

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

**STRUCTURE**  
**SUBSURFACE INVESTIGATION**

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PROJ. REFERENCE NO. 34866.1.1 (U-2810) F.A. PROJ. STP-1003(22)  
 COUNTY CUMBERLAND  
 PROJECT DESCRIPTION WIDENING AND REALIGNMENT OF  
SR 1003 (CAMDEN ROAD) FROM NC 59 (HOPE MILLS ROAD)  
TO NORTH OF SR 1007 (OWEN DRIVE)  
 SITE DESCRIPTION BRIDGE NO. 194 ON -L- (SR 1003, CAMDEN  
ROAD) OVER CSXT RAILROAD AT STATION 115+52

**CAUTION NOTICE**

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

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

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

**PROJECT: 34866.1.1 ID: U-2810B**

PERSONNEL  
**N. D. MOHS**

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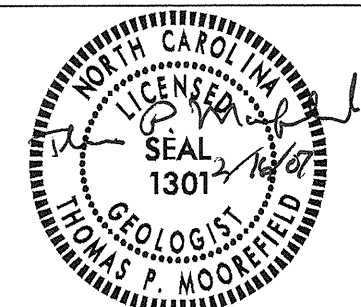
**T. T. WALKER**

INVESTIGATED BY **T. P. MOOREFIELD**

CHECKED BY **N. T. ROBERSON**

SUBMITTED BY **N. T. ROBERSON**

DATE **FEBRUARY, 2007**



DRAWN BY: **N. D. MOHS, T. T. WALKER**

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. <b>34866.1.1 (U-2810)</b>	SHEET NO. <b>2</b>
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**SUBSURFACE INVESTIGATION**

**SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS**

SOIL DESCRIPTION		GRADATION		ROCK DESCRIPTION		TERMS AND DEFINITIONS					
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE: <i>VERY STIFF, GRN. SLTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGH PLASTIC, A-7-6</i>		WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED) GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.		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: 		ALLUVIUM (ALLOUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. ADUIFIER - 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 SLICES 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 DISLODGED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SCREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.					
SOIL LEGEND AND AASHTO CLASSIFICATION		MINERALOGICAL COMPOSITION		WEATHERING		ROCK HARDNESS					
GENERAL CLASS. GRANULAR MATERIALS (<= 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS		MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.		FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE. VERY SLIGHT (V SL.) ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY, ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE. SLIGHT (SL.) ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS. MODERATE (MOD.) SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK. MODERATELY SEVERE (MOD. SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES 'CLUNK' SOUND WHEN STRUCK. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i> SEVERE (SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. <i>IF TESTED, YIELDS SPT N VALUES &gt; 100 BPF</i> VERY SEVERE (V SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. <i>IF TESTED, YIELDS SPT N VALUES &lt; 100 BPF</i> COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.		SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50		WEATHERING		VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN. 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. 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 PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. SOFT CAN BE GROOVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE. 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.	
CONSISTENCY OR DENSITY		GROUND WATER		MISCELLANEOUS SYMBOLS		ROCK HARDNESS					
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT <sup>2</sup> )		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		ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY DIP & DIP DIRECTION OF ROCK STRUCTURES SOUNDING ROD		SPT TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION SPT N-VALUE SPT REFUSAL		S - BULK SAMPLE SS - SPLIT SPOON SAMPLE ST - SHELBY TUBE SAMPLE RS - ROCK SAMPLE RT - RECOMPACTED TRIAXIAL SAMPLE CBR - CALIFORNIA BEARING RATIO SAMPLE			
TEXTURE OR GRAIN SIZE		MISCELLANEOUS SYMBOLS		ABBREVIATIONS		ROCK HARDNESS					
U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270 4.76 2.00 0.42 0.25 0.075 0.053		ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY DIP & DIP DIRECTION OF ROCK STRUCTURES SOUNDING ROD		HI. - HIGHLY MED. - MEDIUM MICA - MICAEOUS MOD. - MODERATELY NP - NON PLASTIC ORG. - ORGANIC PMT - PRESSUREMETER TEST SAP. - SAPROLITIC SD. - SAND, SANDY SL. - SILT, SILTY SLI. - SLIGHTLY TCR - TRICONE REFUSAL		S - BULK SAMPLE SS - SPLIT SPOON SAMPLE ST - SHELBY TUBE SAMPLE RS - ROCK SAMPLE RT - RECOMPACTED TRIAXIAL SAMPLE CBR - CALIFORNIA BEARING RATIO SAMPLE		S - BULK SAMPLE SS - SPLIT SPOON SAMPLE ST - SHELBY TUBE SAMPLE RS - ROCK SAMPLE RT - RECOMPACTED TRIAXIAL SAMPLE CBR - CALIFORNIA BEARING RATIO SAMPLE			
SOIL MOISTURE - CORRELATION OF TERMS		EQUIPMENT USED ON SUBJECT PROJECT		FRACATURE SPACING		BEDDING					
SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION		DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE: CORE SIZE: HAND TOOLS:		TERM SPACING		TERM THICKNESS					
LL - LIQUID LIMIT PL - PLASTIC LIMIT OM - OPTIMUM MOISTURE SL - SHRINKAGE LIMIT		<input checked="" type="checkbox"/> CLAY BITS <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER <input type="checkbox"/> 8" HOLLOW AUGERS <input type="checkbox"/> HARD FACED FINGER BITS <input type="checkbox"/> TUNG-CARBIDE INSERTS <input type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER <input type="checkbox"/> TRICONE * STEEL TEETH <input type="checkbox"/> TRICONE * TUNG-CARB. <input type="checkbox"/> CORE BIT		VERY WIDE MORE THAN 10 FEET WIDE 3 TO 10 FEET MODERATELY CLOSE 1 TO 3 FEET CLOSE 0.16 TO 1 FEET VERY CLOSE LESS THAN 0.16 FEET		VERY THICKLY BEDDED > 4 FEET THICKLY BEDDED 1.5 - 4 FEET THINLY BEDDED 0.16 - 1.5 FEET VERY THINLY BEDDED 0.03 - 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET					
PLASTICITY		EQUIPMENT USED ON SUBJECT PROJECT		INDURATION		INDURATION					
NONPLASTIC 0-5 VERY LOW LOW PLASTICITY 6-15 SLIGHT MED. PLASTICITY 16-25 MEDIUM HIGH PLASTICITY 26 OR MORE HIGH		<input checked="" type="checkbox"/> CME-45B <input type="checkbox"/> CME-550 <input type="checkbox"/> PORTABLE HOIST		FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.		FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.					
COLOR		EQUIPMENT USED ON SUBJECT PROJECT		INDURATION		INDURATION					
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.		<input type="checkbox"/> MOBILE B- <input type="checkbox"/> BK-51 <input checked="" type="checkbox"/> CME-45B <input type="checkbox"/> CME-550 <input type="checkbox"/> PORTABLE HOIST		FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.		FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.					



STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY  
GOVERNOR

LYNDO TIPPETT  
SECRETARY

February 2, 2007

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

DESCRIPTION: Bridge No. 194 on -L- (SR 1003, Camden Road) over CSXT Railroad at Station 115+52

SUBJECT: Geotechnical Report – Structure Inventory

**Project Description**

A single span bridge, of 208.0 feet in length and 118° skew, is to be constructed on new alignment -L- (SR 1003, Camden Road) over the CSXT Railroad located approximately 600 feet south of the existing structure. The new bridge is 81.6 feet wide and will accommodate four travel lanes. The project is located in southwestern Cumberland County between City of Fayetteville and Town of Hope Mills.

The subsurface investigation was conducted during December of 2006 using an ATV-mounted CME-45B drill machine. Standard Penetration Test borings were performed at each of the proposed end bent locations. All borings were terminated between elevations 64.5 feet and 84.3 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 Coastal Plain materials.

Coastal Plain material, of the Cape Fear Formation, was encountered from the ground surface to termination. The predominant soils are white to orange, moist to saturated, loose to medium dense, sand and silty sand (A-3, A-2-4), with lesser amounts of gray, moist, medium stiff to hard sandy silt and silty clay (A-4, A-7-6).

**Groundwater**

Groundwater was encountered at all boring locations. The groundwater elevation ranges from 176.6 feet at EB1-B to 182.4 feet at EB2-B.

**Notice**

This Geotechnical foundation report is based on the Preliminary General Drawing dated August, 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 "Nathan Mohs".

