

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

STRUCTURE
SUBSURFACE INVESTIGATION

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PROJ. REFERENCE NO. 33644.1.1(B-4307) F.A. PROJ. BRSTP-401(145)
COUNTY WARREN
PROJECT DESCRIPTION BRIDGE NO. 4 ON -L- (US 401) OVER
SHOCCO CREEK AT -L- STATION 16+77.5

INVENTORY

CAUTION NOTICE

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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.

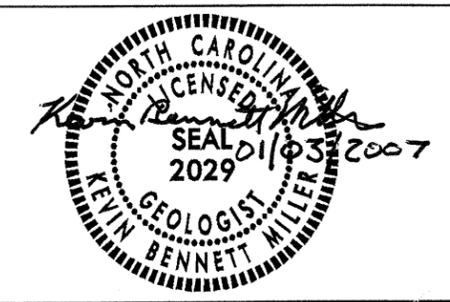
THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT 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: 33644.1.1 ID: B-4307

PERSONNEL

- O.B. OTI
- M.L. REEDER
- J.R. MATULA
- D.W. DIXON
- H.R. CONLEY

INVESTIGATED BY K.B. MILLER
CHECKED BY O.B. OTI
SUBMITTED BY N.T. ROBERSON
DATE JANUARY 2007



DRAWN BY: 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

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 (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: <i>VERY STIFF, GRAY-SILT CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HARD 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 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 (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND 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 INTRODUCED 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 60 BLOWS PER FOOT. STRATA CORE RECOVERY (SCRC) - 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.									
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.										WEATHERED ROCK (WR) NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.										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.									
SOIL LEGEND AND AASHTO CLASSIFICATION										ANGULARITY OF GRAINS THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.										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.										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.									
GROUP CLASS. A-1, A-2, A-3, A-4, A-5, A-6, A-7, A-7.5, A-8, A-9										COMPRESSIBILITY SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50										WEATHERING 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.									
SYMBOL										PERCENTAGE OF MATERIAL ORGANIC MATERIAL GRANULAR SOILS SILT - CLAY SOILS OTHER MATERIAL										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.									
% PASSING										GROUND WATER WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING										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. IF TESTED, WOULD YIELD SPT REFUSAL.										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. IF TESTED, YIELDS SPT N VALUES > 100 BPF.									
LIQUID LIMIT PLASTIC INDEX										MISCELLANEOUS SYMBOLS ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION										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. IF TESTED, YIELDS SPT N VALUES < 100 BPF.										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.									
GROUP INDEX										ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT										ROCK HARDNESS 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.									
USUAL TYPES OF MAJOR MATERIALS										INFERRED SOIL BOUNDARY										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 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.									
GENERATING AS A SUBGRADE										INFERRED ROCK LINE										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.										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.									
PI OF A-7-5 SUBGROUP IS <= LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30										ALLUVIAL SOIL BOUNDARY										EQUIPMENT USED ON SUBJECT PROJECT DRILL UNITS: MOBILE B- BK-51 CME-45C CME-550 PORTABLE HOIST										ADVANCING TOOLS: CLAY BITS 6" CONTINUOUS FLIGHT AUGER 8" HOLLOW AUGERS HARD FACED FINGER BITS TUNG-CARBIDE INSERTS CASING W/ ADVANCER TRICONE * STEEL TEETH TRICONE * TUNG-CARB. CORE BIT									
CONSISTENCY OR DENSENESS										DIP & DIP DIRECTION OF ROCK STRUCTURES										FRACTURE SPACING TERM SPACING 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										BEDDING TERM THICKNESS 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									
TEXTURE OR GRAIN SIZE										SOUNDING ROD										INDURATION FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.										FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.									
U.S. STD. SIEVE SIZE OPENING (MM)										SLOPE INDICATOR INSTALLATION										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.									
BOULDER (BLDR.) COBBLE (COB.) GRAVEL (GR.) COARSE SAND (CSE. SD.) FINE SAND (F. SD.) SILT (SL.) CLAY (CL.)										SPT N-VALUE										EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.										SPT REFUSAL									
SOIL MOISTURE - CORRELATION OF TERMS										SPT REFUSAL										ABBREVIATIONS HI. - HIGHLY MED. - MEDIUM MICA - MICACEOUS MOD. - MODERATELY NP - NON PLASTIC ORG. - ORGANIC PMT - PRESSUREMETER TEST SAP. - SAPROLITIC SD. - SAND, SANDY SL. - SILT, SILTY SLI. - SLIGHTLY TCR - TRICONE REFUSAL										MOISTURE CONTENT W - VERY VST - VANE SHEAR TEST WEA. - WEATHERED UNIT WEIGHT DRY UNIT WEIGHT									
SOIL MOISTURE SCALE (ATTERBERG LIMITS)										SOUNDING ROD										HAND TOOLS: POST HOLE DIGGER HAND AUGER SOUNDING ROD VANE SHEAR TEST										FIELD MOISTURE DESCRIPTION - SATURATED - (SAT.) USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE									
PLASTICITY										SOUNDING ROD										FIELD MOISTURE DESCRIPTION - WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE										GUIDE FOR FIELD MOISTURE DESCRIPTION - LIQUID LIMIT (LL) - SATURATED - (SAT.) USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE									
NONPLASTIC LOW PLASTICITY MED. PLASTICITY HIGH PLASTICITY										SOUNDING ROD										FIELD MOISTURE DESCRIPTION - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE										FIELD MOISTURE DESCRIPTION - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE									
COLOR										SOUNDING ROD										FIELD MOISTURE DESCRIPTION - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE										FIELD MOISTURE DESCRIPTION - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE									
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.										SOUNDING ROD										FIELD MOISTURE DESCRIPTION - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE										FIELD MOISTURE DESCRIPTION - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE									



