

CONTRACT: ID: B-3824

# STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL UNIT

## STRUCTURE SUBSURFACE INVESTIGATION

STATE PROJECT 33276.1.1 I.D. NO. B-3824  
F.A. PROJECT BRZ-1525(4)  
COUNTY CHATHAM  
PROJECT DESCRIPTION BRIDGE NO. 88 ON  
-L- (SR 1525) OVER FERRELL'S CREEK  
AT -L- STATION 13+35

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	33276.1.1 (B-3824)	1	15

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### 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 RELED 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.

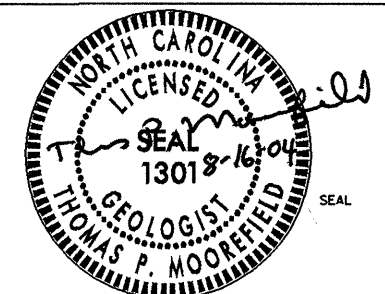
THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT 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 <u>T.P. MOOREFIELD</u>	PERSONNEL <u>J.L. LOVE</u>
CHECKED BY <u>D.N. ARGENBRIGHT</u>	<u>J.B. BARFIELD</u>
SUBMITTED BY <u>D.N. ARGENBRIGHT</u>	<u>O.B. OTI</u>
DATE <u>AUGUST 2004</u>	<u>L.B. MADISON</u>
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DRAWN BY: J.L. LOVE, T.T. WALKER

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 UNIT**

ID	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
B-3824	33276.1.1	2	15

**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 WHICH CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND WHICH YIELDS LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (ASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM AND 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, GRAY SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGH PLASTIC, A-7-6</i>	<b>WELL-GRADED</b> - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE <b>UNIFORM</b> - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED) <b>GAP-GRADED</b> - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES. <b>ANGULARITY OF GRAINS</b> THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS ARE DESIGNATED BY THE TERMS: <b>ANGULAR</b> , <b>SUBANGULAR</b> , <b>SUBROUNDED</b> , OR <b>ROUNDED</b> .	<b>HARD ROCK</b> IS NON-COASTAL PLAIN MATERIAL THAT WHEN 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: <b>WEATHERED ROCK (WR)</b> <b>CRYSTALLINE ROCK (CR)</b> <b>NON-CRYSTALLINE ROCK (NCR)</b> <b>COASTAL PLAIN SEDIMENTARY ROCK (CP)</b>	<b>ALLUVIUM (ALLUV.)</b> - SOILS WHICH HAVE BEEN TRANSPORTED BY WATER. <b>AQUIFER</b> - A WATER BEARING FORMATION OR STRATA. <b>ARENACEOUS</b> - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. <b>ARGILLACEOUS</b> - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC. <b>ARTESIAN</b> - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IS IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. <b>CALCAREOUS (CALC.)</b> - SOILS WHICH CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. <b>COLLUVIUM</b> - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. <b>CORE RECOVERY (REC.)</b> - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. <b>DIKE</b> - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. <b>DIP</b> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. <b>DIP DIRECTION (DIP AZIMUTH)</b> - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. <b>FAULT</b> - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. <b>FISSILE</b> - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. <b>FLOAT</b> - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. <b>FLOOD PLAIN (F.P.)</b> - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. <b>FORMATION (FM.)</b> - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. <b>JOINT</b> - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. <b>LEDGE</b> - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. <b>LENS</b> - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. <b>MOTTLED (MOT.)</b> - IRRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. <b>PERCHED WATER</b> - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. <b>RESIDUAL SOIL</b> - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. <b>ROCK QUALITY DESIGNATION (R.Q.D.)</b> - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. <b>SAPROLITE (SAP.)</b> - RESIDUAL SOIL WHICH RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. <b>SILL</b> - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, WHICH HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. <b>SLICKENSIDE</b> - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. <b>STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT)</b> - NUMBER OF BLOWS (N OR B.P.F.) 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 LESS THAN 0.1 FOOT PENETRATION WITH 60 BLOWS. <b>STRATA CORE RECOVERY (SREC.)</b> - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. <b>STRATA ROCK QUALITY DESIGNATION (S.R.Q.D.)</b> - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 10 CENTIMETERS DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. <b>TOPSOIL (T.S.)</b> - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
<b>SOIL LEGEND AND AASHTO CLASSIFICATION</b> GENERAL CLASS. GRANULAR MATERIALS (35% PASSING #200) SILT-CLAY MATERIALS (75% PASSING #200) ORGANIC MATERIALS GROUP CLASS. 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STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION

Michael F. Easley  
GOVERNOR

P.O. BOX 25201, RALEIGH, N.C. 27611-5201

Lyndo Tippet  
SECRETARY

August 19, 2004

STATE PROJECT: 33276.1.1 (B-3824)  
FEDERAL PROJECT: BRZ-1525(4)  
COUNTY: Chatham

DESCRIPTION: Bridge No. 88 on SR 1525 over Ferrell's Creek

SUBJECT: Geotechnical Report – Foundation Investigation for Structure on  
-L- (SR 1525) over Ferrell's Creek at -L- Station 13+35

**Note:** This inventory report supersedes the previously submitted report of August 28, 2003.

**Project Description**

This project consists of a 144-foot long three span bridge to be constructed over Ferrell's Creek. The proposed bridge has a 60° skew and will replace the existing 116-foot long structure. The project is located approximately 7 miles north of Pittsboro.

