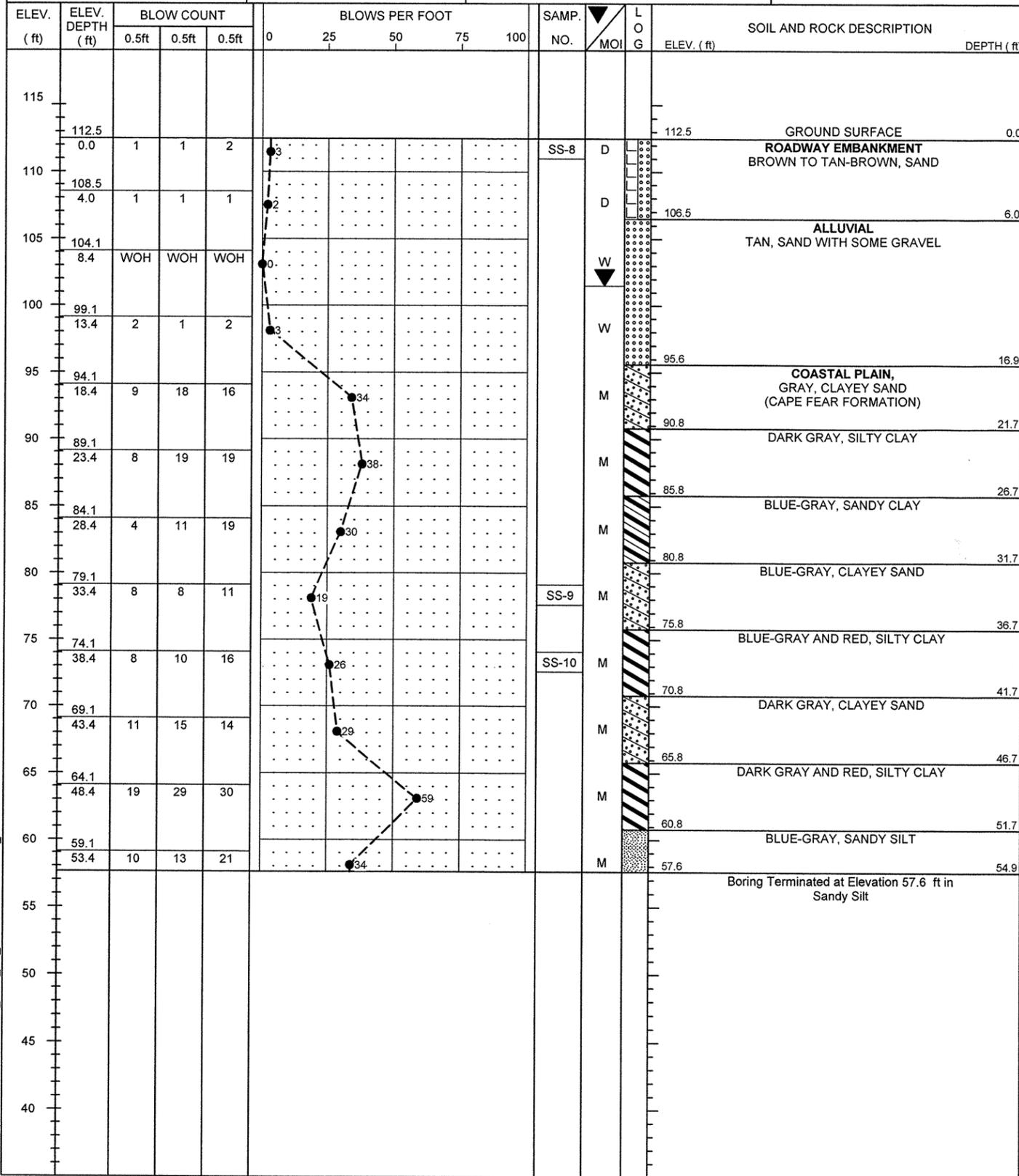
PROJECT NO. 34866.1.1	ID. U-2810	COUNTY CUMBERLAND	GEOLOGIST Mohs, N. D.
SITE DESCRIPTION BRIDGE NO. 102 ON -L- (CAMDEN RD., SR 1003) OVER LITTLE ROCKFISH CREEK			GROUND WTR (ft)
BORING NO. B3-A	STATION 28+18	OFFSET 19 ft LT	ALIGNMENT -L-
COLLAR ELEV. 104.2 ft	TOTAL DEPTH 45.5 ft	NORTHING 449,970	EASTING 2,012,011
DRILL MACHINE CME-45B	DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
START DATE 03/02/05	COMP. DATE 03/02/05	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A



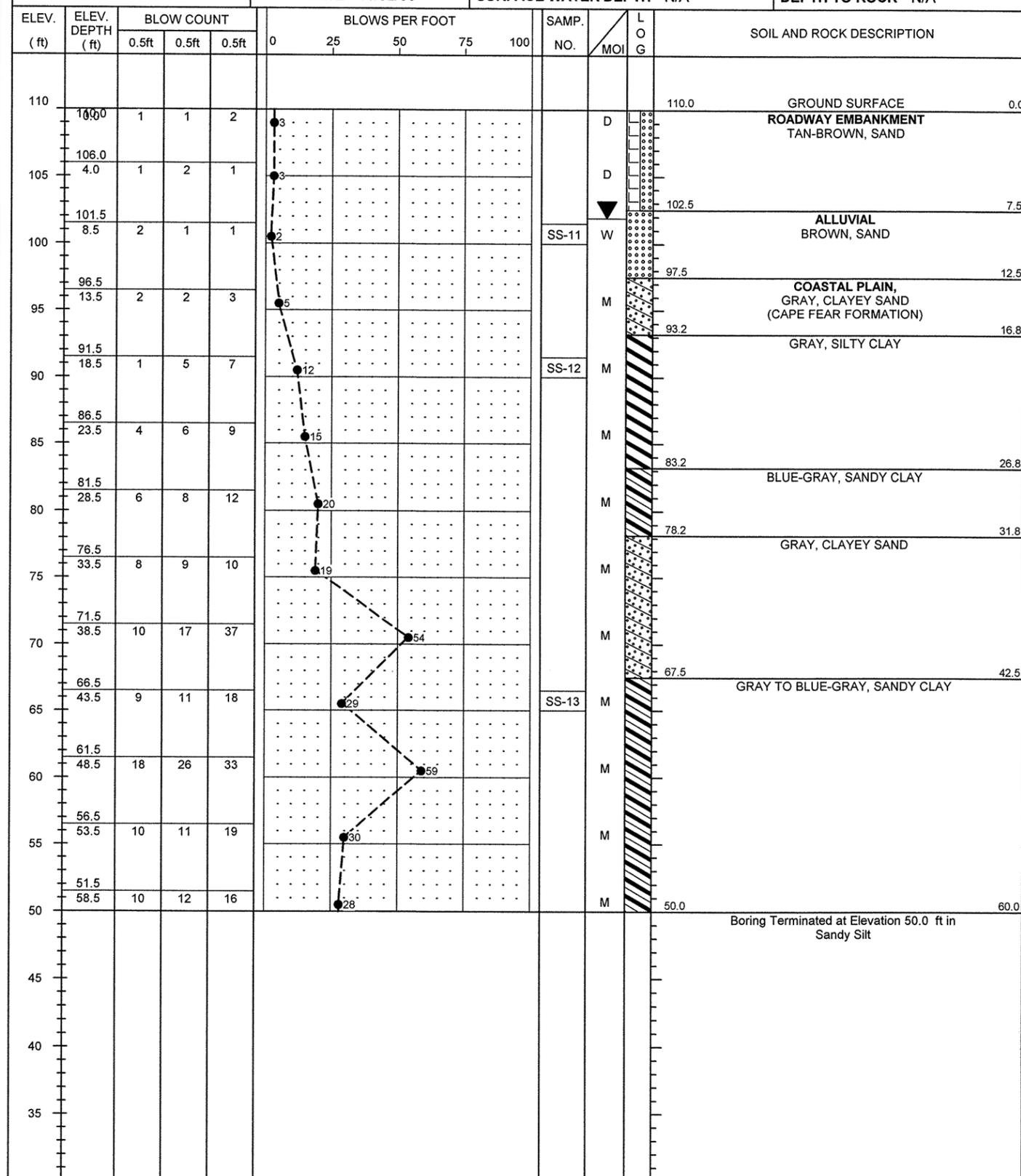
NC DOT BORE DOUBLE U-2810_GEO_BH_BRDG0102.GPJ NC_DOT_GDT_12/08/06



PROJECT NO. 34866.1.1	ID. U-2810	COUNTY CUMBERLAND	GEOLOGIST Czajka, C. D.
SITE DESCRIPTION BRIDGE NO. 102 ON -L- (CAMDEN RD., SR 1003) OVER LITTLE ROCKFISH CREEK			GROUND WTR (ft)
BORING NO. B3-B	STATION 28+25	OFFSET 45 ft RT	ALIGNMENT -L-
COLLAR ELEV. 112.5 ft	TOTAL DEPTH 54.9 ft	NORTHING 449,916	EASTING 2,012,047
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 11/01/06	COMP. DATE 11/01/06	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A



PROJECT NO. 34866.1.1	ID. U-2810	COUNTY CUMBERLAND	GEOLOGIST Czajka, C. D.
SITE DESCRIPTION BRIDGE NO. 102 ON -L- (CAMDEN RD., SR 1003) OVER LITTLE ROCKFISH CREEK			GROUND WTR (ft)
BORING NO. EB2-A	STATION 28+75	OFFSET 10 ft LT	ALIGNMENT -L-
COLLAR ELEV. 110.0 ft	TOTAL DEPTH 60.0 ft	NORTHING 449,988	EASTING 2,012,066
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 11/02/06	COMP. DATE 11/02/06	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A



NCDOT BORE DOUBLE U-2810_GEO_BH_BRDG0102.GPJ_NC_DOT_GDT 12/08/06

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-117	50 RT	26+20	3.2-4.7	A-3(0)	22	NP	45.9	48.6	1.5	4.0	92	73	8	-	-
SS-118	50 RT	26+20	9.2-9.7	A-1-b(0)	40	NP	65.3	18.2	10.5	6.1	96	50	18	-	-
SS-119	50 RT	26+20	18.2-19.7	A-2-7(1)	44	21	59.9	17.0	11.0	12.1	98	60	24	-	-
SS-120	50 RT	26+20	33.2-34.7	A-2-7(0)	46	20	70.0	12.7	8.2	9.1	95	45	19	-	-

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-6	20' RT	27+15	23.9-24.1	A-2-6(0)	37	13	59.2	20.3	8.4	12.2	97	57	22	-	-
SS-7	20' RT	27+15	28.9-29.1	A-6(3)	28	11	27.2	29.4	23.2	20.3	100	84	51	-	-

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-1	20' RT	27+75	7.3-7.5	A-2-7(1)	42	20	62.6	19.7	9.6	8.1	96	57	20	-	-
SS-2	20' RT	27+75	12.3-12.5	A-7-6(35)	64	42	11.3	12.8	15.1	60.8	100	94	79	-	-
SS-3	20' RT	27+75	17.3-17.5	A-6(2)	39	17	46.8	19.3	19.8	14.2	99	71	37	-	-
SS-4	20' RT	27+75	27.3-27.5	A-6(3)	35	13	19.9	42.8	29.3	8.1	100	88	49	-	-
SS-5	20' RT	27+75	32.3-32.5	A-4(0)	21	9	34.7	33.6	19.6	12.2	100	81	38	-	-

B3-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		
S-89	19 LT	28+18	4.3-5.8	A-1-b(0)	25	NP	84.6	14.7	0.7	0.0	91	35	1	-	-
S-90	19 LT	28+18	9.3-10.8	A-2-5(0)	43	NP	65.9	16.8	12.3	5.0	97	57	18	-	-
S-91	19 LT	28+18	14.0-15.5	A-6(7)	35	18	26.1	21.1	24.6	28.1	100	85	57	-	-
S-92	19 LT	28+18	24.0-25.5	A-2-6(0)	38	18	64.6	16.1	10.2	9.1	96	53	20	-	-
S-93	19 LT	28+18	29.0-30.5	A-6(5)	38	17	24.7	30.1	31.0	14.2	97	82	49	-	-
S-94	19 LT	28+18	34.0-35.5	A-4(0)	19	6	33.8	34.1	22.1	10.1	100	81	38	-	-
S-95	19 LT	28+18	39.0-40.5	A-6(10)	39	17	16.6	20.0	37.1	26.3	100	90	69	-	-
S-96	19 LT	28+18	44.0-45.5	A-6(1)	35	13	34.4	33.6	26.0	6.0	100	82	36	-	-

B3-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	45' RT	28+25	0.0-0.2	A-3(0)	22	NP	44.6	48.6	2.7	4.1	98	73	9	-	-
SS-9	45' RT	28+25	33.4-33.6	A-2-6(0)	36	14	64.0	21.7	8.2	6.1	93	52	17	-	-
SS-10	45' RT	28+25	38.4-38.6	A-7-5(12)	51	19	17.2	27.8	36.8	18.2	100	89	64	-	-

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-11	10' LT	28+75	8.5-8.7	A-3(0)	25	NP	24.4	70.0	2.5	3.0	100	95	8	-	-
SS-12	10' LT	28+75	18.5-18.7	A-7-6(21)	52	33	18.0	18.0	15.3	48.6	99	89	68	-	-
SS-13	10' LT	28+75	43.5-43.7	A-6(4)	30	15	25.1	33.4	27.3	14.2	100	85	49	-	-



**FIELD
 SCOUR REPORT**

WBS: 34866.1.1 TIP: U-2810 COUNTY: Cumberland

DESCRIPTION(1): Bridge No. 102 on -L- (SR 1003, Camden Creek) over Little Rockfish Creek

EXISTING BRIDGE

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

Bridge No.: 102 Length: 120 Total Bents: 8 Bents in Channel: 3 Bents in Floodplain: 5
 Foundation Type: Timber piles

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: Minor Scour - pocket at EB1

Interior Bents: Bank material scoured out at B5 & B7

Channel Bed: Minor contraction scour

Channel Bank: Scour pockets along bank. Undercut banks with exposed tree roots.