Nathan Mohs  
Engineering Geologist

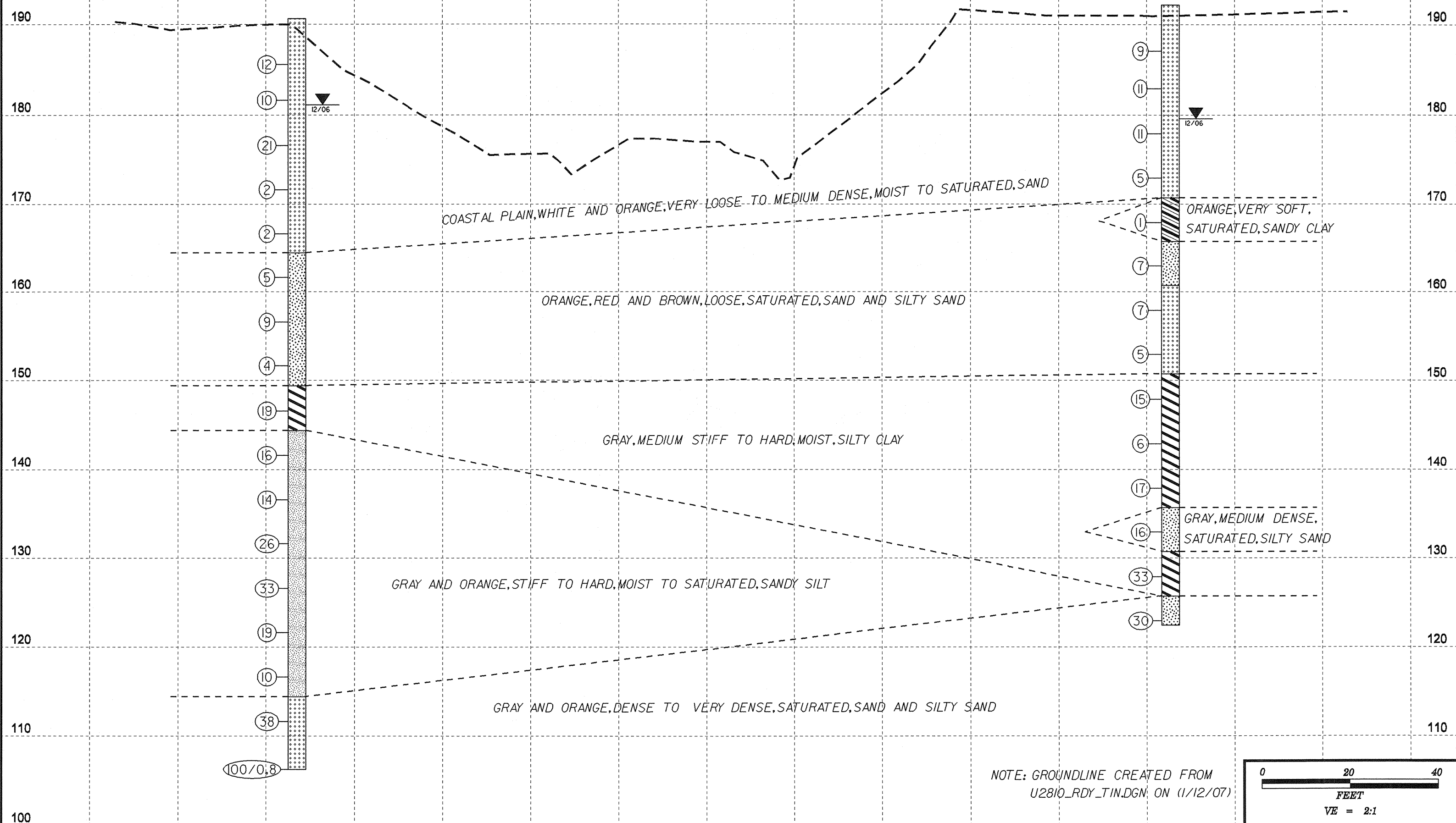
**SKEW ANGLE = 118**



**FENCE DIAGRAM OF BORINGS ON -L-**

**EB1-A**  
114+67  
44' LT

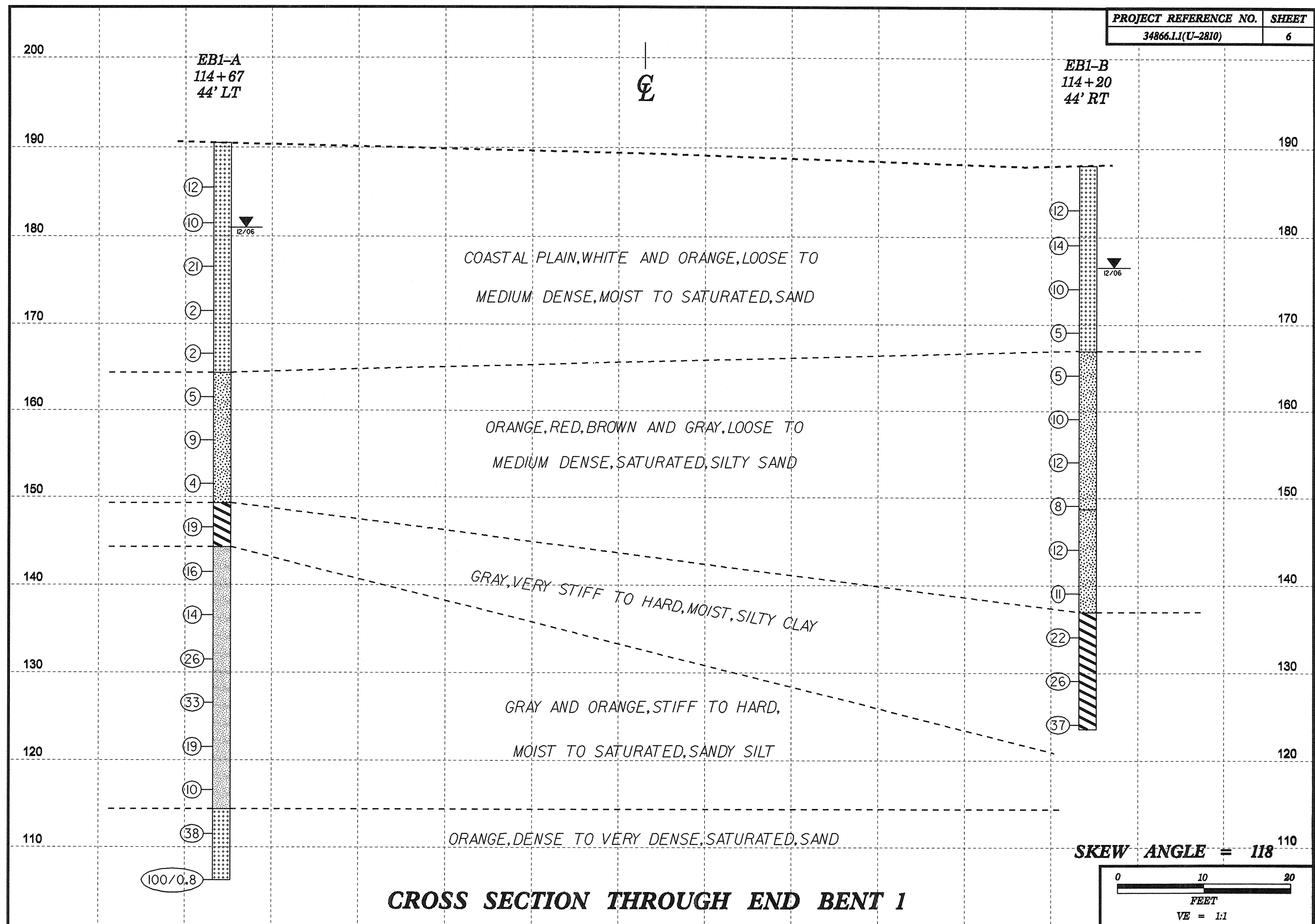
**EB2-A**  
116+65  
44' LT



100/0.8

115+00

116+00



**CROSS SECTION THROUGH END BENT 1**

**SKIEW ANGLE = 118**

0 10 20  
FEET  
VE = 1:1

**EB2-A**  
116+65  
44' LT

**EB2-B**  
116+15  
50' RT

200

200

190

190

180

180

170

170

160

160

150

150

140

140

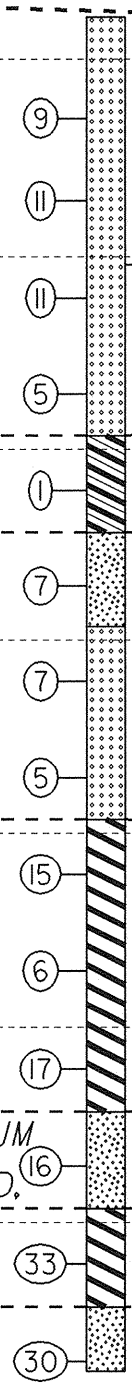
130

130

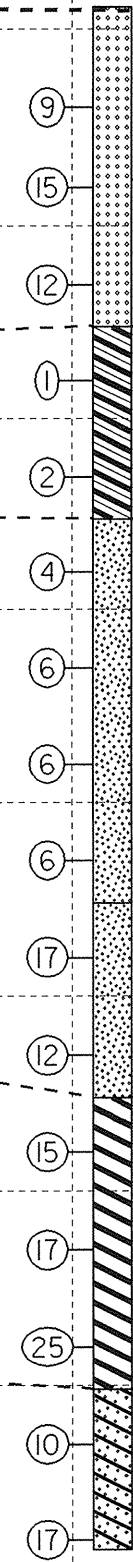
120

120

110



12/06



12/06

COASTAL PLAIN, WHITE, ORANGE AND TAN, LOOSE TO MEDIUM DENSE, MOIST TO SATURATED, SAND

ORANGE, VERY SOFT, SATURATED, SANDY CLAY

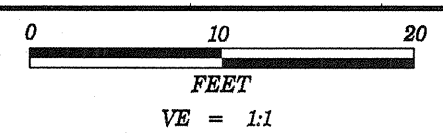
ORANGE, RED AND GRAY, LOOSE, SATURATED SAND, AND LOOSE TO MEDIUM DENSE, SATURATED, SILTY SAND