This site was originally investigated in July 2003 for a single span structure. In May 2004, the field crew returned to investigate for the proposed three span structure discussed in this report. The July 2003 borings were advanced using a BK 51 ATV-mounted drill machine with automatic hammer. The August 2004 borings were drilled using a CME 550 ATV-mounted drill machine with automatic hammer. Standard Penetration Tests were performed at each bent location. Representative soil samples were collected for visual classification in the field and for laboratory analysis by the Materials and Tests Unit.

**Physiography and Geology**

The project is located in gently rolling terrain of the central Piedmont Physiographic Province in rural northern Chatham County. The project occurs within the Carolina Slate Belt geologic province. The underlying bedrock consists of metamorphosed granite and diorite intrusions.

**Soil Properties**

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

The roadway embankment fill soil consists of very soft to medium stiff, moist to wet sandy clay (AASHTO classification of A-6) and silty sandy clay (A-7-6). The fill soil is approximately 10 to 18 feet thick at End Bent One, 2 feet thick at Bent Two, and 10 to 14 feet thick at End Bent Two.

The alluvial soil underlies the roadway embankment in each boring and ranges from 9 to 15 feet in thickness. The alluvial soil consists of interbedded very soft to soft, moist to wet, sandy silt (A-4) and silty sandy clay (A-6 and A-7-6) with trace organic matter, overlying 1.5 to 12 feet of gray coarse alluvial sand (A-3). A lag gravel deposit was encountered at the base of the alluvial soils and yielded N-values of 100+. The alluvial soil overlies either residual soil or weathered rock.

The residual soil consists of silty coarse sand derived from the in-place weathering of the underlying bedrock. These soils include medium dense to very dense, dry silty coarse sand (A-2-4) and coarse sand (A-1-b). The residual soils grade into weathered rock with depth.

**Rock Properties**

The weathered rock was derived from the underlying metamorphosed granite and diorite bedrock. Weathered rock was encountered below the residual soil at Bent One, Bent Two, and the right side of End Bent One. The weathered rock is interbedded with very dense residual sand in boring EB2-B.

**Groundwater**

Groundwater was encountered at each bent location. Groundwater elevations ranged from 358.0 to 361.5 feet.

**Undisturbed Sample**

An undisturbed sample of alluvial soil was retrieved from the interval 21.0 to 23.0 feet in boring EB2-B. The sample was submitted to the Materials and Test Unit for consolidation testing. See Settlement Test Report dated August 22, 2003 for results.

**Notice**

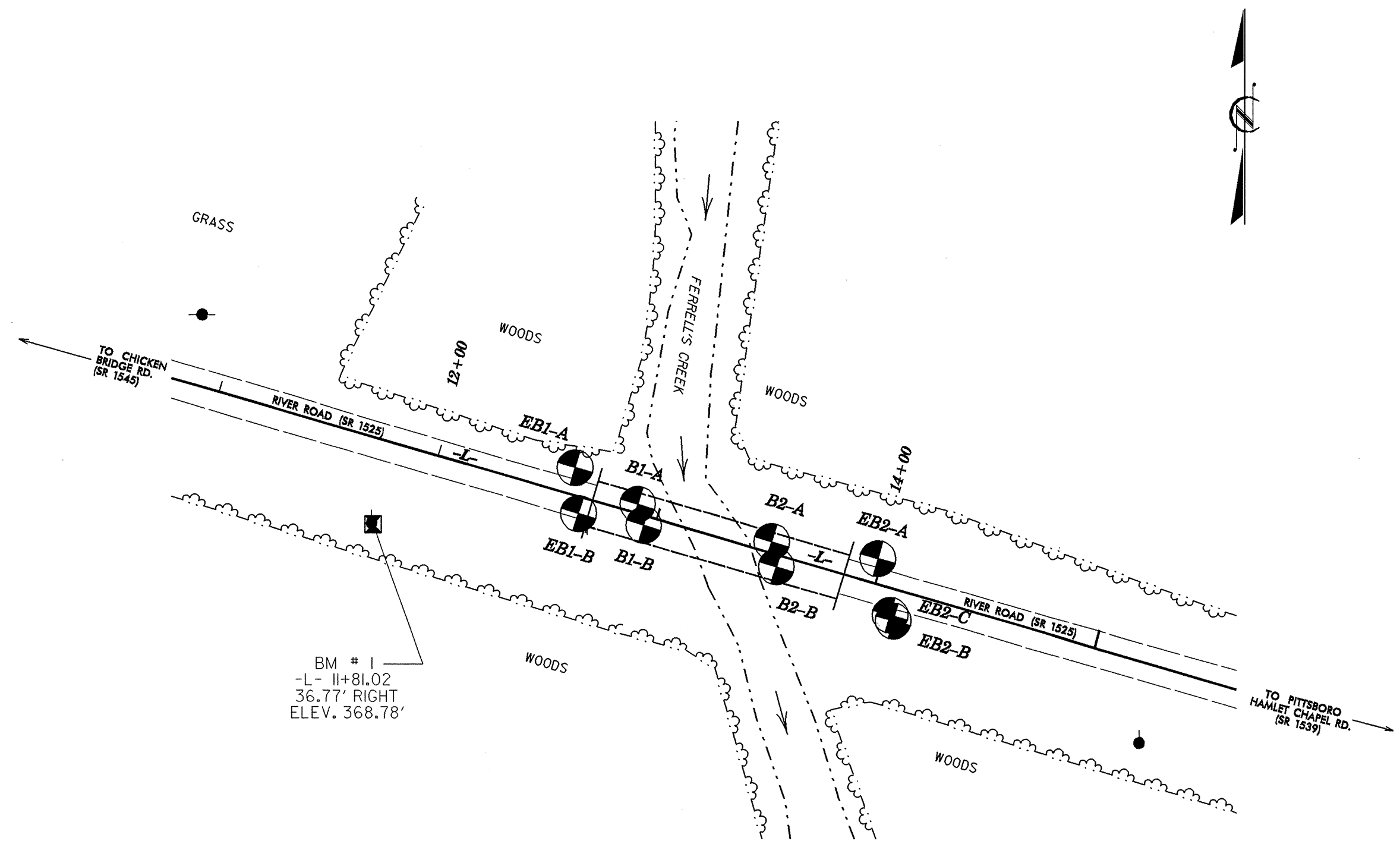
This Geotechnical foundation report is based on the bent locations provided in the Bridge Survey & Hydraulic Design Report dated April 23, 2003 and the memo "Revised Request for Foundation Recommendations" dated April 29, 2004. If significant changes are made in the design, or location of the proposed structure, the subsurface information should be reviewed and modified as necessary.