EXISTING SCOUR PROTECTION

Type(3): None

Extent(4): N/A

Effectiveness(5): N/A

Obstructions(6): Sand bar and debris pile between Bents 4 & 5

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): (SS-11) Loose, Brown and gray sand (A-3)

Channel Bank Material(8): (SS-89) Very loose, white-tan, coarse sand (A-1-b)

Channel Bank Cover(9): Woods, shrubs, grass, large and small trees

Floodplain Width(10): Approximately 100-200 feet

Floodplain Cover(11): Woods, shrubs, grass

Stream is(12): Aggrading _____ Degrading Static _____

Channel Migration Tendency(13): Slight tendency to the west

Observations and Other Comments: N/A

DESIGN SCOUR ELEVATIONS(14)

Feet Meters _____

100 yr	100 yr	100 yr								
89.0	89.0	97.8								
B1	B2	B3								

Comparison of DSE to Hydraulics Unit theoretical scour:
 No scour is anticipated beyond the end bents. The Geotechnical Engineering Unit agrees with the predicted scour in the bridge Survey and Hydraulic Design Report dated 10/18/06 for bents one and three. Interior bent two is lowered due to migration tendencies of Little Rockfish Creek.

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

Bed or Bank										
Sample No.										
Retained #4										
Passed #10										
Passed #40										
Passed #200										
Coarse Sand										
Fine Sand										
Silt										
Clay										
LL										
PI										
AASHTO										
Station										
Offset										
Depth										

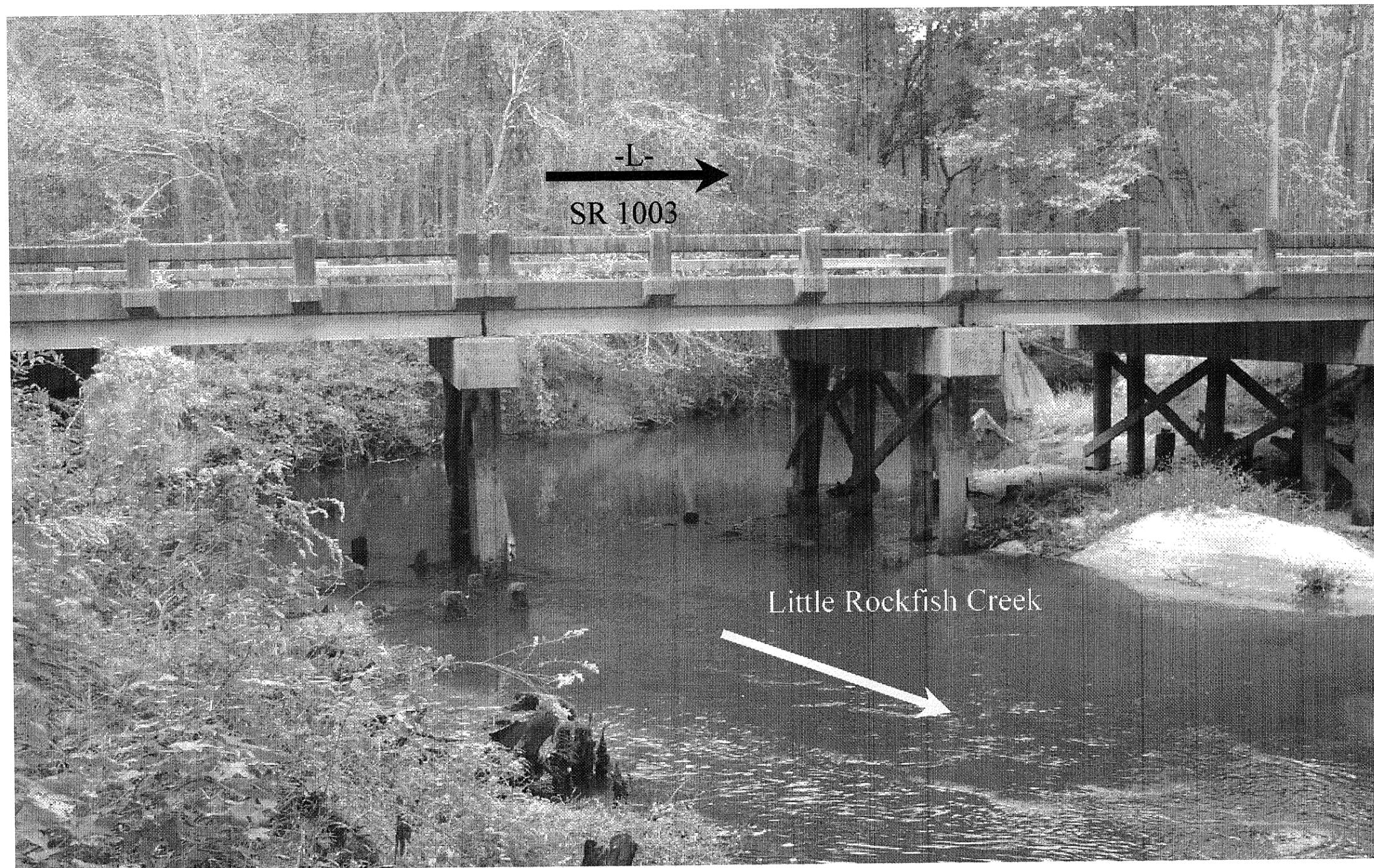
See Sheet 10,
 "Soil Test Results",
 for samples:
 SS-11
 SS-89

Reported by: Joseph I. Milkovits, Jr.
 for: Joseph I. Milkovits, Jr.

Date: 10/24/2006

SITE PHOTOGRAPH

Bridge No. 102 on SR 1003 over Little Rockfish Creek



STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	34866.1.1(U-2810)	1	13

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

STRUCTURE
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 34866.1.1 (U-2810) F.A. PROJ. STP-1003(22)
COUNTY CUMBERLAND
PROJECT DESCRIPTION FAYETTEVILLE - SR 1003 (CAMDEN RD.)
FROM NC 59 (HOPE MILLS RD.) TO NORTH OF SR 1007
(OWEN RD.)
SITE DESCRIPTION BRIDGE NO. 120 ON -L- (CAMDEN RD.,
SR 1003) OVER BUCKHEAD CREEK

CONTENTS

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

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.

ID: U-2810A

PROJECT: 34866.1.1

St # 2

PERSONNEL
C.D. CZAJKA

W.N. CHERRY

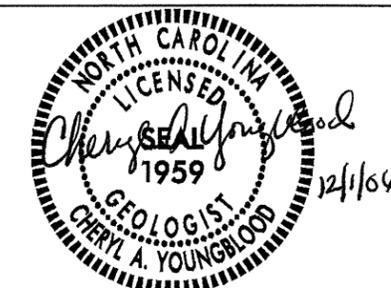
R.E. SMITH

INVESTIGATED BY **G.A. YOUNGBLOOD**

CHECKED BY **N.T. ROBERSON**

SUBMITTED BY **N.T. ROBERSON**

DATE **DECEMBER 2006**



DRAWN BY: **T.T. WALKER/C.D. CZAJKA**

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

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

PROJECT REFERENCE NO. 34866.1(U-2810)	SHEET NO. 2
--	----------------

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 ASHTO 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>VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGH PLASTIC, A-7-6</p>		<p>WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED)</p> <p>GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.</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.</p> <p>ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p>		<p>ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.</p> <p>AQUIFER - A WATER BEARING FORMATION OR STRATA.</p> <p>ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.</p> <p>ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.</p> <p>ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.</p> <p>CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.</p> <p>COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.</p> <p>CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.</p> <p>DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.</p> <p>DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.</p> <p>DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.</p> <p>FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.</p> <p>FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.</p> <p>FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.</p> <p>FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.</p> <p>FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.</p> <p>JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.</p> <p>LEDGE - A SELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.</p> <p>LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.</p> <p>MOTTLED (MOT.) - IRRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.</p> <p>PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.</p> <p>RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.</p> <p>ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.</p> <p>SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.</p> <p>SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.</p> <p>SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.</p> <p>STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (IN OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.</p> <p>STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.</p> <p>STRATA ROCK QUALITY DESIGNATION (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.</p> <p>SURFACE SOIL (SS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>																																																																																																																																								
<p>SOIL LEGEND AND AASHTO CLASSIFICATION</p> <table border="1"> <tr> <th>GENERAL CLASS.</th> <th colspan="4">GRANULAR MATERIALS (≤ 35% PASSING #200)</th> <th colspan="4">SILT-CLAY MATERIALS (> 35% PASSING #200)</th> <th colspan="4">ORGANIC MATERIALS</th> </tr> <tr> <th>GROUP CLASS.</th> <th>A-1</th> <th>A-3</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-4, A-5</th> <th>A-6, A-7</th> </tr> <tr> <th>SYMBOL</th> <td></td> </tr> <tr> <th>% PASSING</th> <td>50 MX 30 MX 15 MX</td> <td>50 MX 25 MX 10 MX</td> <td>50 MX 35 MX 15 MX</td> </tr> <tr> <th>LIQUID LIMIT</th> <td>6 MX</td> <td>NP</td> <td>40 MX 10 MX</td> <td>41 MN 11 MN</td> </tr> <tr> <th>PLASTIC INDEX</th> <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> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <th>GROUP INDEX</th> <td></td> </tr> <tr> <th>USUAL TYPES OF MAJOR MATERIALS</th> <td>STONE FRAGS, GRAVEL, AND SAND</td> <td>FINE SAND</td> <td>SILTY OR CLAYED GRAVEL AND SAND</td> <td>SILTY SOILS</td> <td>CLAYEY SOILS</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <th>GENERATING AS A SUBGRADE</th> <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> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </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-2-4	A-2-5	A-2-6	A-2-7	A-4	A-5	A-6	A-7	A-1, A-2	A-4, A-5	A-6, A-7	SYMBOL															% PASSING	50 MX 30 MX 15 MX	50 MX 25 MX 10 MX	50 MX 35 MX 15 MX	LIQUID LIMIT	6 MX	NP	40 MX 10 MX	41 MN 11 MN	PLASTIC INDEX	0	0	4 MX	8 MX	12 MX	16 MX	No MX								GROUP INDEX															USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS, GRAVEL, AND SAND	FINE SAND	SILTY OR CLAYED GRAVEL AND SAND	SILTY SOILS	CLAYEY SOILS										GENERATING AS A SUBGRADE	EXCELLENT TO GOOD			FAIR TO POOR			FAIR TO POOR	POOR	UNSATURABLE						<p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.</p>		<p>WEATHERED ROCK (WR)</p> <p>CRYSTALLINE ROCK (CR)</p> <p>NON-CRYSTALLINE ROCK (NCR)</p> <p>COASTAL PLAIN SEDIMENTARY ROCK (CP)</p>		<p>WEATHERING</p> <p>FRESH</p> <p>VERY SLIGHT (V SL.)</p> <p>SLIGHT (SL.)</p> <p>MODERATE (MOD.)</p> <p>MODERATELY SEVERE (MOD. SEV.)</p> <p>SEVERE (SEV.)</p> <p>VERY SEVERE (V SEV.)</p> <p>COMPLETE</p>		<p>ROCK HARDNESS</p> <p>VERY HARD</p> <p>HARD</p> <p>MODERATELY HARD</p> <p>MEDIUM HARD</p> <p>SOFT</p> <p>VERY SOFT</p>																						
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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

December 1, 2006

STATE PROJECT: 34866.1.1 (U-2810)
F.A. PROJECT: STP-1003 (22)
COUNTY: Cumberland
DESCRIPTION: Bridge No. 120 on -L- (SR 1003, Camden Road) over Buckhead Creek
SUBJECT: Geotechnical Report – Structure Inventory

Project Description

This project consists of a 105.0 foot long, two span bridge to be constructed over Buckhead Creek in approximately the same location as the existing structure. Proposed span lengths are 45.0 feet and 60.0 feet and the bridge will be on an 85° skew. The project is located in southwestern Cumberland County between City of Fayetteville and Town of Hope Mills.