GRAY, MEDIUM SATURATED, DENSE, SILTY SAND

GRAY, MEDIUM STIFF TO HARD, MOIST, SILTY CLAY

ORANGE AND RED, LOOSE TO DENSE, SATURATED, SILTY SAND AND SAND

**SKEW ANGLE = 118**



**CROSS SECTION THROUGH END BENT 2**



# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

PROJECT NO. 34866.1.1	ID. U-2810	COUNTY CUMBERLAND	GEOLOGIST Mohs, N. D.
SITE DESCRIPTION BRIDGE NO. 194 ON -L- (SR 1003, CAMDEN ROAD) OVER CSXT RAILROAD			GROUND WTR (ft)
BORING NO. EB1-A	STATION 114+67	OFFSET 44ft LT	ALIGNMENT L
COLLAR ELEV. 190.6 ft	TOTAL DEPTH 84.3 ft	NORTHING 454,390	EASTING 2,019,202
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 12/06/06	COMP. DATE 12/07/06	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

ELEV (ft)	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						
195														190.6	0.0
186.6	4.0														
182.6	8.0	5	5	7											
177.6	13.0	3	4	6											
172.6	18.0	7	10	11											
172.6	18.0	1	1	1											
167.6	23.0	2	1	1											
162.6	28.0	1	3	2											
157.6	33.0	3	3	6											
152.6	38.0	1	1	3											
147.6	43.0	5	7	12											
142.6	48.0	4	7	9											
137.6	53.0	3	6	8											
132.6	58.0	9	10	16											
127.6	63.0	9	16	17											
122.6	68.0	4	8	11											
117.6	73.0	4	4	6											

PROJECT NO. 34866.1.1	ID. U-2810	COUNTY CUMBERLAND	GEOLOGIST Mohs, N. D.
SITE DESCRIPTION BRIDGE NO. 194 ON -L- (SR 1003, CAMDEN ROAD) OVER CSXT RAILROAD			GROUND WTR (ft)
BORING NO. EB1-A	STATION 114+67	OFFSET 44ft LT	ALIGNMENT L
COLLAR ELEV. 190.6 ft	TOTAL DEPTH 84.3 ft	NORTHING 454,390	EASTING 2,019,202
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 12/06/06	COMP. DATE 12/07/06	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