Prepared by,

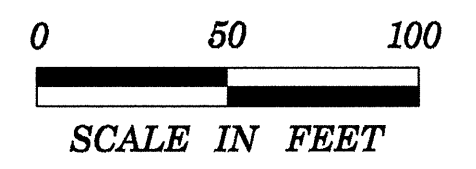
*Thomas P. Moorefield*

Thomas P. Moorefield, LG  
Project Geologist

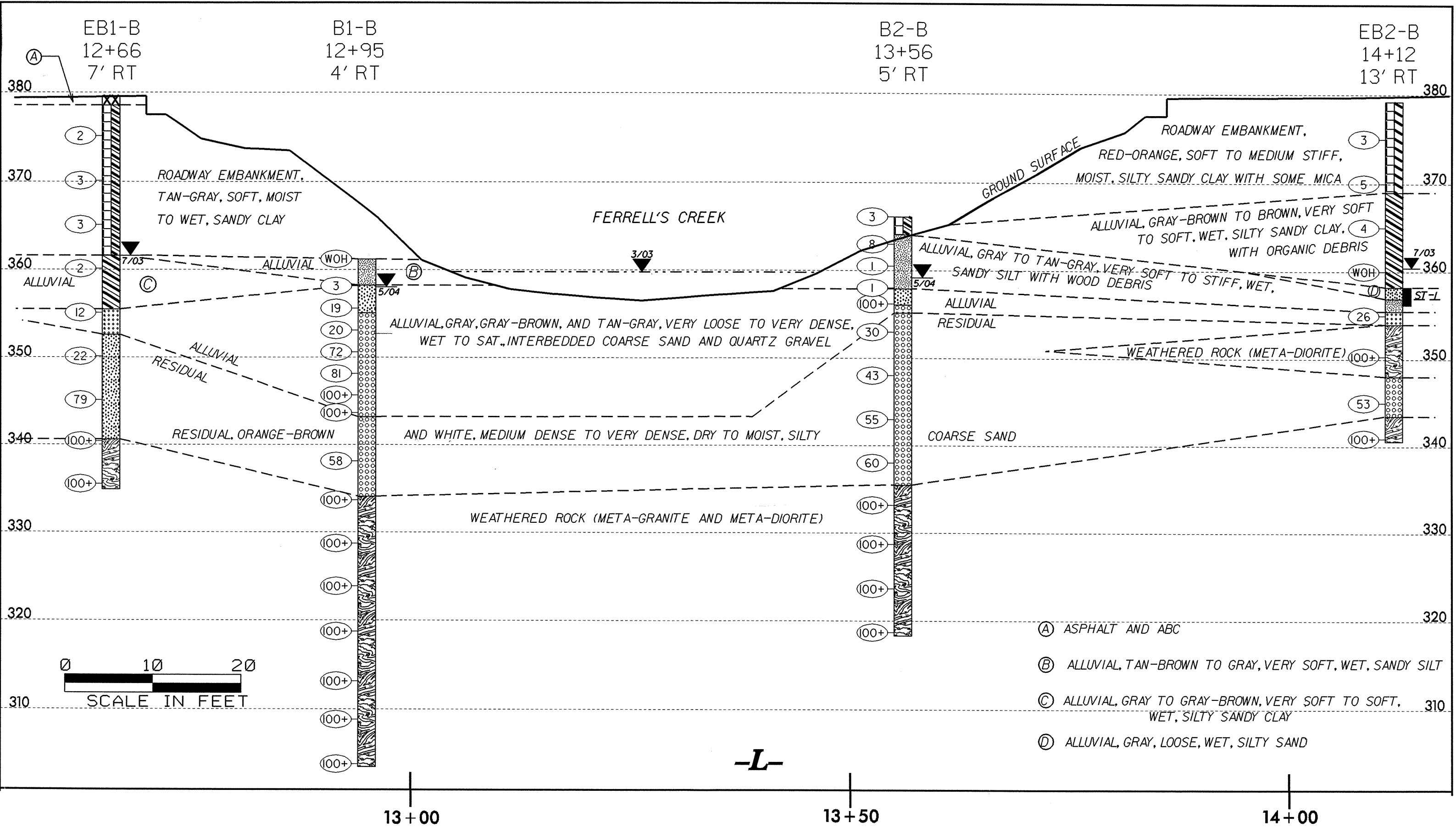
# TEST SITE PLAN



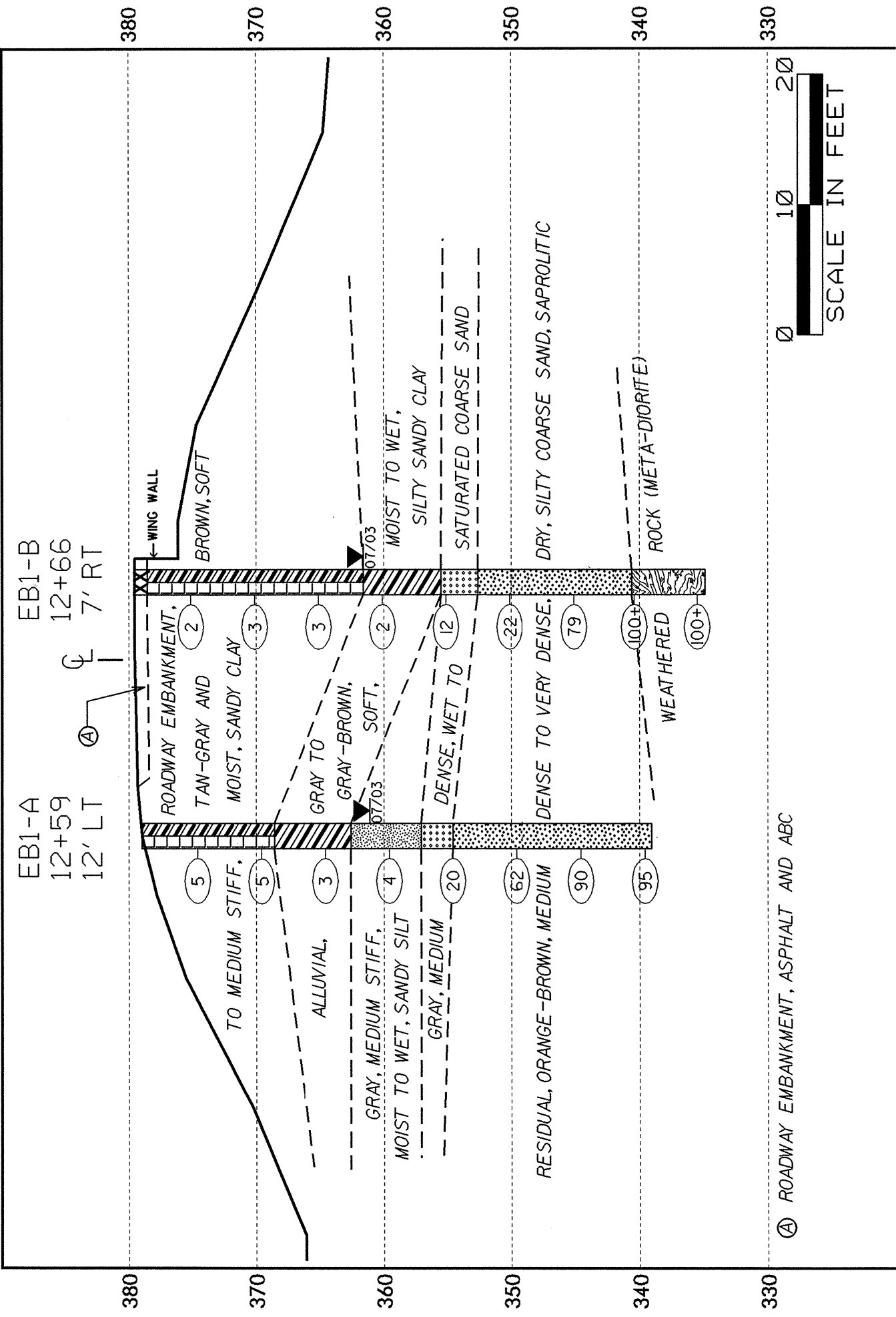
BM # 1  
-L- 11+81.02  
36.77' RIGHT  
ELEV. 368.78'