The subsurface investigation was conducted during October and November of 2006 using an ATV-mounted CME-45B drill machine. Standard Penetration Test borings were performed at each of the proposed bent locations. All borings were terminated between elevations 53.8 feet and 63.8 feet. 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 flat to gently rolling terrain of the Coastal Plain Physiographic province. The land use in the area consists of residential homes, a mobile home park and woods. Geologically, the site is underlain by Coastal Plain soils of the Cape Fear Formation. The Coastal Plain soils were derived from the multiple transgression and regression of sea level during the Cretaceous age.

Soil Properties

Soils encountered at the project site include roadway embankment, alluvial soils and Coastal Plain materials.

Roadway embankment soils were encountered in borings EB1-B, B1-B and EB2-B. The embankment soils range in thickness from 1.7 to 2.5 feet. These soils consist of red-brown, moist, loose, fine sand (A-3). Alluvial soils underlie roadway embankment soils.

Alluvial soils range from 13.0 to 17.3 feet in thickness. These soils predominantly consist of tan, gray to dark gray, moist to wet, very loose to dense, silty, fine and coarse sand (A-2-4, A-3, A-1-b). Other soils present consist of gray, moist, medium stiff, sandy clay (A-6). The alluvial soils were deposited on Coastal Plain soils at each bent location.

Coastal Plain material consists of Cape Fear Formation soils that are light gray to blue-gray, moist, soft to hard, sandy and silty clay (A-6, A-7-6) with lesser amounts of gray to dark gray, moist, medium dense to dense silty and clayey sand (A-2-4, A-2-6, A-2-7).

Groundwater

Groundwater was encountered at all bent locations. The groundwater elevation ranges from 106.5 feet to 110.3 feet. The water in Buckhead Creek was measured at elevation 106.8 feet in May, 2006.

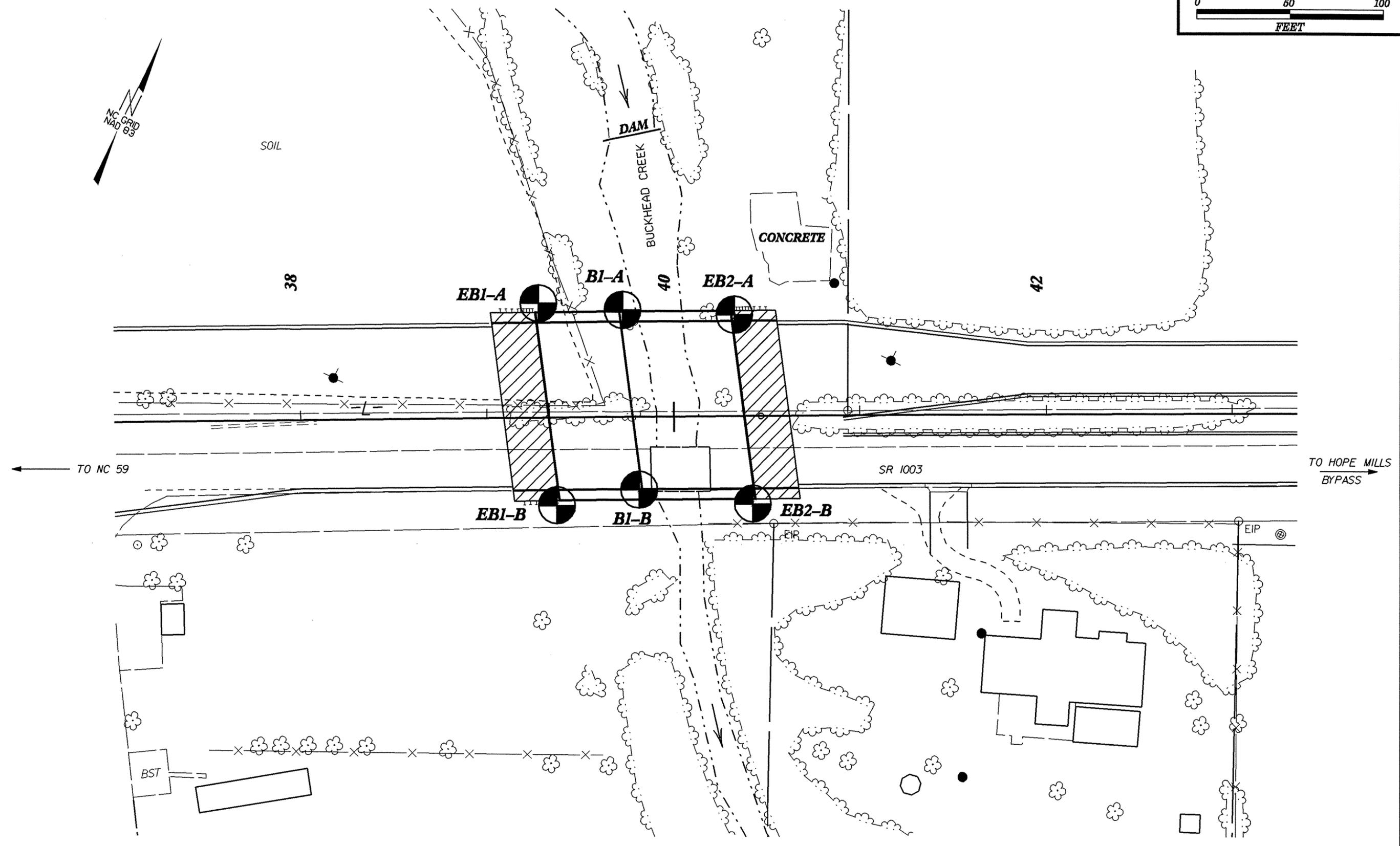
Notice

This Geotechnical foundation report is based on the Preliminary General Drawing dated August, 2006 and the Hydraulics Bridge Report dated May 3, 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.

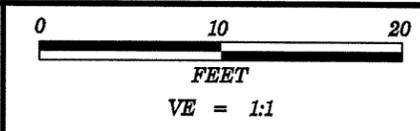
Prepared by,

Handwritten signature of Cheryl A. Youngblood in cursive.

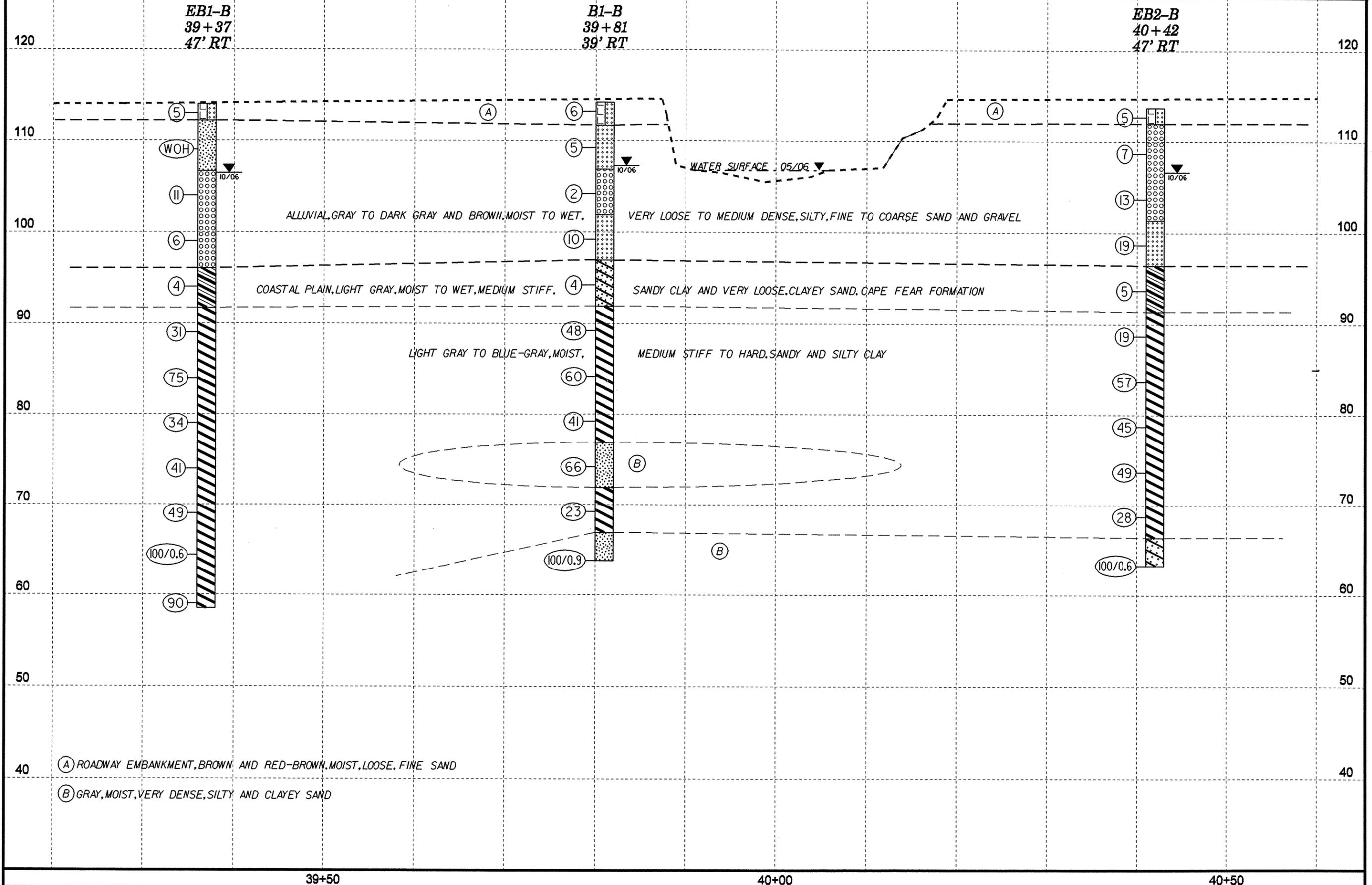
Cheryl A. Youngblood, L.G.
Project Geological Engineer



SKEW = 85°



PROJECT REFERENCE NO.	SHEET
34866.1.1(U-2810)	5
PROFILE BORINGS PROJECTED ALONG -L-	



EB1-B
39+37
47' RT

B1-B
39+81
39' RT

EB2-B
40+42
47' RT

120

120

110

110

100

100

90

90

80

80

70

70

60

60

50

50

40

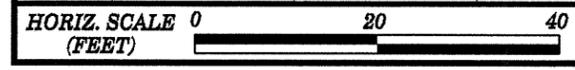
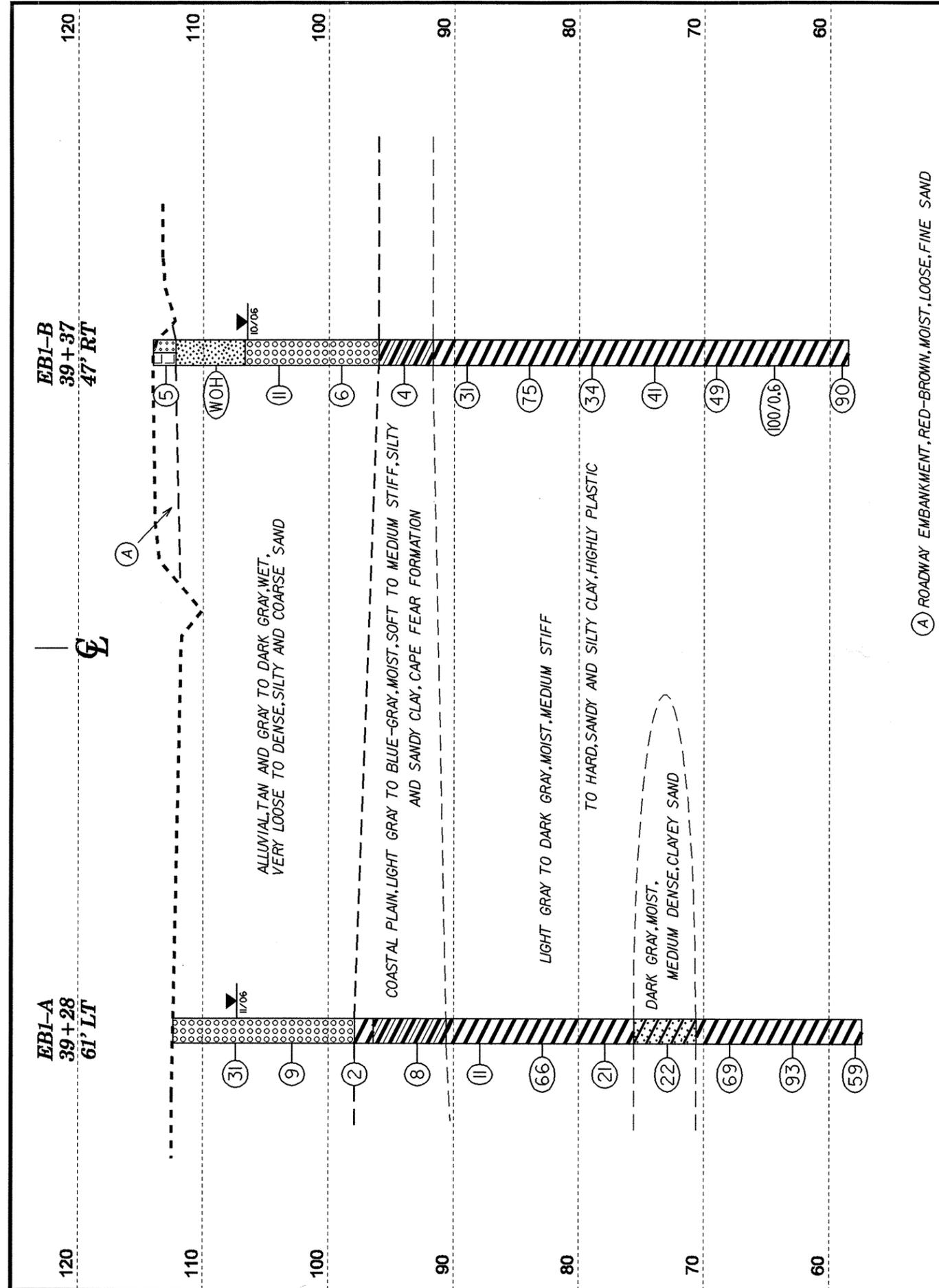
40