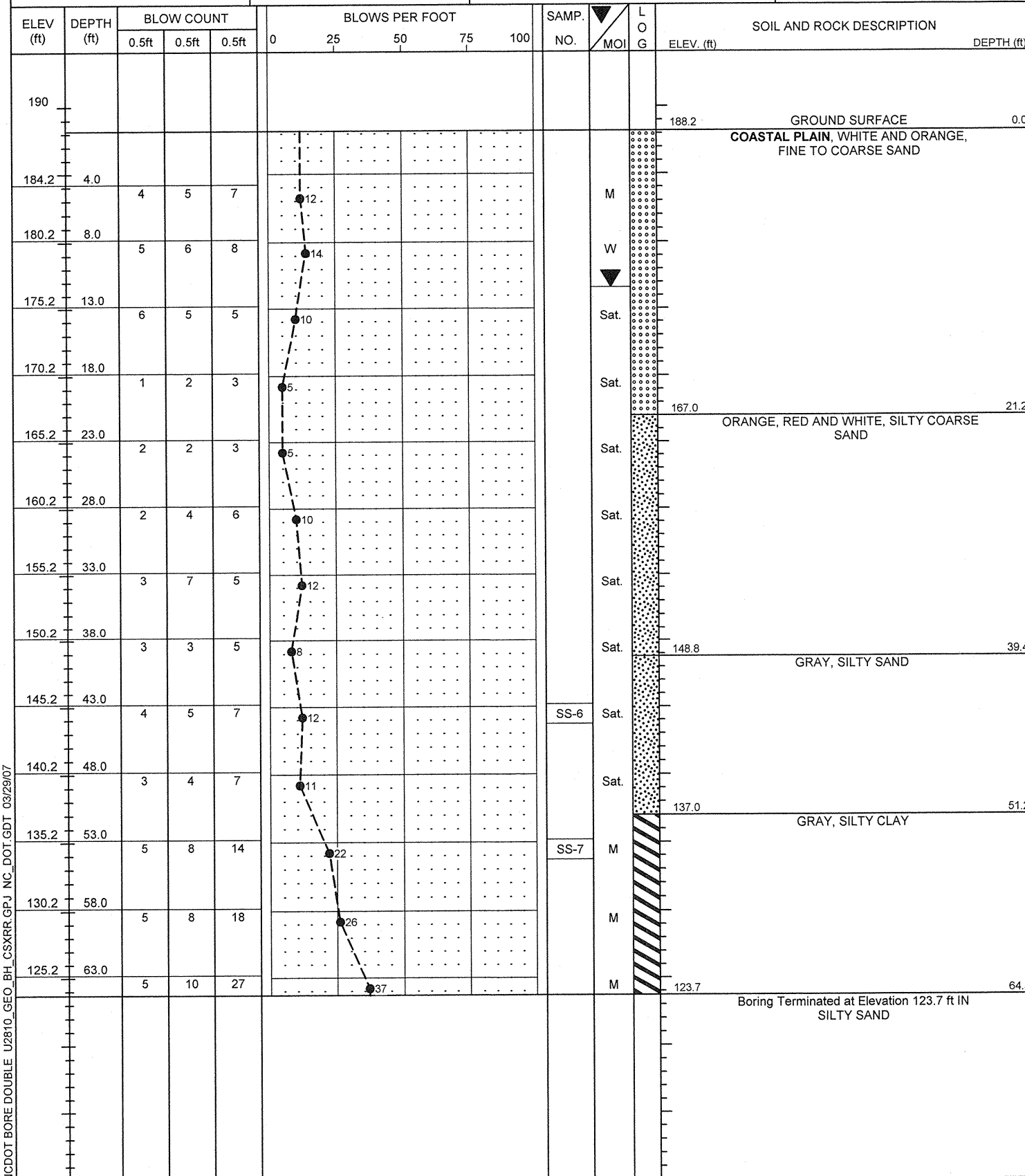
ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
		0.5ft	0.5ft	0.5ft	0	25	50	75	100						
115															
112.6	78.0	11	12	26										114.4	76.2
107.6	83.0	38	49	51/0.3											
														106.3	84.3