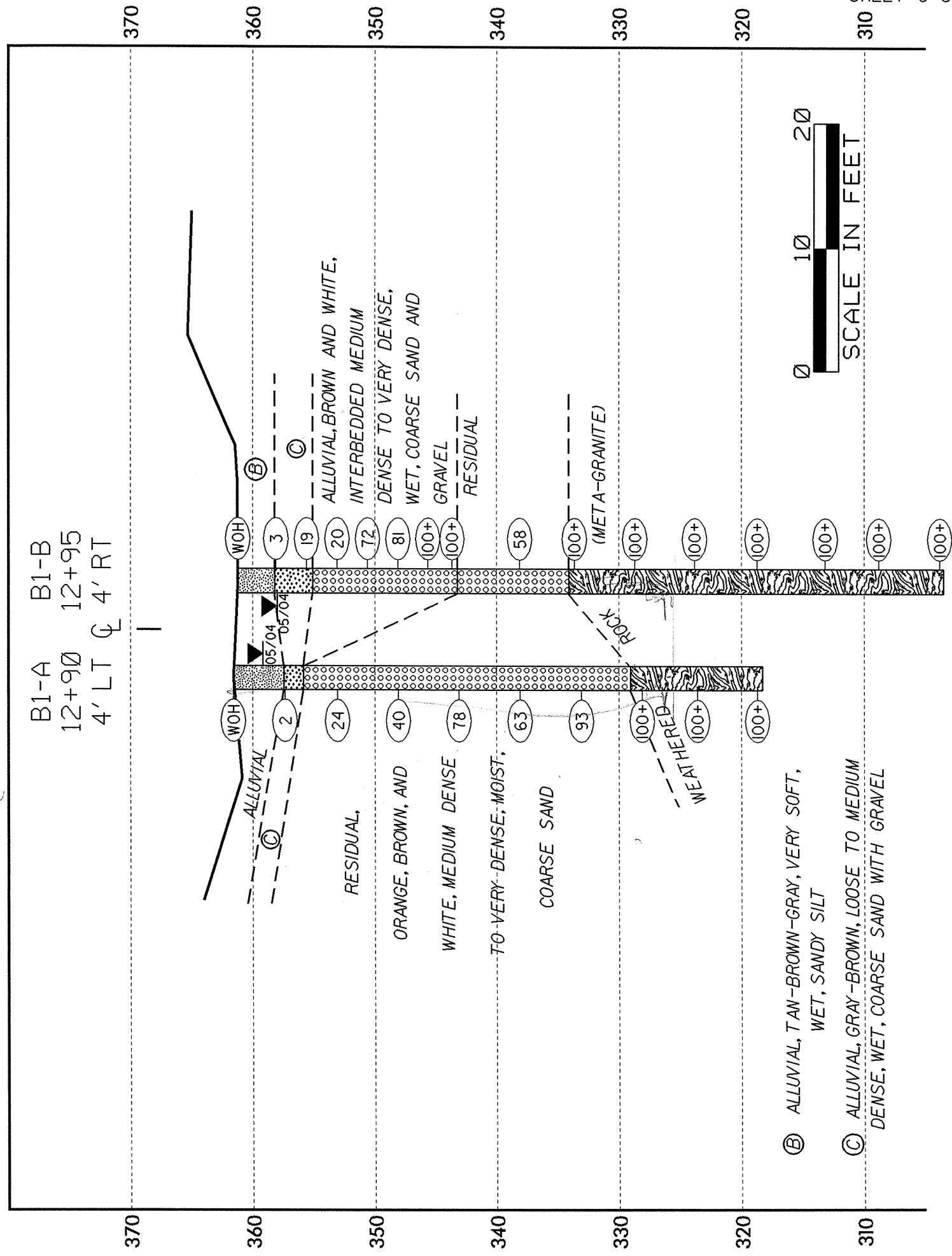
# PROFILE THROUGH BORINGS PROJECTED ALONG -L-



CROSS SECTION THROUGH END BENT I BRIDGE NO. 88, 33276.1.1 (B-3824)



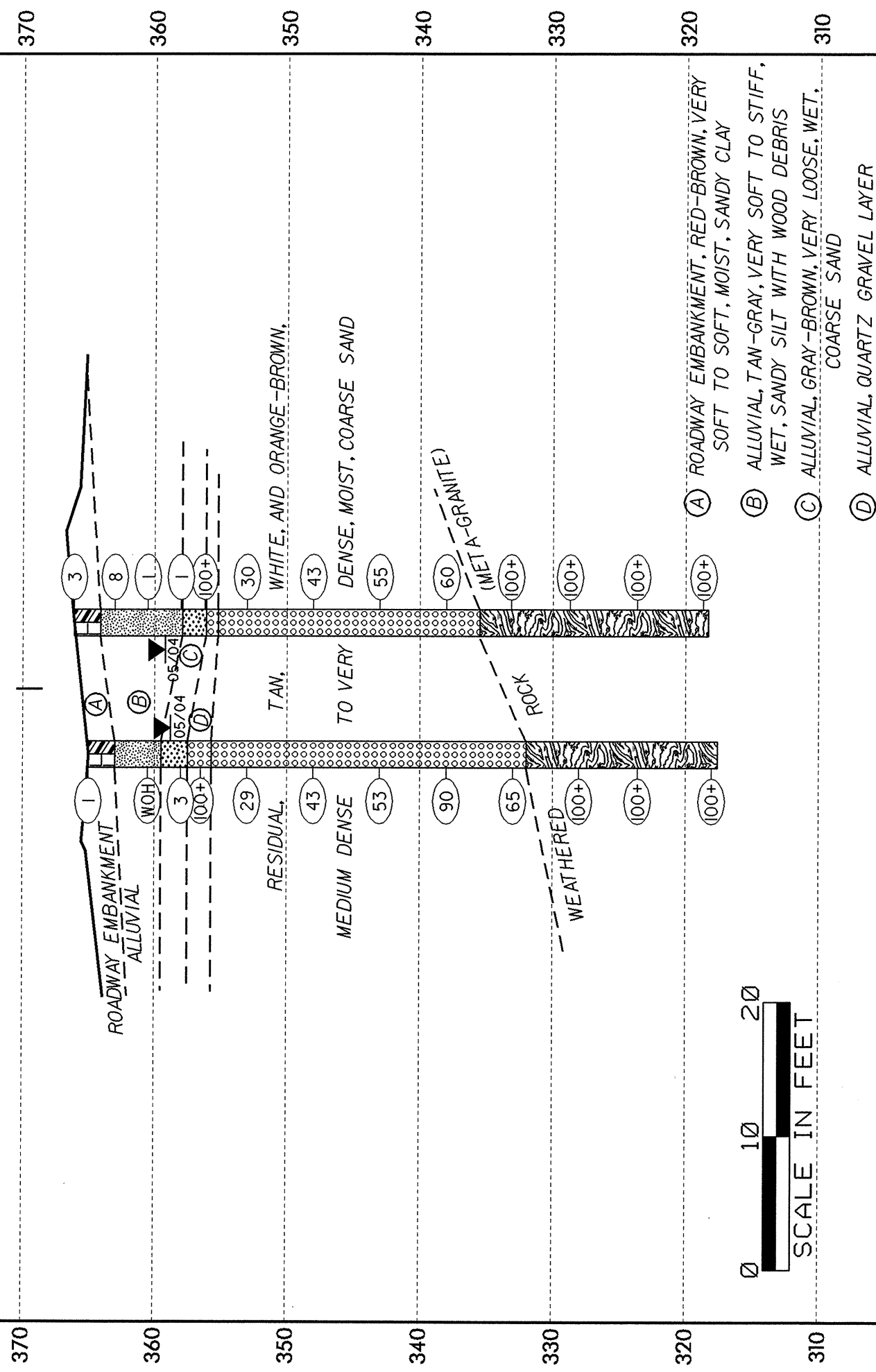
CROSS SECTION THROUGH BENT I BRIDGE NO. 88, 33276.1.1 (B-3824)