39+50

40+00

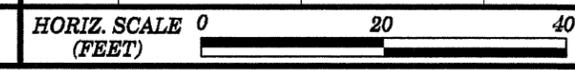
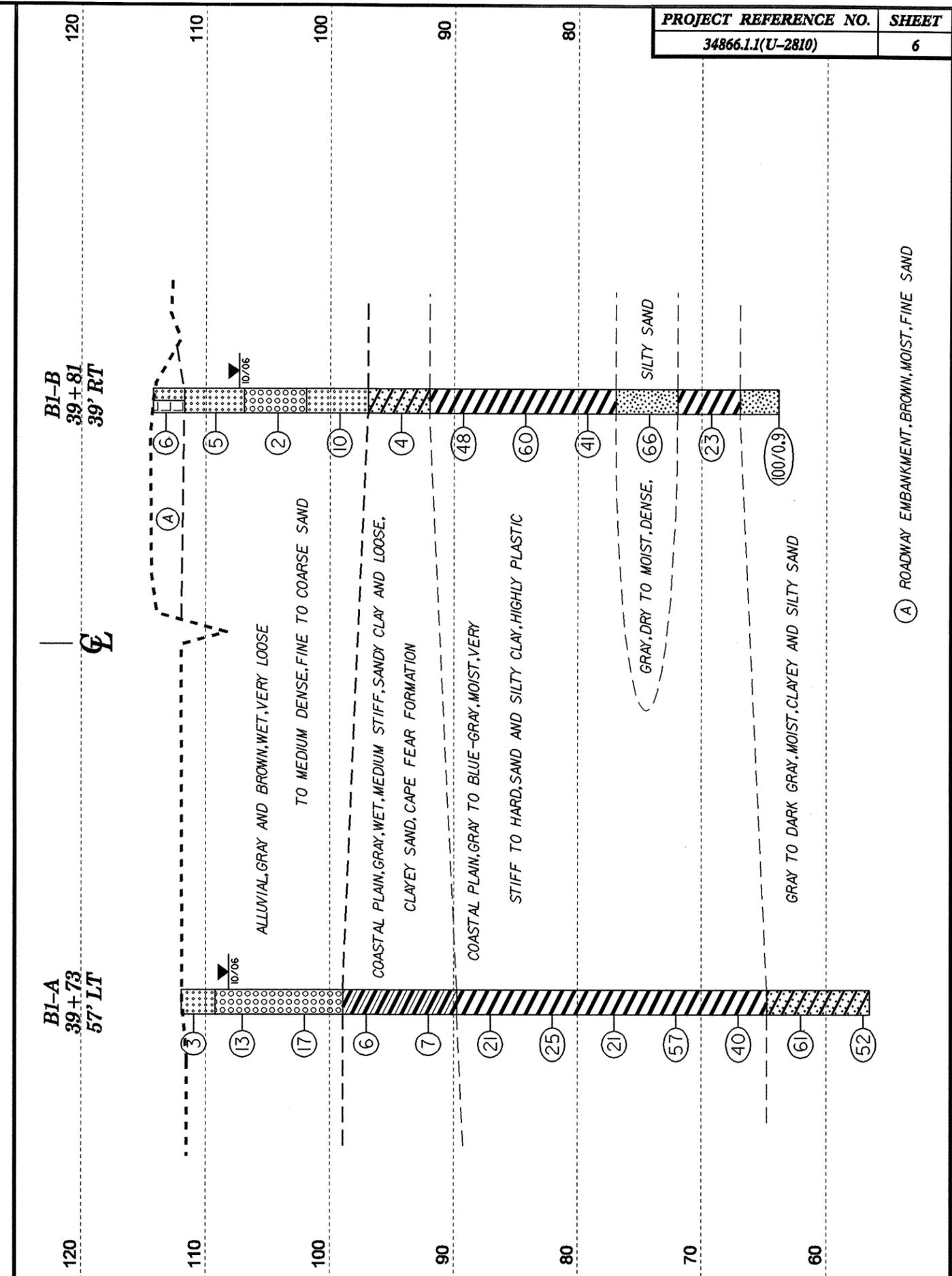
40+50

- (A) ROADWAY EMBANKMENT, BROWN AND RED-BROWN, MOIST, LOOSE, FINE SAND
- (B) GRAY, MOIST, VERY DENSE, SILTY AND CLAYEY SAND



VE = 2:1

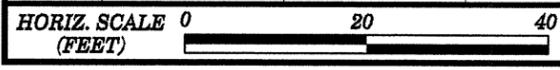
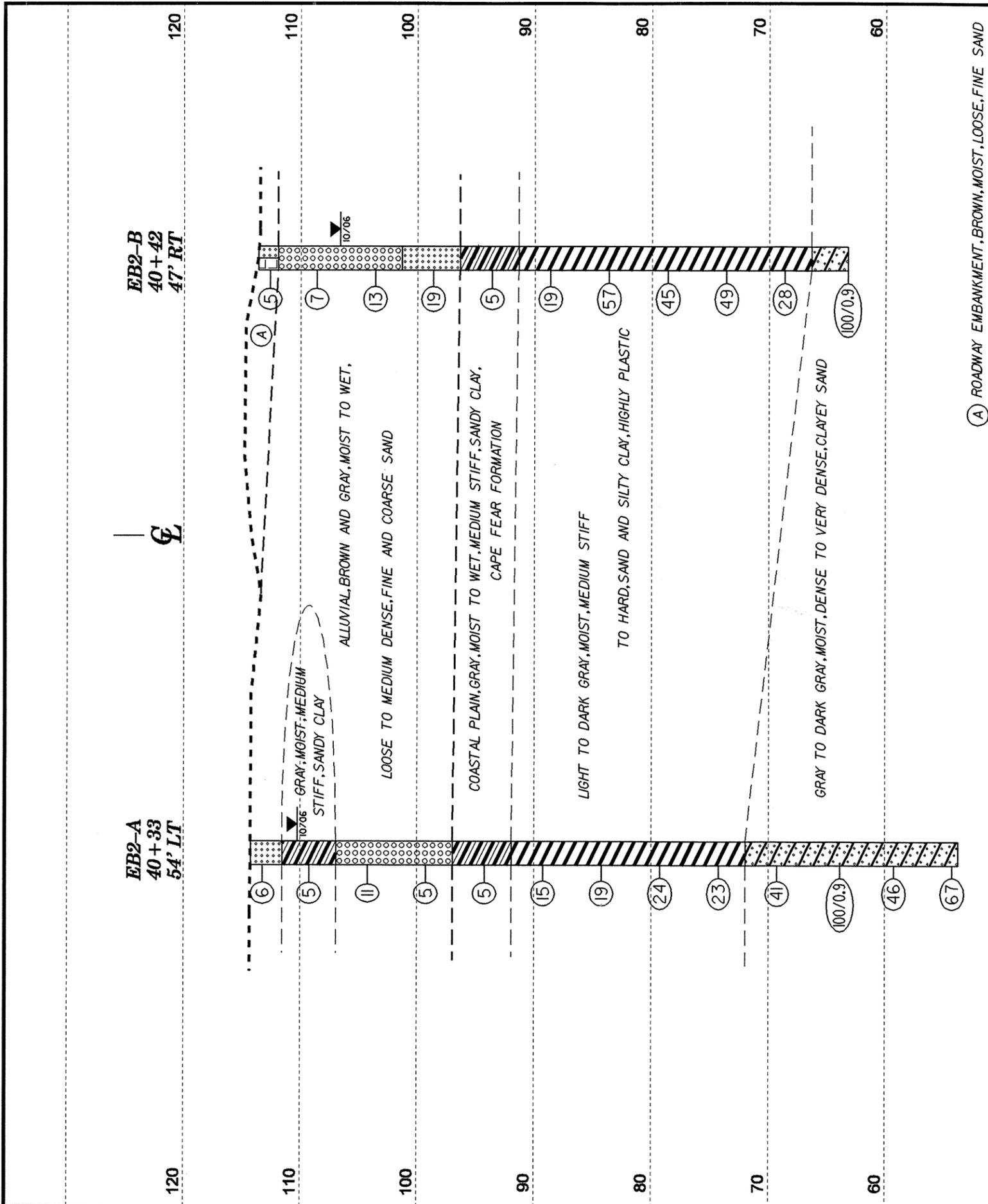
CROSS SECTION THROUGH END BENT 1