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

January 3, 2007

STATE PROJECT: 33644.1.1 (B-4307)
FEDERAL PROJECT: BRSTP-401 (145)
COUNTY: Warren

DESCRIPTION: Bridge No. 4 on -L- (US 401) over Shocco Creek

SUBJECT: Geotechnical Report – Structure Inventory

Site Description

The project is located in north central Warren County on US 401 18 miles north of the town of Louisburg. The proposed bridge will replace the existing structure in place. The replacement structure is a 135 feet long single span with a skew of 90 degrees. Traffic will be detoured off site during construction.

The subsurface investigation was conducted in October of 2006 using a CME-550 drill machine equipped with an automatic hammer. Four Standard Penetration Test borings were advanced to crystalline rock using hollow stem augers. Representative soils sample were collected for visual classification in the field and for laboratory analysis by the Materials and Tests Unit.

Physiography and Geology

The structure is located in rolling terrain within the Piedmont Physiographic Province. The area is a rural farming community that is sparsely populated. Geologically, the site is within the Raleigh Belt and contains Biotite gneiss and mica schist.

Soil Properties

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

Roadway Embankment was encountered in all borings and consists of 8.0 to 10.7 feet of red brown, soft, silty clay (A-7-5).

Alluvial soils at the site are approximately 8.0 to 16.0 feet thick and consist of tan-brown, soft to stiff, silty and sandy clay (A-7-5, A-6) and tan-gray, loose, fine to coarse sand (A-1-b, A-3). Alluvial soils were encountered in all borings.

Residual soils range from 5.5 to 26.0 feet thick and consist of tan-gray-brown, loose to very dense, silty sand (A-2-4, A-2-5). Residual soils are derived from the in-place weathering of gneissic rock.

Rock Properties

Weathered rock was encountered in all borings at elevations ranging from 237.8 to 243.5 feet. All borings yielded SPT and/or hollow stem auger refusal. The rock fragments recovered from the hollow stems were gneiss.

Groundwater

Groundwater elevations at the site ranged from 263.0 to 264.8 feet at the time of the investigation. The Hydraulics Unit noted the surface water elevation of Shocco Creek at 265.0 feet in January 2006. Seasonal fluctuation in the ground water table can be expected.