# CROSS SECTION THROUGH BENT 2

BRIDGE NO. 88, 33276.1.1 (B-3824)

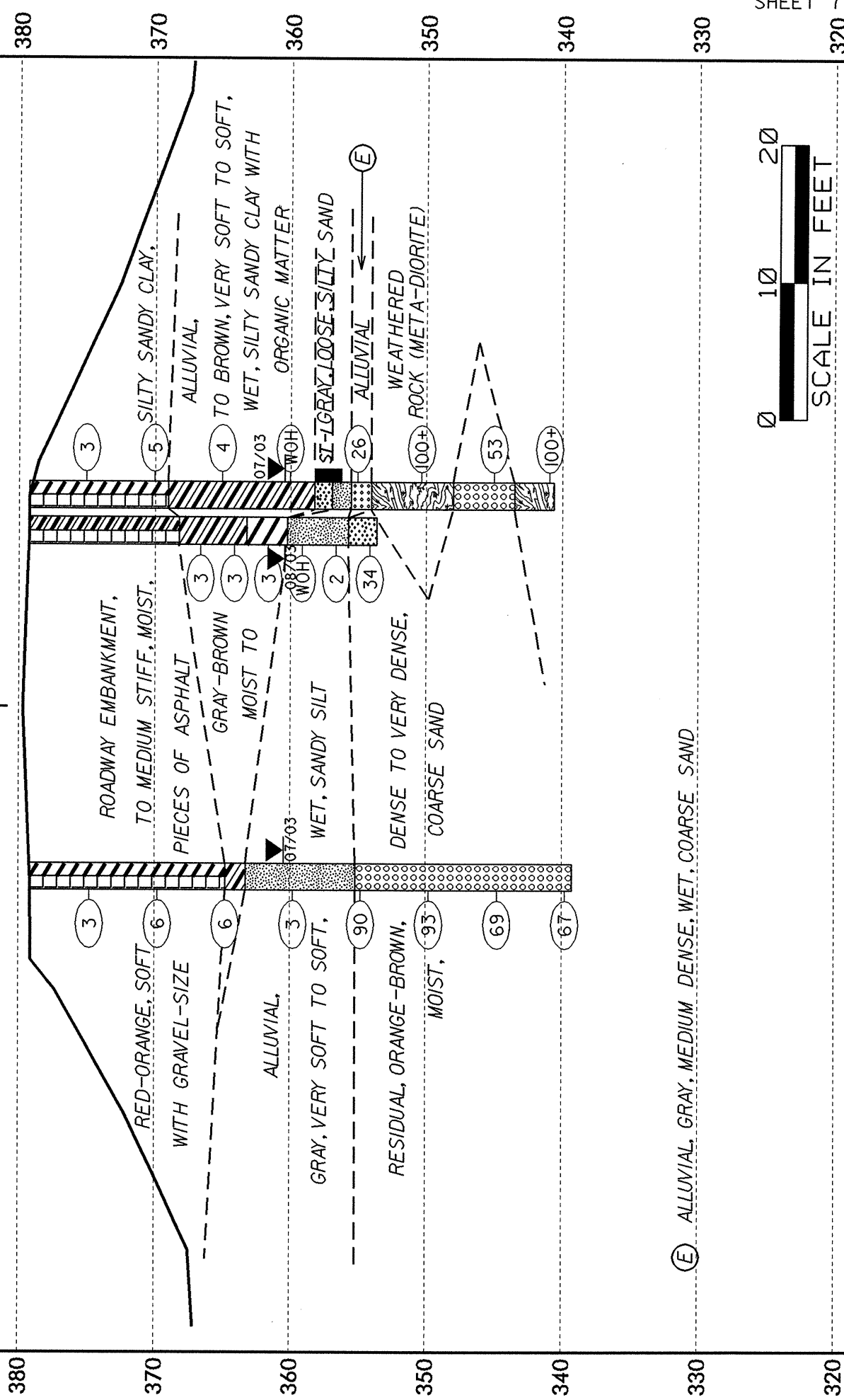
B2-A B2-B  
13+51 13+56  
5' LT & 5' RT



# CROSS SECTION THROUGH END BENT 2

BRIDGE NO. 88, 33276.1.1 (B-3824)