VE = 2:1

CROSS SECTION THROUGH BENT 1

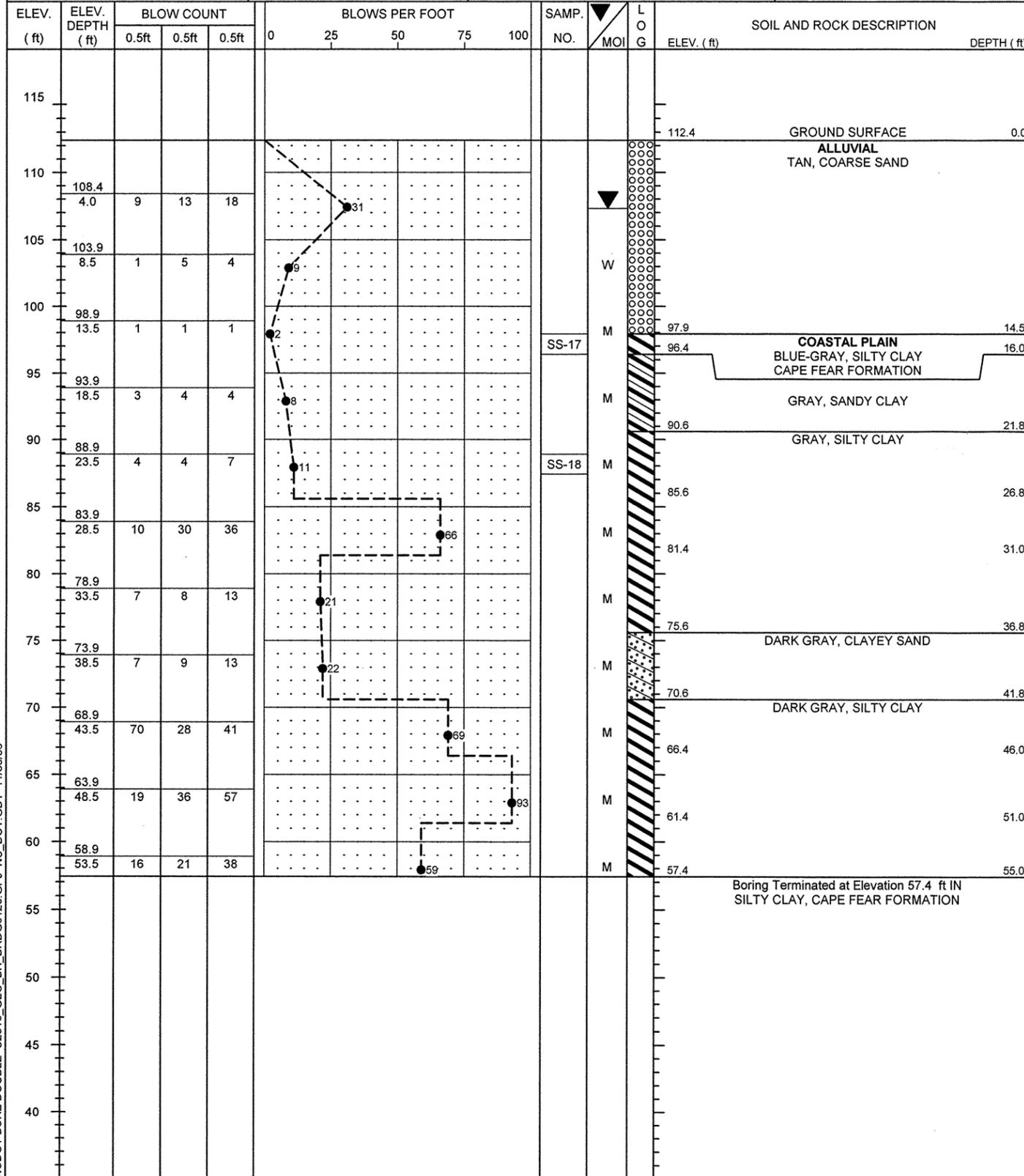
(A) ROADWAY EMBANKMENT, BROWN, MOIST, FINE SAND



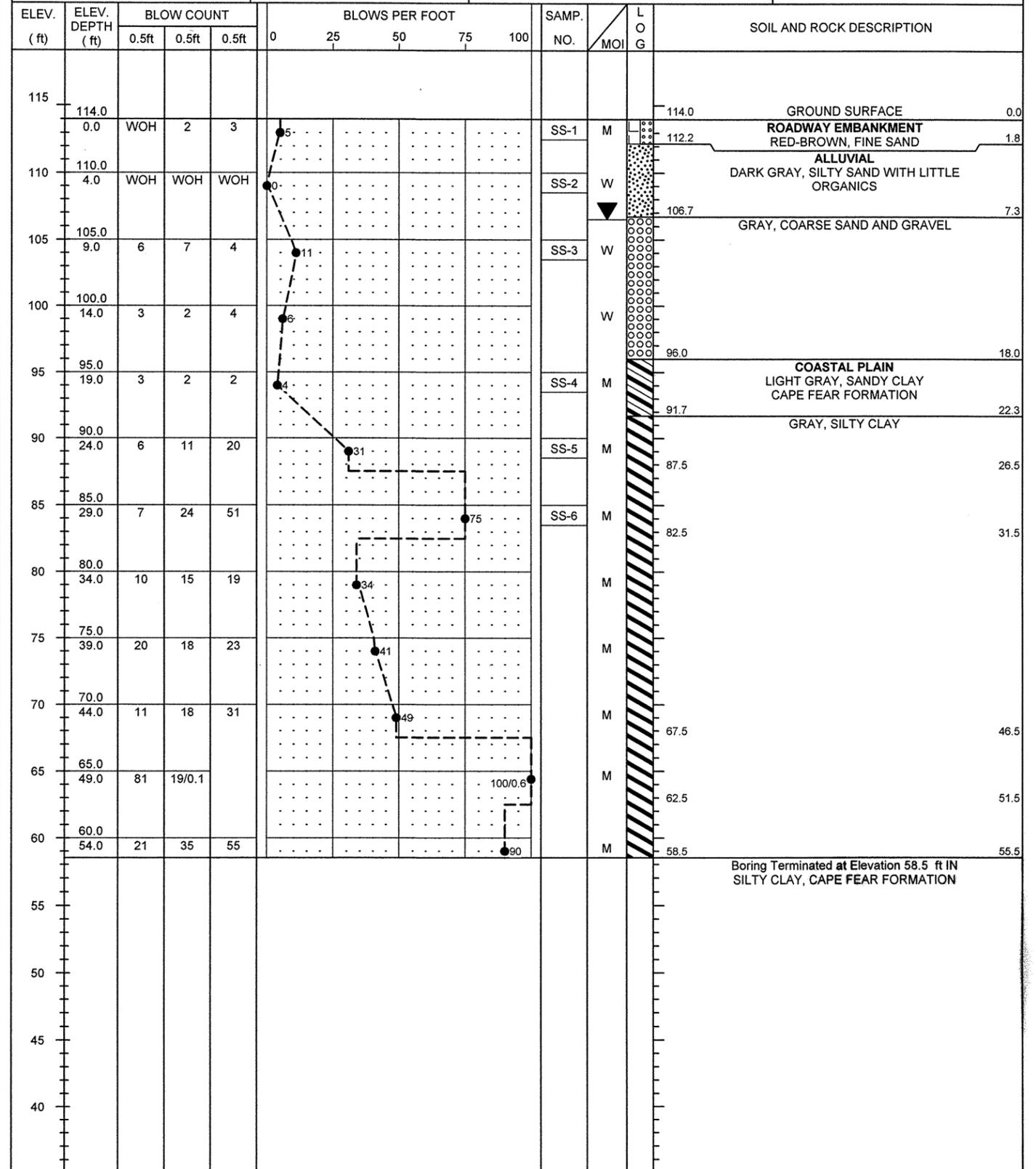
VE = 2:1

CROSS SECTION THROUGH END BENT 2

PROJECT NO. 34866.1.1	ID. U-2810	COUNTY CUMBERLAND	GEOLOGIST Czajka, C. D.
SITE DESCRIPTION BRIDGE NO. 120 ON -L- (CAMDEN RD., SR 1003) OVER BUCKHEAD CREEK			GROUND WTR (ft)
BORING NO. EB1-A	STATION 39+28	OFFSET 61 ft LT	ALIGNMENT -L- 0 HR. N/A
COLLAR ELEV. 112.4 ft	TOTAL DEPTH 55.0 ft	NORTHING 450,509	EASTING 2,012,983 24 HR. 5.1
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 11/02/06	COMP. DATE 11/03/06	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

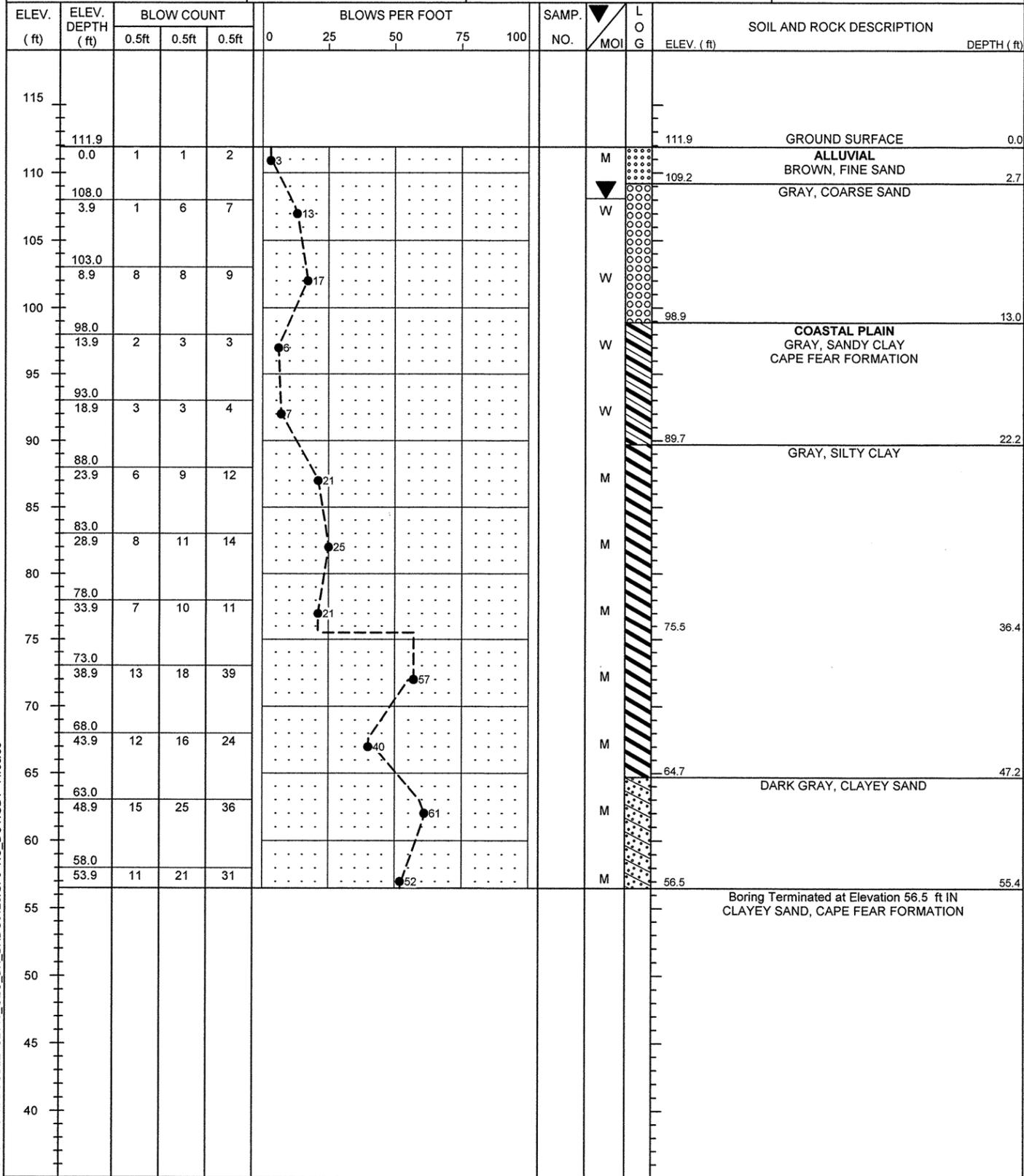


PROJECT NO. 34866.1.1	ID. U-2810	COUNTY CUMBERLAND	GEOLOGIST Czajka, C. D.
SITE DESCRIPTION BRIDGE NO. 120 ON -L- (CAMDEN RD., SR 1003) OVER BUCKHEAD CREEK			GROUND WTR (ft)
BORING NO. EB1-B	STATION 39+37	OFFSET 47 ft RT	ALIGNMENT -L- 0 HR. N/A
COLLAR ELEV. 114.0 ft	TOTAL DEPTH 55.5 ft	NORTHING 450,416	EASTING 2,013,040 24 HR. 7.5
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 10/25/06	COMP. DATE 10/25/06	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

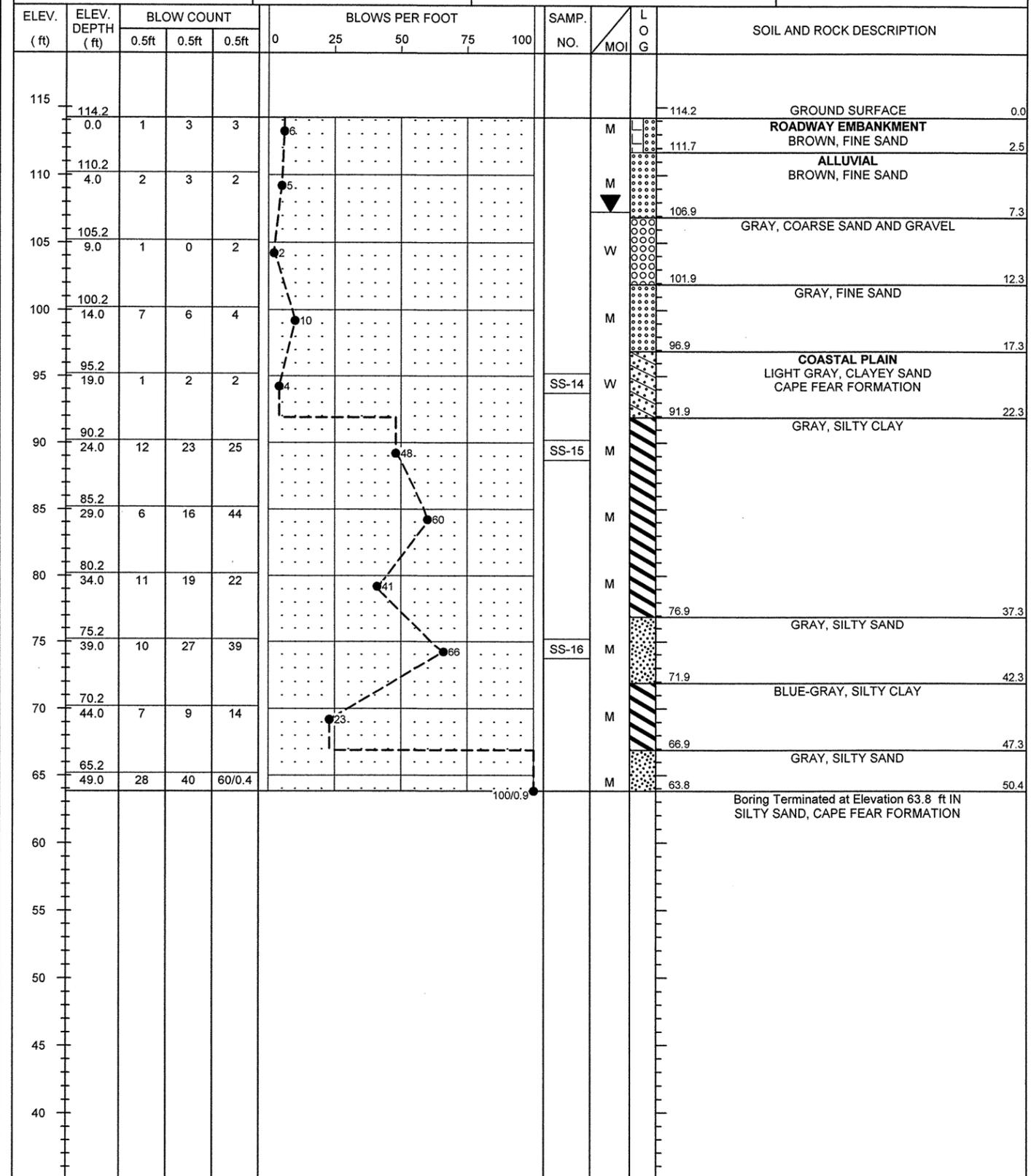


NC DOT BORE DOUBLE U2810_GEO_BH_BRD0120.GPJ NC_DOT.GDT 11/30/06

PROJECT NO. 34866.1.1	ID. U-2810	COUNTY CUMBERLAND	GEOLOGIST Czajka, C. D.
SITE DESCRIPTION BRIDGE NO. 120 ON -L- (CAMDEN RD., SR 1003) OVER BUCKHEAD CREEK			GROUND WTR (ft)
BORING NO. B1-A	STATION 39+73	OFFSET 57 ft LT	ALIGNMENT -L- 0 HR. N/A
COLLAR ELEV. 111.9 ft	TOTAL DEPTH 55.4 ft	NORTHING 450,525	EASTING 2,013,025 24 HR. 3.8
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 10/26/06	COMP. DATE 10/26/06	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