NCDOT BORE DOUBLE U2810\_GEO\_BH\_CSXRR.GPJ NC\_DOT.GDT 03/29/07

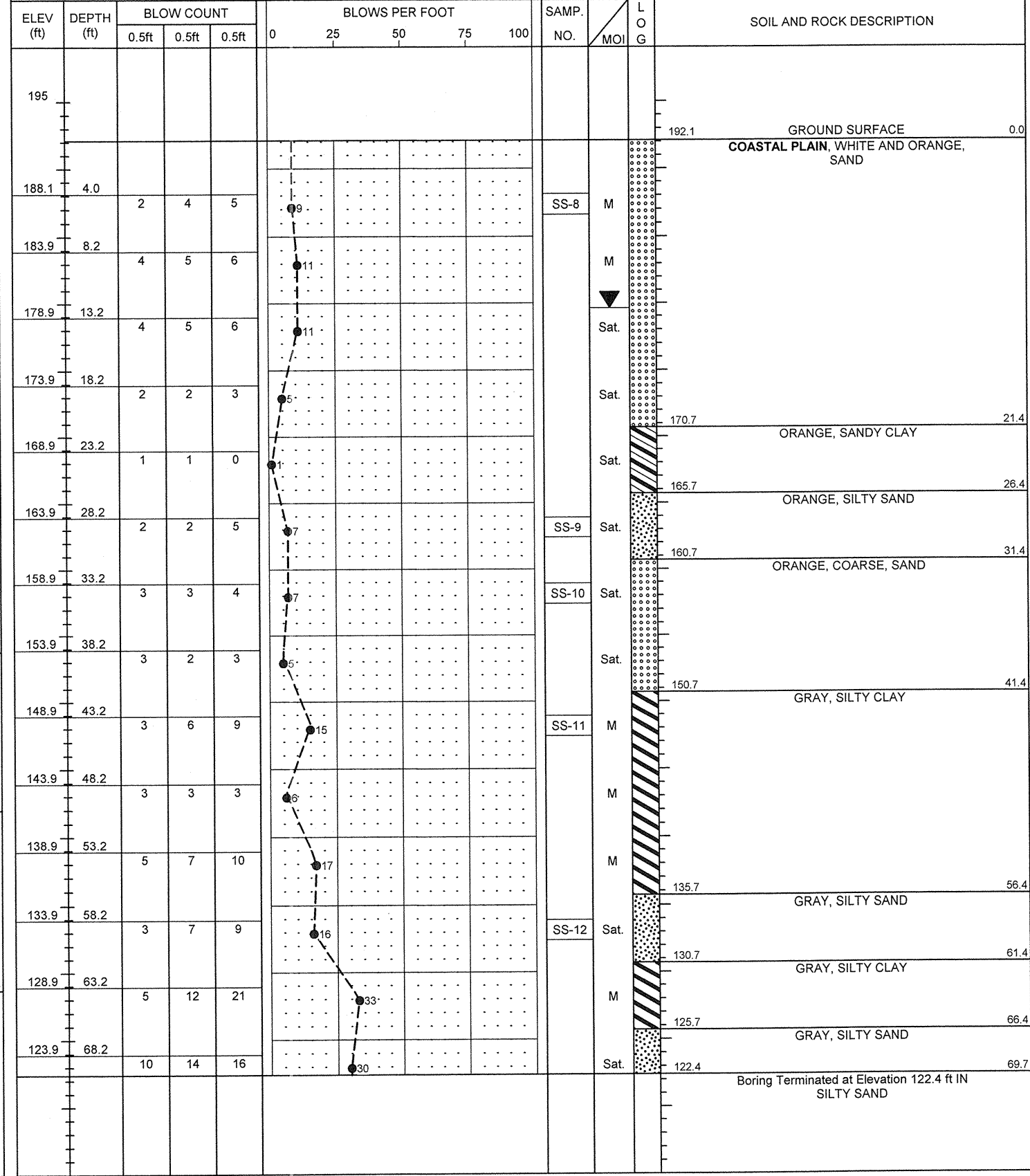


**NCDOT GEOTECHNICAL ENGINEERING UNIT**  
**BORELOG REPORT**

PROJECT NO. 34866.1.1	ID. U-2810	COUNTY CUMBERLAND	GEOLOGIST Mohs, N. D.
SITE DESCRIPTION BRIDGE NO. 194 ON -L- (SR 1003, CAMDEN ROAD) OVER CSXT RAILROAD			GROUND WTR (ft)
BORING NO. EB1-B	STATION 114+20	OFFSET 44ft RT	ALIGNMENT L
COLLAR ELEV. 188.2 ft	TOTAL DEPTH 64.5 ft	NORTHING 454,302	EASTING 2,019,155
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 12/07/06	COMP. DATE 12/07/06	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. 194 ON -L- (SR 1003, CAMDEN ROAD) OVER CSXT RAILROAD			GROUND WTR (ft)
BORING NO. EB2-A	STATION 116+65	OFFSET 44ft LT	ALIGNMENT L
COLLAR ELEV. 192.1 ft	TOTAL DEPTH 69.7 ft	NORTHING 454,390	EASTING 2,019,400
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 12/08/06	COMP. DATE 12/08/06	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A



NCDOT BORE DOUBLE U2810\_GEO\_BH\_CSXRR.GPJ NC\_DOT\_GDT\_03/29/07

# NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

PROJECT NO. 34866.1.1	ID. U-2810	COUNTY CUMBERLAND	GEOLOGIST Mohs, N. D.
SITE DESCRIPTION BRIDGE NO. 194 ON -L- (SR 1003, CAMDEN ROAD) OVER CSXT RAILROAD			GROUND WTR (ft)
BORING NO. EB2-B	STATION 116+15	OFFSET 50ft RT	ALIGNMENT L
COLLAR ELEV. 191.1 ft	TOTAL DEPTH 79.6 ft	NORTHING 454,296	EASTING 2,019,350
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 12/11/06	COMP. DATE 12/11/06	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
		0.5ft	0.5ft	0.5ft	0	25	50	75	100				
195													191.1
												GROUND SURFACE	0.0
												COASTAL PLAIN, WHITE AND TAN, SAND	
187.1	4.0	3	3	6							M		
183.0	8.1	6	6	9							M		
178.0	13.1	4	5	7							W		
173.0	18.1	2	0	1							SS-13	Sat.	174.8
168.0	23.1	3	1	1							Sat.		
163.0	28.1	1	2	2							SS-14	Sat.	164.8
158.0	33.1	1	2	4							Sat.		
153.0	38.1	4	2	4							Sat.		
148.0	43.1	2	2	4							Sat.		
143.0	48.1	5	7	10							SS-15	Sat.	144.8
138.0	53.1	4	5	7							Sat.		
133.0	58.1	4	7	8							M		
128.0	63.1	3	7	10							Sat.		
123.0	68.1	6	10	15							Sat.		
118.0	73.1	4	4	6							SS-16	Sat.	119.8