EB2-A EB2-B  
13+98 EB2-C  
11' LT 14+10 14+12  
11.5' RT 13' RT









NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
 GEOTECHNICAL UNIT BORING LOG

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
 GEOTECHNICAL UNIT BORING LOG

SHEET 10 OF 15

PROJECT NO. 33276.1.1		ID. B-3824		COUNTY CHATHAM		GEOLOGIST J.L. LOVE							
SITE DESCRIPTION BRIDGE NO. 88 ON -L- (SR 1525) OVER FERRELL'S CREEK							GROUND WATER						
BORING NO. B2-A		BORING LOCATION 13+51		OFFSET 5' RT		ALIGNMENT -L-							
COLLAR ELEVATION 365.0'		NORTHING 755835		EASTING 1943313		0 HR. N/A							
TOTAL DEPTH 47.4'		DRILL MACHINE CME-550		DRILL METHOD H.S. AUGERS		HAMMER TYPE AUTOMATIC							
START DATE 5/24/04		COMPLETION DATE 5/24/04		SURFACE WATER DEPTH N/A		DEPTH TO ROCK N/A							
ELEV. (FT.)	DEPTH (FT.)	BLOW COUNT			PEN. (FT.)	BLOWS PER FOOT				SAMPLE NUMBER	MOI.	LOG	SOIL AND ROCK DESCRIPTION
		0.5'	0.5'	0.5'		0	25	50	75				
365.0	0.0	WOH	WOH	1	1.0							M	ROADWAY EMBANKMENT, RED-BROWN, SANDY CLAY
	3.5	WOH	WOH	WOH	1.0							W	ALLUVIAL, GRAY, SANDY SILT, W/ WOOD DEBRIS
360.0	6.0	WOH	1	2	1.0							W	GRAY, COARSE SAND
	8.5	60			0.0								GRAY, COARSE SAND
355.0	11.0	14	15	14	1.0							W	QUARTZ GRAVEL LAYER
	16.0	10	19	24	1.0							W	RESIDUAL, TAN, WHITE, AND ORANGE-BROWN, COARSE SAND
350.0	21.0	9	22	31	1.0							W	
	26.0	28	42	48	1.0							D	
345.0	31.0	18	29	36	1.0							D	
340.0	36.0	27	38	62	0.9								WEATHERED ROCK (META-GRANITE)
335.0	41.0	25	75		0.8								
330.0	46.0	31	40	60	0.9								
325.0													
320.0													
315.0													
310.0													
305.0													
300.0													
295.0													
290.0													

PROJECT NO. 33276.1.1		ID. B-3824		COUNTY CHATHAM		GEOLOGIST J.L. LOVE							
SITE DESCRIPTION BRIDGE NO. 88 ON -L- (SR 1525) OVER FERRELL'S CREEK							GROUND WATER						
BORING NO. B2-B		BORING LOCATION 13+56		OFFSET 5' RT		ALIGNMENT -L-							
COLLAR ELEVATION 366.1'		NORTHING 755824		EASTING 1943315		0 HR. N/A							
TOTAL DEPTH 47.8'		DRILL MACHINE CME-550		DRILL METHOD H.S. AUGERS		HAMMER TYPE AUTOMATIC							
START DATE 5/20/04		COMPLETION DATE 5/20/04		SURFACE WATER DEPTH N/A		DEPTH TO ROCK N/A							
ELEV. (FT.)	DEPTH (FT.)	BLOW COUNT			PEN. (FT.)	BLOWS PER FOOT				SAMPLE NUMBER	MOI.	LOG	SOIL AND ROCK DESCRIPTION
		0.5'	0.5'	0.5'		0	25	50	75				
366.1	0.0	1	1	2	1.0							M	ROADWAY EMBANKMENT, RED-BROWN, SANDY CLAY
365.0	2.1	1	4	4	1.0							W	ALLUVIAL, RED-BROWN, SANDY CLAY WITH SOME ASPHALT PIECES
	4.6	WOH	1	0	1.0							W	ALLUVIAL, TAN-GRAY, SANDY SILT WITH WOOD DEBRIS
360.0	7.1	WOH	WOH	1	1.0							W	GRAY, COARSE SAND
	9.6	25	75		0.7							W	GRAY-BROWN, COARSE SAND
355.0	12.1	10	14	16	1.0							M	GRAVEL LAYER
	17.1	13	20	23	1.0							M	RESIDUAL, ORANGE-BROWN, COARSE SAND
350.0	22.1	22	30	25	1.0								
345.0	27.1	17	30	30	1.0								
340.0	32.1	33	57	43	0.7								
335.0	37.1	70	30		0.6								WEATHERED ROCK (META-GRANITE)
330.0	42.1	55	45		0.7								
325.0	47.1	65	35		0.7								
320.0													
315.0													
310.0													
305.0													
300.0													
295.0													
290.0													

BORING TERMINATED AT  
 ELEVATION 317.6 FEET  
 IN WEATHERED ROCK  
 (META-GRANITE)

BORING TERMINATED AT  
 ELEVATION 318.3 FEET  
 IN WEATHERED ROCK  
 (META-GRANITE)

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
 GEOTECHNICAL UNIT BORING LOG