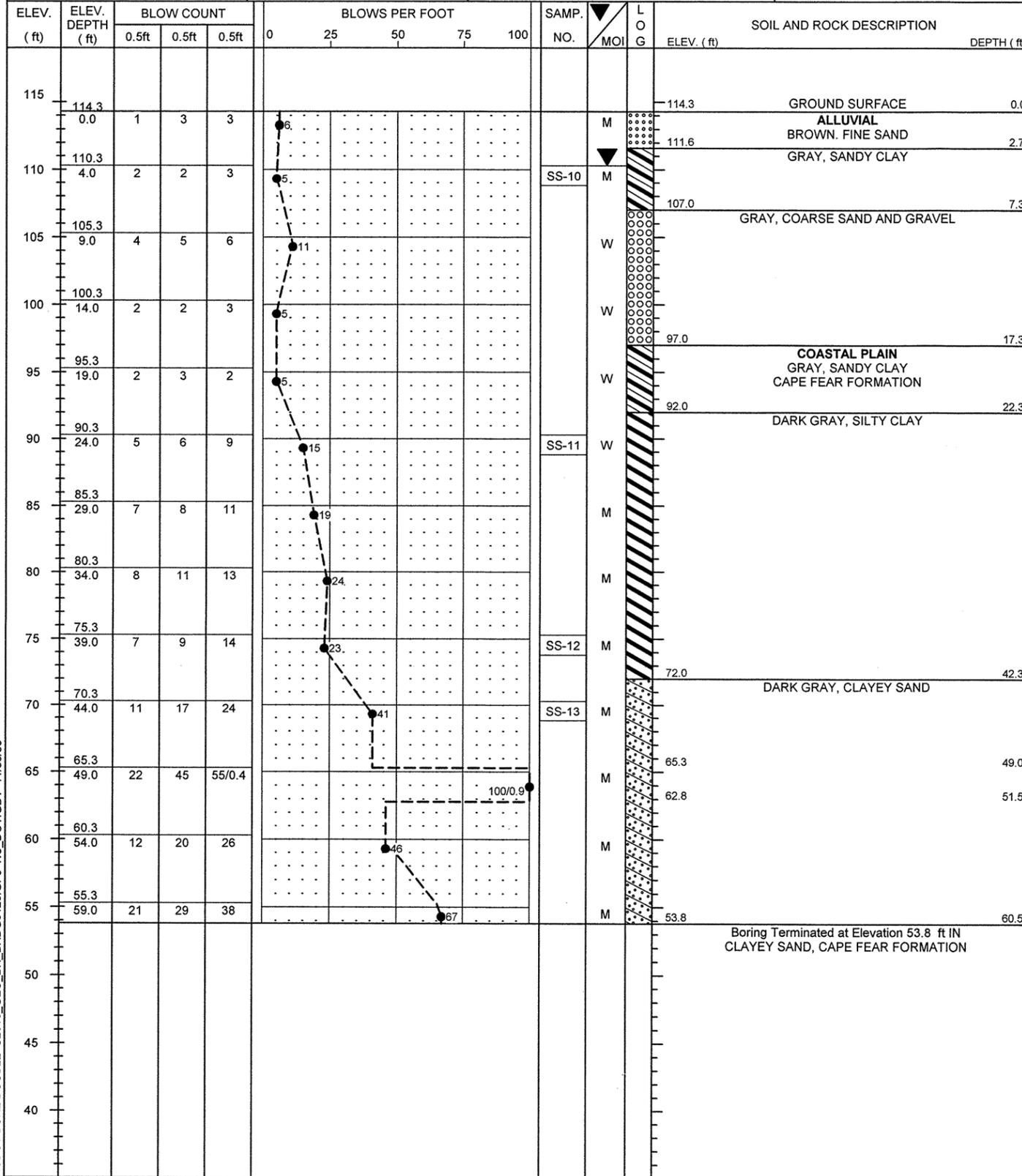


PROJECT NO. 34866.1.1	ID. U-2810	COUNTY CUMBERLAND	GEOLOGIST Czajka, C. D.
SITE DESCRIPTION BRIDGE NO. 120 ON -L- (CAMDEN RD., SR 1003) OVER BUCKHEAD CREEK			GROUND WTR (ft)
BORING NO. B1-B	STATION 39+81	OFFSET 39 ft RT	ALIGNMENT -L- 0 HR. N/A
COLLAR ELEV. 114.2 ft	TOTAL DEPTH 50.4 ft	NORTHING 450,443	EASTING 2,013,075 24 HR. 6.9
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 10/30/06	COMP. DATE 10/30/06	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

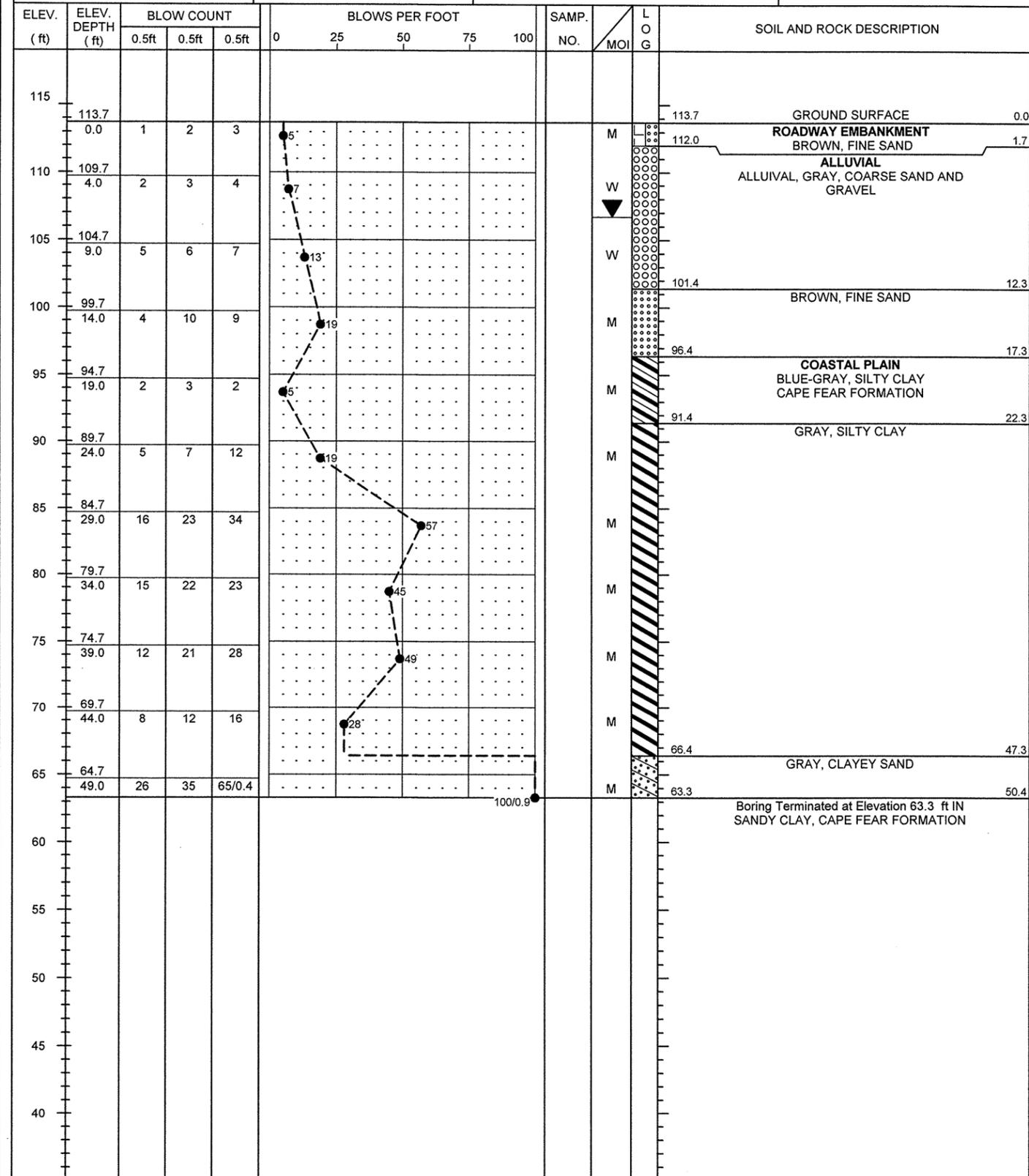


NC DOT BORE DOUBLE U2810_GEO_BH_BRD0120.GPJ_NC_DOT_GDT_11/30/06

PROJECT NO. 34866.1.1	ID. U-2810	COUNTY CUMBERLAND	GEOLOGIST Czajka, C. D.
SITE DESCRIPTION BRIDGE NO. 120 ON -L- (CAMDEN RD., SR 1003) OVER BUCKHEAD CREEK			GROUND WTR (ft)
BORING NO. EB2-A	STATION 40+33	OFFSET 54 ft LT	ALIGNMENT -L-
COLLAR ELEV. 114.3 ft	TOTAL DEPTH 60.5 ft	NORTHING 450,550	EASTING 2,013,080
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 10/26/06	COMP. DATE 10/26/06	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A



PROJECT NO. 34866.1.1	ID. U-2810	COUNTY CUMBERLAND	GEOLOGIST Czajka, C. D.
SITE DESCRIPTION BRIDGE NO. 120 ON -L- (CAMDEN RD., SR 1003) OVER BUCKHEAD CREEK			GROUND WTR (ft)
BORING NO. EB2-B	STATION 40+42	OFFSET 47 ft RT	ALIGNMENT -L-
COLLAR ELEV. 113.7 ft	TOTAL DEPTH 50.4 ft	NORTHING 450,464	EASTING 2,013,133
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 10/25/06	COMP. DATE 10/25/06	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A



NC DOT BORE DOUBLE U2810_GEO_BH_BRD0120.GPJ_NC_DOT_GDT 11/30/06

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-17	61' LT	39+28	14.5-15.0	A-7-6(14)	47	28	21.1	19.0	11.2	48.6	97	88	61			
SS-18	61' LT	39+28	23.5-25.0	A-7-6(31)	65	46	9.5	24.9	18.9	46.6	100	96	70			

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-1	47' RT	39+37	0.0-1.5	A-3(0)	17	NP	51.2	39.4	4.4	5.0	96	62	10			
SS-2	47' RT	39+37	4.0-5.5	A-2-4(0)	23	4	18.4	53.5	15.0	13.1	99	91	33			
SS-3	47' RT	39+37	9.0-10.5	A-1-b(0)	20	NP	76.8	19.1	3.1	1.0	55	22	3			
SS-4	47' RT	39+37	19.0-20.5	A-6(1)	33	13	26.4	40.8	10.6	22.2	100	84	36			
SS-5	47' RT	39+37	24.0-25.5	A-7-6(26)	53	38	15.3	16.8	21.5	46.4	100	91	72			
SS-6	47' RT	39+37	29.0-30.5	A-7-6(9)	46	28	31.3	25.0	17.5	26.2	100	81	48			

BI-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-14	39' LT	39+81	19.0-20.5	A-2-6(0)	31	12	56.3	24.5	7.0	12.2	98	64	20			
SS-15	39' LT	39+81	24.0-25.5	A-7-6(5)	51	28	45.8	17.2	8.6	28.4	98	68	39			
SS-16	39' LT	39+81	39.0-40.5	A-2-4(0)	40	2	58.2	23.1	10.6	8.1	95	59	20			

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-10	54' LT	40+33	4.0-5.5	A-6(3)	31	14	5.9	55.5	16.4	22.2	100	97	47			
SS-11	54' LT	40+33	24.0-25.5	A-7-6(9)	51	35	42.6	14.9	14.2	28.3	92	61	42			
SS-12	54' LT	40+33	37.0-40.5	A-7-6(16)	41	24	12.5	21.2	38.0	28.3	100	92	73			
SS-13	54' LT	40+33	44.0-45.5	A-2-7(2)	41	20	47.6	22.8	21.5	8.1	99	72	33			

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-7	47' RT	40+42	14.0-15.5	A-3(0)	25	NP	11.7	82.8	4.4	1.0	100	99	10			
SS-8	47' RT	40+42	44.0-45.5	A-7-6(11)	42	17	1.4	50.3	38.2	10.1	100	99	69			
SS-9	47' RT	40+42	49.0-50.5	A-2-6(1)	36	15	49.2	24.2	20.5	6.1	98	66	30			



**FIELD
 SCOUR REPORT**

WBS: 34866.1.1 TIP: U-2810 COUNTY: Cumberland

DESCRIPTION(1): Bridge No. 120 on -L- (Camden Rd., SR 1003) over Buckhead Creek

EXISTING BRIDGE

Information from: Field Inspection Microfilm _____ (reel _____ pos: _____)
 Other (explain) Bridge Survey and Hydraulic Design Report

Bridge No.: 120 Length: 32' Total Bents: 3 Bents in Channel: 1 Bents in Floodplain: 2
 Foundation Type: Timber Piles

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: Full Exposed Abutement

Interior Bents: Scour Pockets Around Timber Piles

Channel Bed: Scour Pockets near Bridge

Channel Bank: Undercut Channel Banks, Exposed Roots

EXISTING SCOUR PROTECTION

Type(3): None

Extent(4): N/A

Effectiveness(5): N/A

Obstructions(6): Minor Stick and Trash Debris

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): Fine and Coarse Sand

Channel Bank Material(8): Primarily Fine and Coarse Sand, Minor Amounts of Silty Sand and Sandy Clay

Channel Bank Cover(9): Trees, Shrubs and Grass

Floodplain Width(10): 100-200'

Floodplain Cover(11): Trees, Shrubs and Grass

Stream is(12): Aggrading _____ Degrading Static _____

Channel Migration Tendency(13): West

Observations and Other Comments: _____

DESIGN SCOUR ELEVATIONS(14)

Feet Meters _____

	100 yr.													
B-1	104.6'													

Comparison of DSE to Hydraulics Unit theoretical scour:
 The Geotechnical Engineering Unit agrees with the theoretical scour estimate for the 100 year event provided by the Hydraulics unit in the Bridge Survey and Hydraulic Design Report, date 05/03/06.