PROJECT NO. 34866.1.1	ID. U-2810	COUNTY CUMBERLAND	GEOLOGIST Mohs, N. D.
SITE DESCRIPTION BRIDGE NO. 194 ON -L- (SR 1003, CAMDEN ROAD) OVER CSXT RAILROAD			GROUND WTR (ft)
BORING NO. EB2-B	STATION 116+15	OFFSET 50ft RT	ALIGNMENT L
COLLAR ELEV. 191.1 ft	TOTAL DEPTH 79.6 ft	NORTHING 454,296	EASTING 2,019,350
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 12/11/06	COMP. DATE 12/11/06	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
		0.5ft	0.5ft	0.5ft	0	25	50	75	100				
115													
113.0	78.1	7	8	9								Match Line	
												ORANGE AND RED, CLAYEY SAND	
												(continued)	
												Boring Terminated at Elevation 111.5 ft IN SAND	79.6

NCDOT BORE DOUBLE U2810\_GEO\_BH\_CSXRR.GPJ NC\_DOT.GDT 03/29/07

**EB1-A**

<b>SOIL TEST RESULTS</b>															
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	44' LT	114+67	4.0-5.5	A-3(0)	21	NP	27.7	64.0	6.2	2.0	100	90	10	-	-
SS-2	44' LT	114+67	28.0-29.5	A-2-4(0)	22	5	69.7	13.9	5.3	11.1	97	51	17	-	-
SS-3	44' LT	114+67	43.0-44.5	A-7-6(32)	57	31	3.4	6.6	25.6	64.3	99	97	92	-	-
SS-4	44' LT	114+67	48.0-49.5	A-4(0)	24	9	40.8	24.7	8.3	26.1	100	90	36	-	-
SS-5	44' LT	144+67	78.0-79.5	A-3(0)	21	NP	76.2	17.3	2.5	4.0	100	85	8	-	-

**EB1-B**

<b>SOIL TEST RESULTS</b>															
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	44' RT	114+20	43.0-44.5	A-2-4(0)	22	6	37.4	32.8	9.7	20.1	100	97	32	-	-
SS-7	44' RT	114+20	53.0-54.5	A-7-6(20)	44	22	1.8	20.3	31.7	46.2	100	99	88	-	-

**EB2-A**

<b>SOIL TEST RESULTS</b>															
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	44' LT	116+65	4.0-5.0	A-3(0)	23	NP	33.6	62.9	3.5	0.0	100	90	5	-	-
SS-9	44' LT	116+65	28.2-29.7	A-2-4(0)	25	8	57.9	14.7	9.3	18.1	100	85	32	-	-
SS-10	44' LT	116+65	33.2-34.7	A-3(0)	18	NP	83.0	9.9	2.0	5.0	100	65	8	-	-
SS-11	44' LT	116+65	43.2-44.7	A-7-6(39)	63	34	2.8	2.2	30.7	64.3	100	98	96	-	-
SS-12	44' LT	116+65	58.2-59.7	A-2-4(0)	22	NP	64.3	22.8	6.8	6.0	100	80	14	-	-

**EB2-B**

<b>SOIL TEST RESULTS</b>															
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-13	50' RT	116+65	18.1-19.6	A-6(1)	30	12	18.9	38.2	14.8	28.1	74	64	36	-	-
SS-14	50' RT	116+65	28.1-29.6	A-2-4(0)	25	NP	12.3	68.9	6.7	12.1	100	99	20	-	-
SS-15	50' RT	116+15	48.1-49.6	A-2-4(0)	23	NP	47.8	36.5	7.6	8.0	99	89	17	-	-
SS-16	50' RT	116+15	73.1-74.6	A-2-6(0)	25	11	86.2	5.7	3.0	5.0	99	20	9	-	-

**SITE PHOTO**

**BRIDGE NO. 194 OVER CSXT RR ON SR 1003 (CAMDEN RD.)**



**LOOKING NORTH**