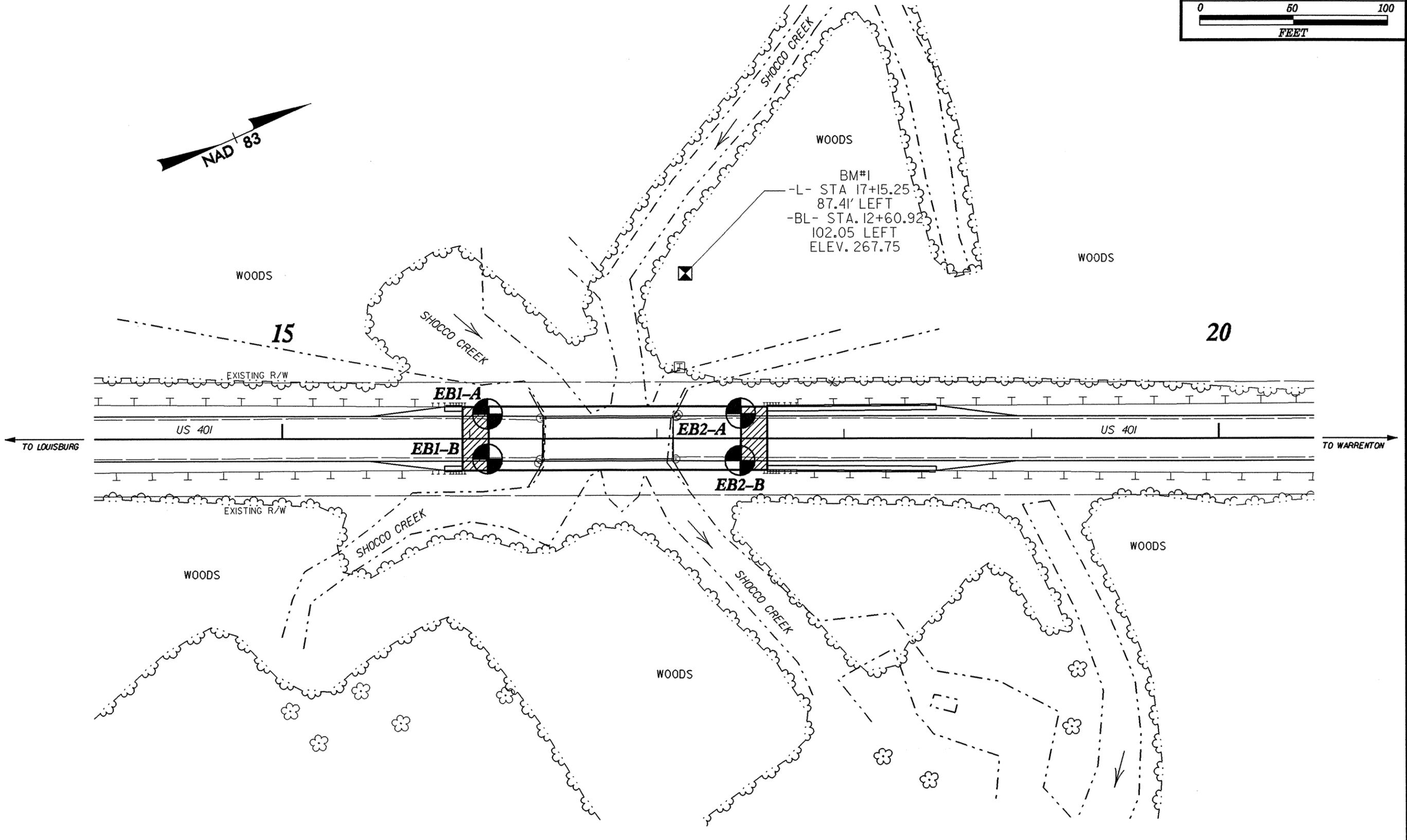
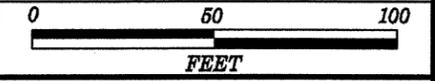
Notice

This report is based on the bent locations provided in the Preliminary General Drawing dated September 6, 2006 and the Bridge Survey and Hydraulic Design Report dated June 12, 2006. If significant changes are made in the design and/or location of the proposed structure the subsurface information should be reviewed and modified as necessary.

Prepared by:

Onuoha B. Oti
Engineering Geologist II

SITE PLAN

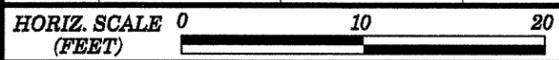
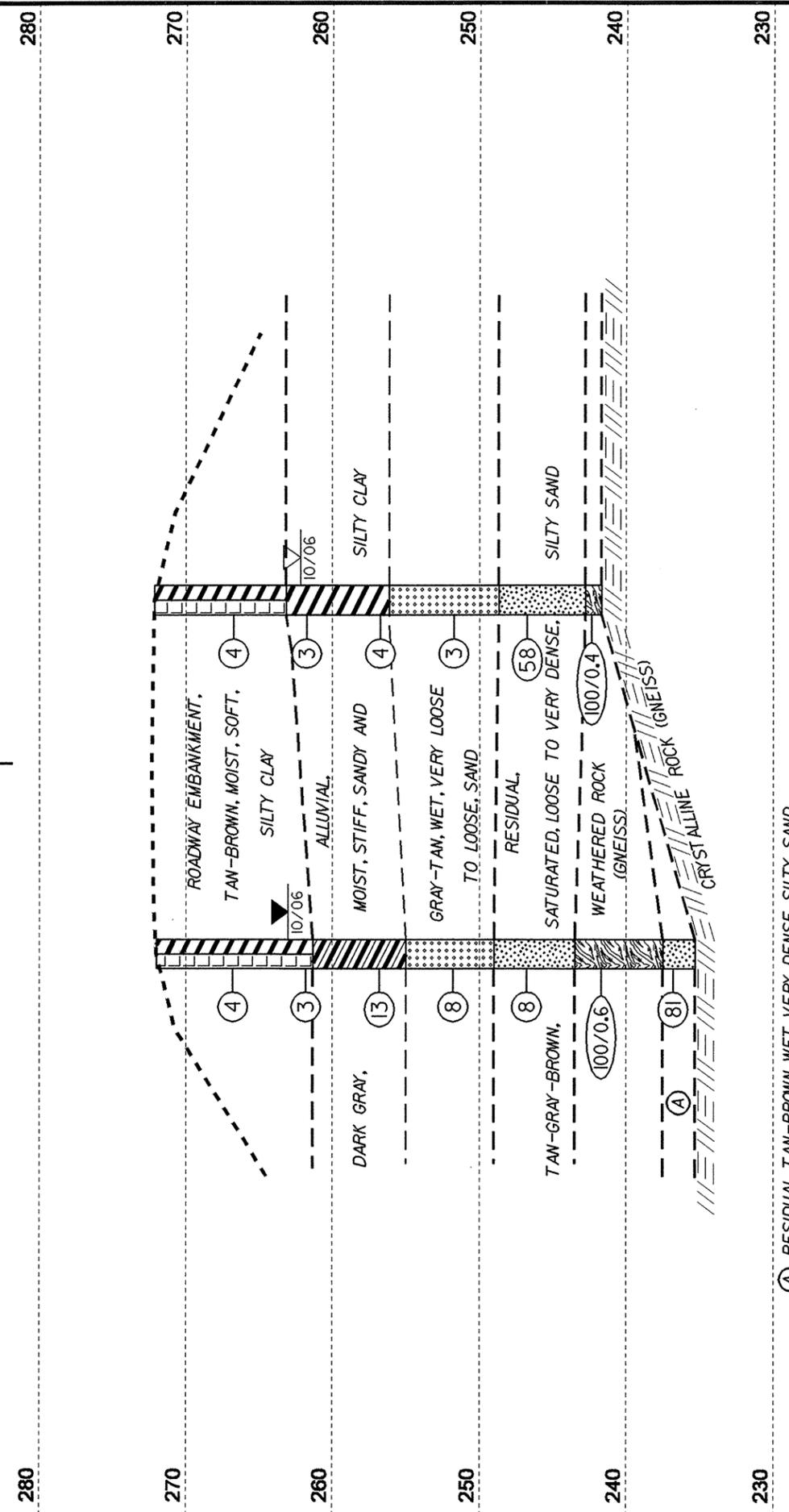