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

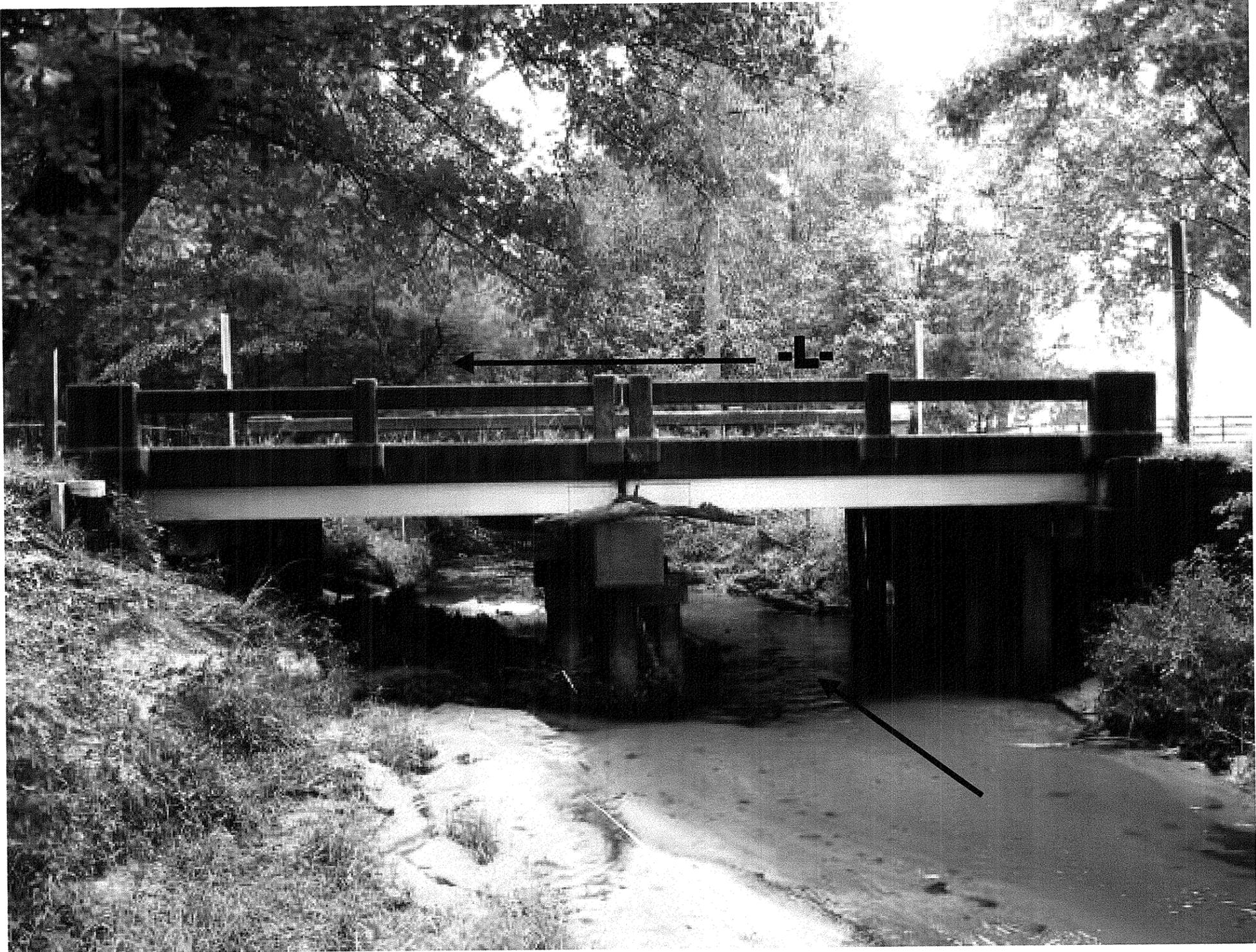
Bed or Bank	Bank	Bank	Bank	Bank			
Sample No.	SS-2	SS-3	SS-7	SS-10			
Retained #4	-	24	-	-			
Passed #10	99	55	100	100			
Passed #40	91	22	99	97			
Passed #200	33	3	10	47			
Coarse Sand	18.4	76.8	11.7	5.9			
Fine Sand	53.5	19.1	82.8	55.5			
Silt	15	3.1	4.4	16.4			
Clay	13.1	1	1	22.2			
LL	23	20	25	31			
PI	4	NP	NP	14			
AASHTO	A-2-4(0)	A-1-b(0)	A-3(0)	A-6(3)			
Station	39+37	39+37	40+42	40+33			
Offset	47' RT	47' RT	47' RT	54' LT			
Depth	4.0' - 5.5'	9.0' - 10.5'	14.0' - 15.5'	4.0' - 5.5'			

Reported by: C. Doug Czajka

Date: 10/24/2006

SITE PHOTOGRAPH

Bridge No. 120 on -L- (Camden Road, SR 1003) Over Buckhead Creek



CONTRACT: ID: U-2810A

CONTENTS:

LINE	STATION	PLAN	PROFILE	XSECTS
-L-	15+00 to 15+50	4	23	
	15+50 to 17+00	4	23	
	17+00 to 93+00	4-10	23-25	
	93+00 to 98+00	10	25,26	40-42
	98+00 to 244+84	10-21	26-31	
-Y1-	11+22 to 12+67	5	32	
-Y4-	10+37 to 12+35	10	33	
-Y6-	10+00 to 16+62	11	34	
-Y7-	10+55 to 19+20	12,22	35	
-Y9-	10+79 to 12+31	14	36	
-Y14-	8+00 to 18+32	19	37	
-RET.WALL-	15+00 to 17+10	4	38	39

NOTE: SEE SHEET 2A FOR PLAN SHEET LAYOUT AT TIME OF INVESTIGATION

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL UNIT

ROADWAY SUBSURFACE INVESTIGATION

STATE PROJ. 34866.1.1 I.D. U-2810A F.A. PROJ. STP-1003(22)

COUNTY CUMBERLAND

PROJECT DESCRIPTION FAYETTEVILLE - SR 1003 (CAMDEN RD.)

FROM NC 59 (HOPE MILLS RD.) TO NORTH OF

SR 1007 (OWEN DRIVE.) RETAINING WALL

INVENTORY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	34866.1.1 (U-2810)	1	42
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
		P.E.	
		CONST.	

CAUTION NOTICE

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

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

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

INVESTIGATED BY T.P. MOOREFIELD PERSONNEL J.L. PEDRO

CHECKED BY N.T. ROBERSON N.D. MOHS

SUBMITTED BY N.T. ROBERSON M.L. REEDER

DATE SEPTEMBER 2005 CONSULTANT: SGME

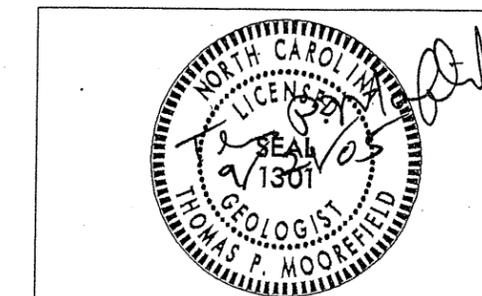
J. WHITE

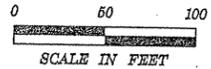
G. PAYNTER

DRAWN BY: T.T. WALKER, J.L. PEDRO

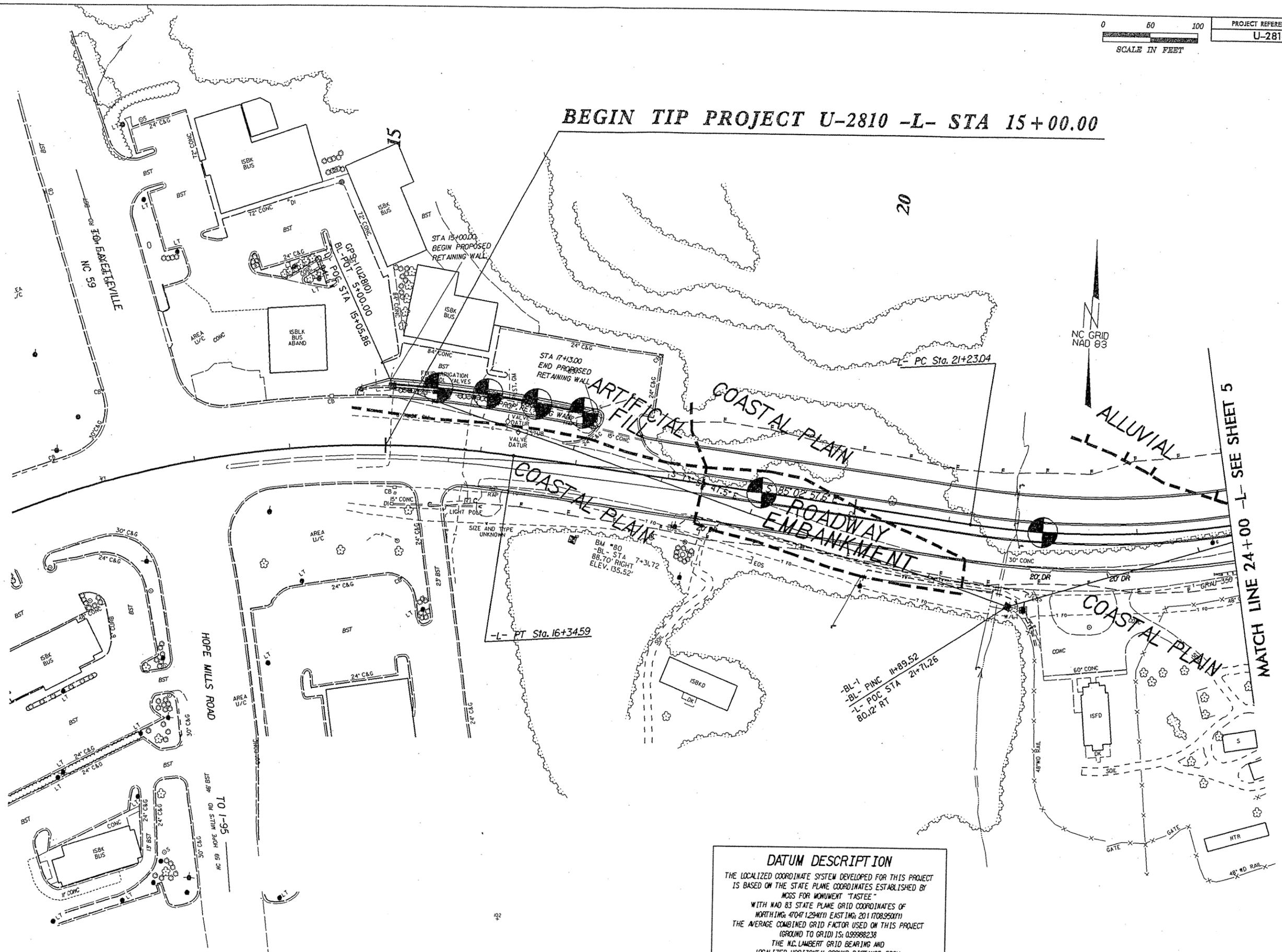
NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IT IS CONSIDERED TO BE PART OF THE PLANS, SPECIFICATIONS, OR CONTRACT FOR THE PROJECT.