SKEW= 90°

EB1-B
16+10
11' RT

EB1-A
16+10
13' LT

-L-



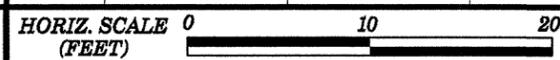
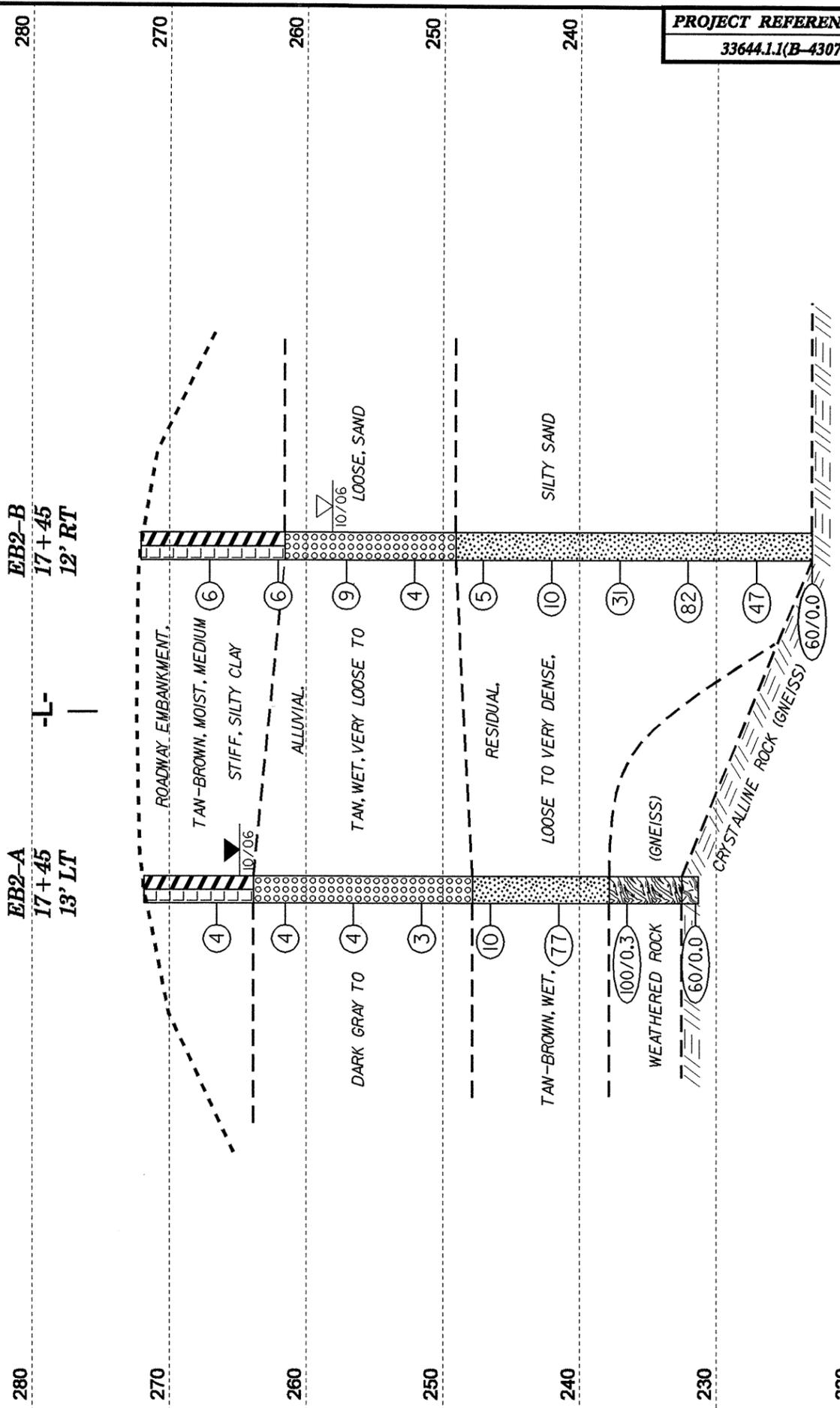
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CROSS SECTION THROUGH END BENT 1

EB2-B
17+45
12' RT

EB2-A
17+45
13' LT

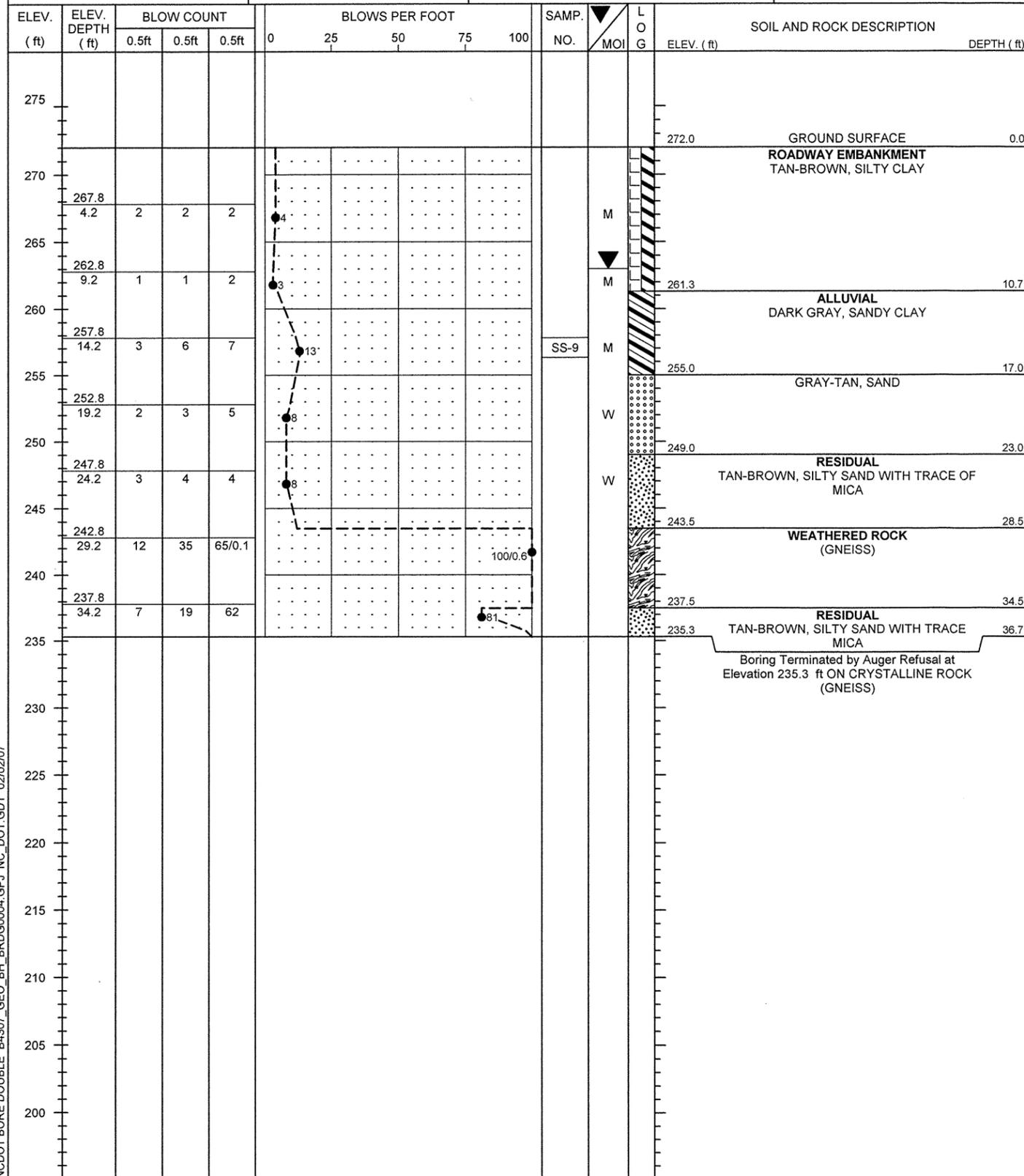
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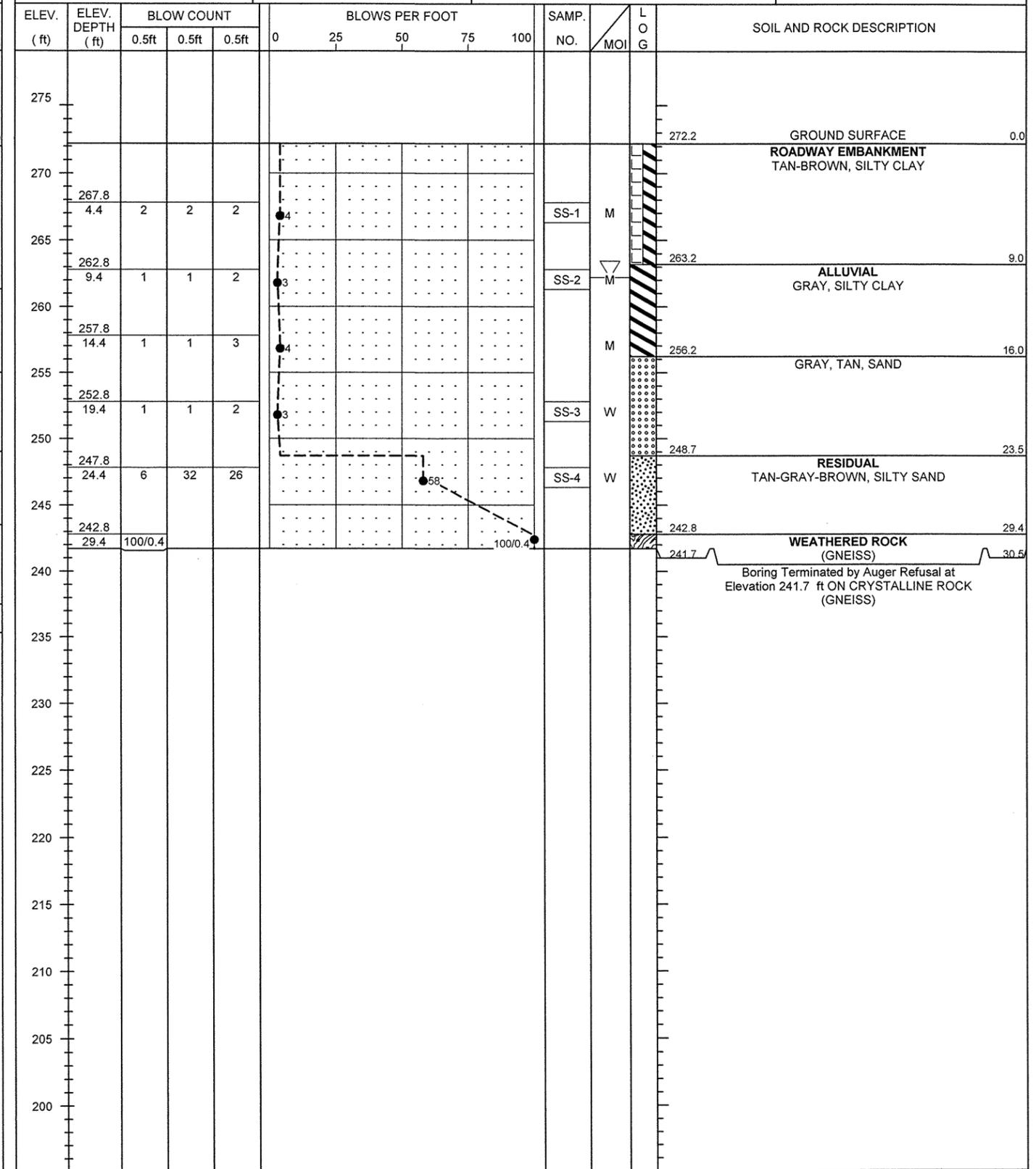
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CROSS SECTION THROUGH END BENT 2