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.





BEGIN TIP PROJECT U-2810 -L- STA 15+00.00



MATCH LINE 24+00 -L- SEE SHEET 5

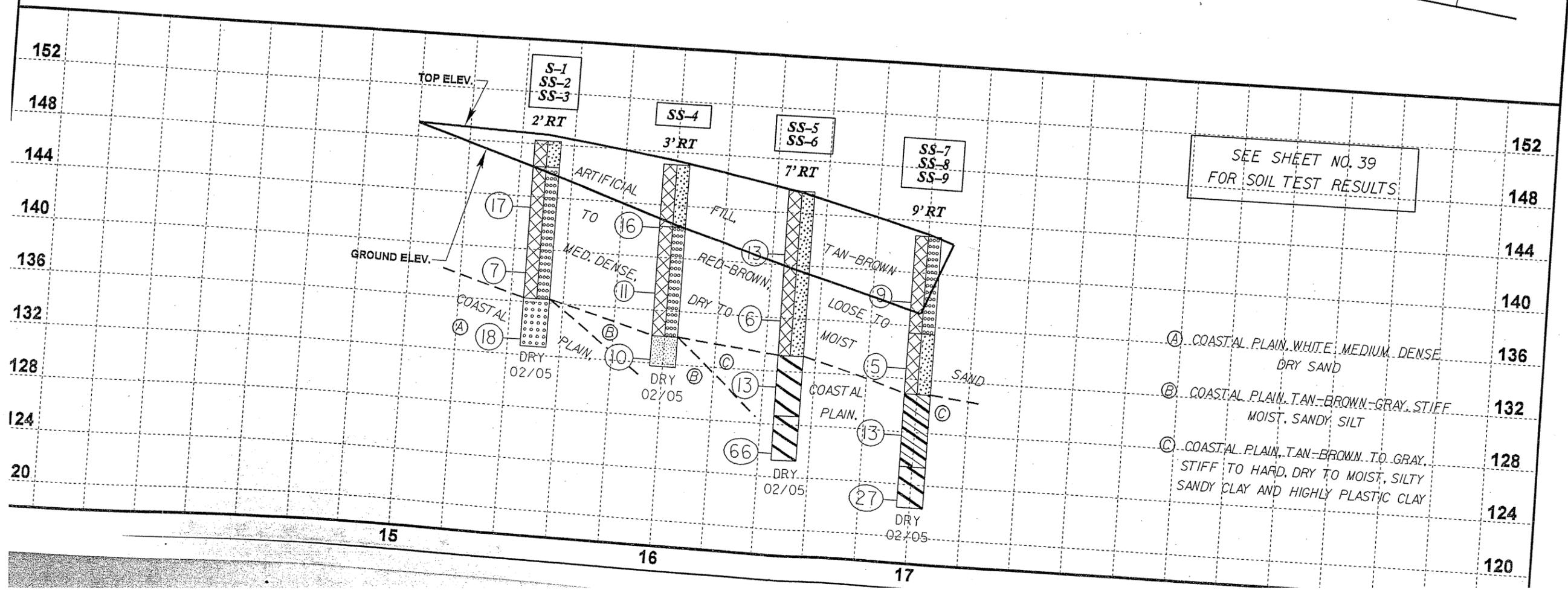
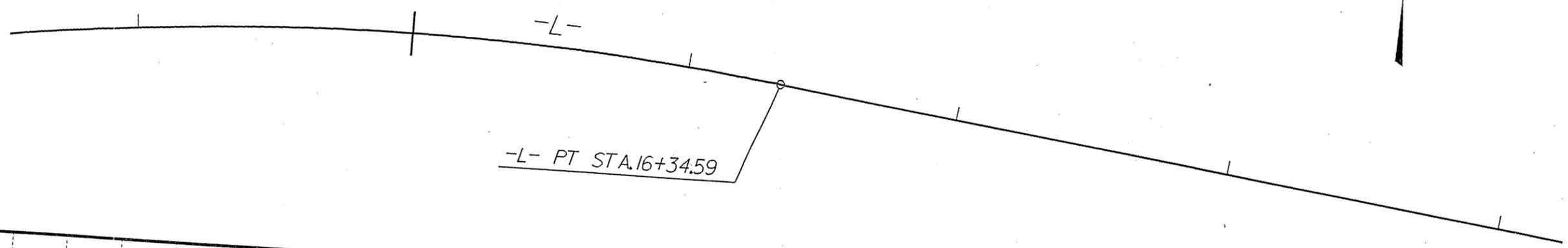
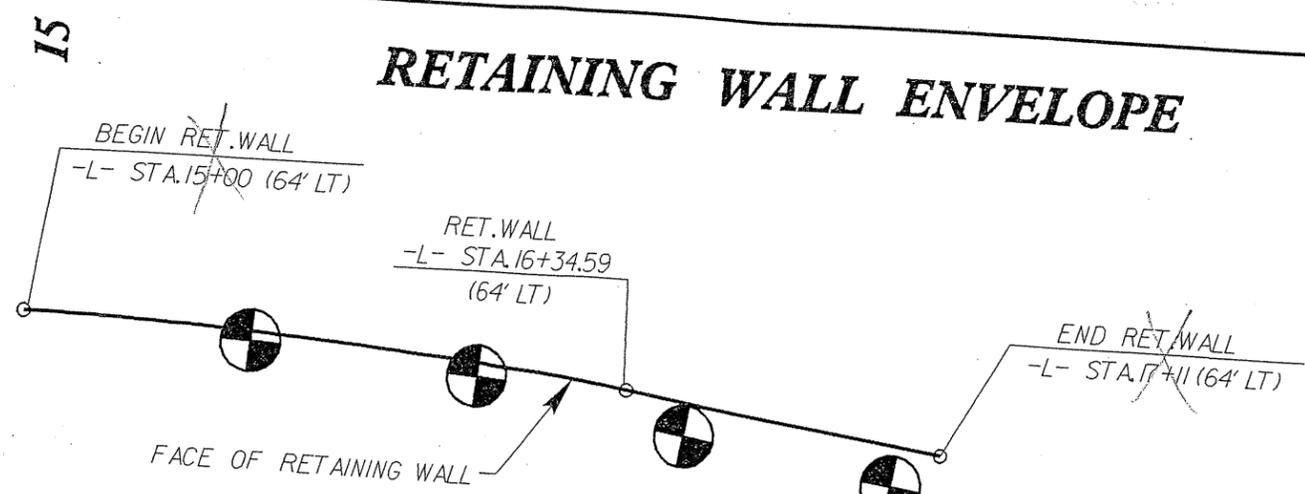
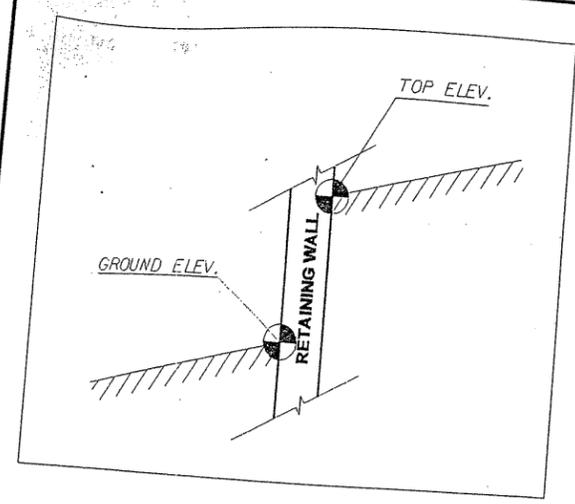
DATUM DESCRIPTION

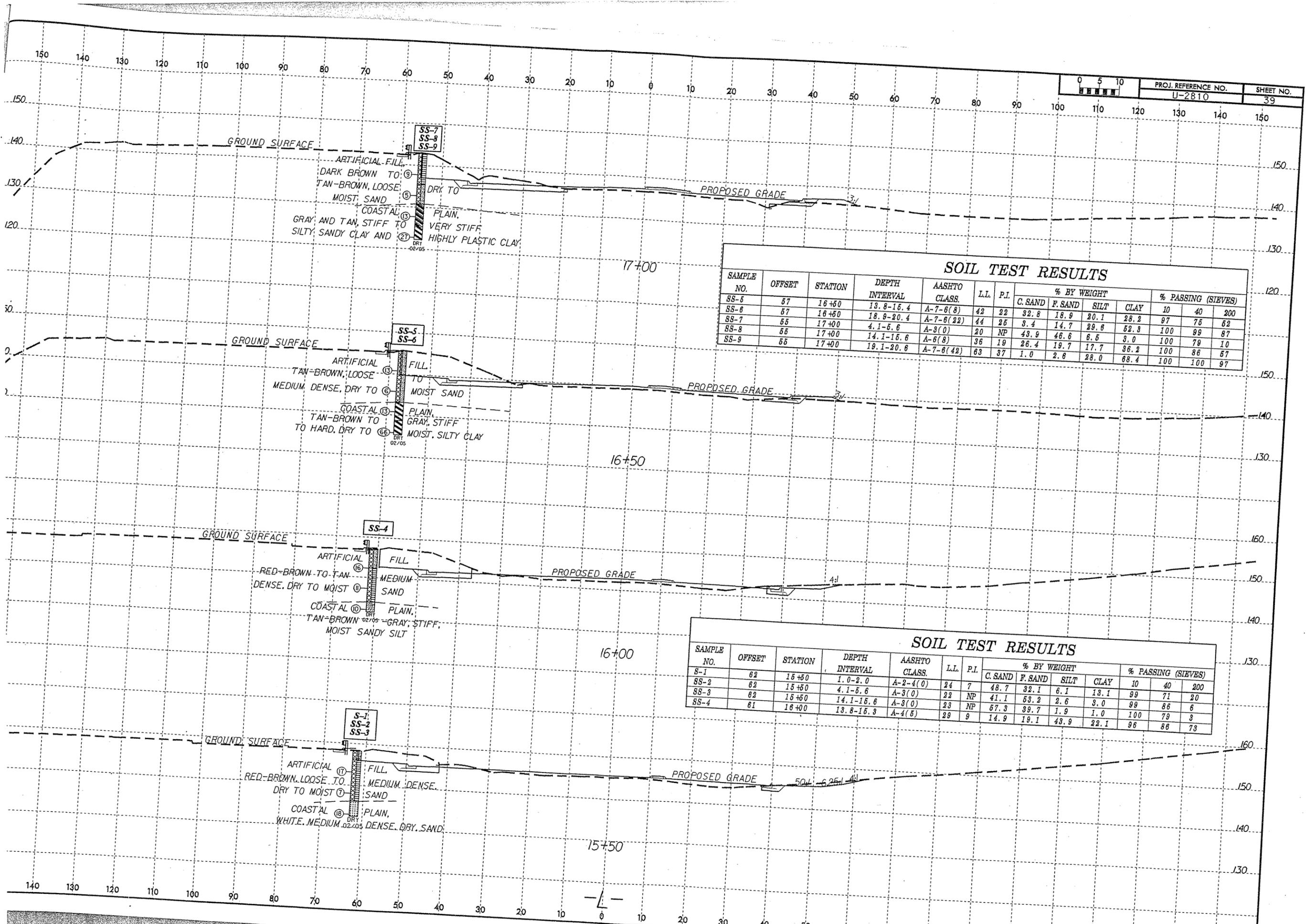
THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCOS FOR MONUMENT "TASTEE" WITH NAD 83 STATE PLANE GRID COORDINATES OF NORTHING: 470471.294(11) EASTING: 2011708.950(11) THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.99988238 THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "TASTEE" TO "L- STATION (supplied by roadway) IS

ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES VERTICAL DATUM USED IS NGVD 29

RETAINING WALL ENVELOPE

PROJECT REFERENCE NO. U-2810	SHEET NO. 38
SCALE	





SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)		
							C. SAND	F. SAND	SILT	CLAY	10	40	200
SS-5	57	16+50	13.8-15.4	A-7-6(8)	42	22	32.8	18.9	20.1	28.2	97	76	52
SS-6	57	16+50	18.9-20.4	A-7-6(22)	44	25	3.4	14.7	29.8	52.3	100	99	87
SS-7	55	17+00	4.1-5.6	A-3(0)	20	NP	43.9	46.6	6.6	3.0	100	79	10
SS-8	55	17+00	14.1-15.6	A-6(8)	36	19	26.4	19.7	17.7	36.2	100	86	57
SS-9	55	17+00	19.1-20.6	A-7-6(42)	63	37	1.0	2.8	28.0	68.4	100	100	97

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)		
							C. SAND	F. SAND	SILT	CLAY	10	40	200
S-1	62	15+50	1.0-2.0	A-2-4(0)	24	7	48.7	32.1	6.1	13.1	99	71	20
SS-2	62	15+50	4.1-5.6	A-3(0)	22	NP	41.1	53.2	2.6	3.0	99	86	6
SS-3	62	16+50	14.1-15.6	A-3(0)	23	NP	57.3	39.7	1.9	1.0	100	79	3
SS-4	61	16+00	13.8-15.3	A-4(5)	29	9	14.9	19.1	43.9	22.1	96	88	73