PROJECT NO. 33644.1.1	ID. B-4307	COUNTY WARREN	GEOLOGIST Oti, O. B.
SITE DESCRIPTION BRIDGE NO. 4 ON -L- (US 401) OVER SHOCCO CREEK			GROUND WTR (ft)
BORING NO. EB1-A	STATION 16+10	OFFSET 13 ft LT	ALIGNMENT -L-
COLLAR ELEV. 272.0 ft	TOTAL DEPTH 36.7 ft	NORTHING 925,984	EASTING 2,227,921
DRILL MACHINE CME-550	DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
START DATE 10/20/06	COMP. DATE 10/20/06	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 36.7 ft



PROJECT NO. 33644.1.1	ID. B-4307	COUNTY WARREN	GEOLOGIST Oti, O. B.
SITE DESCRIPTION BRIDGE NO. 4 ON -L- (US 401) OVER SHOCCO CREEK			GROUND WTR (ft)
BORING NO. EB1-B	STATION 16+10	OFFSET 11 ft RT	ALIGNMENT -L-
COLLAR ELEV. 272.2 ft	TOTAL DEPTH 30.5 ft	NORTHING 925,974	EASTING 2,227,943
DRILL MACHINE CME-550	DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
START DATE 10/18/06	COMP. DATE 10/18/06	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 30.5 ft



NCDOT BORE DOUBLE B4307 GEO_BH_BRDGG004.GPJ NC_DOT.GDT 02/02/07



PROJECT NO. 33644.1.1		ID. B-4307		COUNTY WARREN		GEOLOGIST Oti, O. B.									
SITE DESCRIPTION BRIDGE NO. 4 ON -L- (US 401) OVER SHOCCO CREEK							GROUND WTR (ft)								
BORING NO. EB2-A		STATION 17+45		OFFSET 13 ft LT		ALIGNMENT -L-									
COLLAR ELEV. 271.8 ft		TOTAL DEPTH 40.5 ft		NORTHING 926,107		EASTING 2,227,976									
DRILL MACHINE CME-550		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
START DATE 10/18/06		COMP. DATE 10/18/06		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 39.3 ft									
ELEV. (ft)	ELEV. DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
		0.5ft	0.5ft	0.5ft	0	25	50	75	100						
275														271.8	0.0
270	267.5	2	2	2											
	4.3														
265	262.5	1	2	2											
	9.3														
260	257.5	1	2	2											
	14.3														
255	252.5	1	1	2											
	19.3														
250	247.5	3	4	6											
	24.3														
245	242.5	23	35	42											
	29.3														
240	237.5	100/0.3													
	34.3														
235	232.5	60/0.0													
	39.3														
230															
225															
220															
215															
210															
205															
200															

PROJECT NO. 33644.1.1		ID. B-4307		COUNTY WARREN		GEOLOGIST Oti, O. B.									
SITE DESCRIPTION BRIDGE NO. 4 ON -L- (US 401) OVER SHOCCO CREEK							GROUND WTR (ft)								
BORING NO. EB2-B		STATION 17+45		OFFSET 12 ft RT		ALIGNMENT -L-									
COLLAR ELEV. 272.1 ft		TOTAL DEPTH 49.0 ft		NORTHING 926,097		EASTING 2,227,998									
DRILL MACHINE CME-550		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
START DATE 10/19/06		COMP. DATE 10/19/06		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 49.0 ft									
ELEV. (ft)	ELEV. DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
		0.5ft	0.5ft	0.5ft	0	25	50	75	100						
275														272.1	0.0
270	268.1	2	2	4											
	4.0														
265	263.1	1	3	3											
	9.0														
260	258.1	2	4	5											
	14.0														
255	253.1	1	1	3											
	19.0														
250	248.1	1	2	3											
	24.0														
245	243.1	3	4	6											
	29.0														
240	238.1	5	11	20											
	34.0														
235	233.1	22	37	45											
	39.0														
230	228.1	6	20	27											
	44.0														
225	223.1	60/0.0													
	49.0														
220															
215															
210															
205															
200															

NCDOT BORE DOUBLE B4307_GEO_BH_BRD0004.GPJ NC_DOT_GDT 02/02/07

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-9	13' LT	16+10	14.2-15.7	A-6(8)	40	23	32.5	19.7	15.7	32.1	100	83	51	-	-

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	11' RT	16+10	4.4-5.9	A-7-5(9)	53	21	18.7	32.9	16.3	32.1	97	88	52	-	-
SS-2	11' RT	16+10	9.4-10.9	A-7-5(23)	56	26	8.4	12.7	22.7	56.2	100	96	81	-	-
SS-3	11' RT	16+10	19.4-20.9	A-3(0)	28	NP	69.8	26.2	2.0	2.0	99	67	5	-	-
SS-4	11' RT	16+10	24.4-25.9	A-2-4(0)	33	NP	20.9	64.7	10.4	4.0	91	86	18	-	-

EB2-A

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-5	13' LT	17+45	4.3-5.8	A-7-5(1)	45	12	29.9	35.7	16.3	18.1	98	83	38	-	-
SS-6	13' LT	17+45	9.3-10.8	A-1-b(0)	22	NP	70.3	16.4	5.3	8.0	95	48	14	-	-
SS-7	13' LT	17+45	24.3-25.8	A-2-5(0)	45	NP	22.5	57.4	16.1	4.0	98	90	26	-	-
SS-8	13' LT	17+45	29.3-30.8	A-2-4(0)	30	NP	15.7	68.7	11.6	4.0	98	94	22	-	-



**FIELD
 SCOUR REPORT**

WBS: 33644.1.1 TIP: B-4307 COUNTY: WARREN

DESCRIPTION(1): BRIDGE NO. 4 ON -L- (NC 401) OVER SHOCCO CREEK

EXISTING BRIDGE

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

Bridge No.: 4 Length: 70 Total Bents: 5 Bents in Channel: 3 Bents in Floodplain: 2
 Foundation Type: TIMBER PILES

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: NONE

Interior Bents: MINOR CONTRACTION SCOUR AROUND PIER 1,2 & 3 (1.5')

Channel Bed: MINOR CONTRACTION SCOUR

Channel Bank: NONE

EXISTING SCOUR PROTECTION

Type(3): TIMBER WING WALLS

Extent(4): 5 TO 7 FEET BEYOND EDGE OF BRIDGE

Effectiveness(5): APPEAR SATISFACTORY

Obstructions(6): MINOR DEBRIS WERE NOTED BOTH DOWN AND UPSTREAM OF BRIDGE

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-6) LOOSE, TAN-GRAY SAND (A-1-B)

Channel Bank Material(8): (SS-2) SOFT, GRAY, SILTY CLAY (A-7-5) AND (SS-6) LOOSE, TAN-GRAY SAND (A-1-B)

Channel Bank Cover(9): WOODS, SHRUBS, GRASS, LARGE AND SMALL TREES

Floodplain Width(10): APPROXIMATELY 530 FEET

Floodplain Cover(11): WOODS, SHRUBS, GRASS

Stream is(12): Aggrading _____ Degrading Static _____

Channel Migration Tendency(13): SLIGHT TENDENCY TO THE NORTH TOWARDS END BENT 2

Observations and Other Comments: N/A

DESIGN SCOUR ELEVATIONS(14)

Feet Meters _____

100 yr																				
257.3																				

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 6/12/06.

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																				

Reported by: Onuoha B. Oti Date: 10/23/2006
 ONUOHA B. OTI

Template Revised 02/07/06

SITE PHOTOGRAPH

Bridge No. 4 On -L- (US 401) Over Shocco Creek



LOOKING SOUTH TOWARDS END BENT 1