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
 GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 33276.1.1		ID. B-3824		COUNTY CHATHAM		GEOLOGIST J.L. LOVE		GROUND WATER		
SITE DESCRIPTION BRIDGE NO. 88 ON -L- (SR 1525) OVER FERRELL'S CREEK								0 HR. 22.0'		
BORING NO. EB2-A		BORING LOCATION 13+98		OFFSET 11' LT		ALIGNMENT -L-		24 HR. 18.7'		
COLLAR ELEVATION 379.2'		NORTHING 755829		EASTING 1943360						
TOTAL DEPTH 39.9'		DRILL MACHINE BK-51		DRILL METHOD H.S. AUGERS		HAMMER TYPE AUTOMATIC				
START DATE 7/17/03		COMPLETION DATE 7/17/03		SURFACE WATER DEPTH N/A		DEPTH TO ROCK N/A				
ELEV. (FT.)	DEPTH (FT.)	BLOW COUNT	PEN. (FT.)	BLOWS PER FOOT				SAMPLE NUMBER	LOG	SOIL AND ROCK DESCRIPTION
		0.5' 1.0' 1.5'		0	25	50	75	100		
379.2										
375.0	3.4	2	1	2	1.0	X3			M	ROADWAY EMBANKMENT, RED-ORANGE, SILTY SANDY CLAY WITH SOME MICA AND GRAVEL-SIZE PIECES OF ASPHALT
370.0	8.4	2	2	4	1.0	X6			M	
365.0	13.4	2	3	3	1.0	X6			M	ALLUVIAL, GRAY, SANDY CLAY
360.0	18.4	WOH	1	2	1.0	X3			SS-6	GRAY, SANDY SILT
355.0	23.4	3	25	65	1.0		90		M	
350.0	28.4	5	28	65	1.0		93		M	RESIDUAL, ORANGE-BROWN, COARSE SAND
345.0	33.4	35	47	22	1.0		69		M	
340.0	38.4	20	35	32	1.0		67		M	
335.0										BORING TERMINATED AT ELEVATION 339.3 FEET IN RESIDUAL COARSE SAND

PROJECT NO. 33276.1.1		ID. B-3824		COUNTY CHATHAM		GEOLOGIST J.L. LOVE		GROUND WATER		
SITE DESCRIPTION BRIDGE NO. 88 ON -L- (SR 1525) OVER FERRELL'S CREEK								0 HR. 20.2'		
BORING NO. EB2-B		BORING LOCATION 14+12		OFFSET 13' RT		ALIGNMENT -L-		24 HR. 18.8'		
COLLAR ELEVATION 379.2'		NORTHING 755801		EASTING 1943367						
TOTAL DEPTH 38.6'		DRILL MACHINE BK-51		DRILL METHOD H.S. AUGERS		HAMMER TYPE AUTOMATIC				
START DATE 7/17/03		COMPLETION DATE 7/17/03		SURFACE WATER DEPTH N/A		DEPTH TO ROCK N/A				
ELEV. (FT.)	DEPTH (FT.)	BLOW COUNT	PEN. (FT.)	BLOWS PER FOOT				SAMPLE NUMBER	LOG	SOIL AND ROCK DESCRIPTION
		0.5' 1.0' 1.5'		0	25	50	75	100		
379.2										
375.0	3.2	1	1	2	1.0	X3			SS-1	ROADWAY EMBANKMENT, RED-ORANGE, SILTY SANDY CLAY WITH SOME MICA
370.0	8.2	1	2	3	1.0	X5			M	
365.0	13.2	1	2	2	1.0	X4			SS-2	ALLUVIAL, GRAY, SANDY CLAY AND SILTY CLAY WITH TRACE ORGANIC MATTER
360.0	18.2	WOH	WOH	WOH	1.0	XWOH			SS-3	
355.0	23.2	1	3	23	1.0		26		ST-1	GRAY, SILTY SAND
									SS-4	GRAY, SANDY SILT
										GRAY-BROWN, COARSE SAND
350.0	28.2	10	90		0.9			100+		WEATHERED ROCK (DIORITE)
345.0	33.2	3	23	30	1.0		53		SS-5	RESIDUAL, ORANGE-BROWN, COARSE SAND
340.0	38.2	30	70		0.7			100+		WEATHERED ROCK (DIORITE)
335.0										BORING TERMINATED AT ELEVATION 340.6 FEET IN WEATHERED ROCK



**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-7	12' LT	12+59	3.4-4.9	A-6(8)	40	23	29.0	20.3	18.2	32.5	94	80	50	-	-
SS-8	12' LT	12+59	13.4-14.9	A-6(1)	25	11	28.2	31.5	15.9	24.4	100	91	44	-	-
SS-9	12' LT	12+59	24.4-24.9	A-2-4(0)	31	NP	55.8	21.7	16.3	6.1	97	55	26	-	-
SS-10	12' LT	12+59	28.4-29.9	A-2-4(0)	28	NP	54.3	24.1	14.5	7.1	99	59	25	-	-

**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-11	7' RT	12+66	24.1-25.0	A-3(0)	29	NP	66.0	26.6	5.4	2.0	100	74	9	-	-

**B1-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-20	4' LT	12+90	0.0-1.5	A-4(0)	22	3	13.1	45.1	25.7	16.2	100	97	47	-	-
SS-21	4' LT	12+90	3.2-4.1	A-4(0)	20	2	12.9	40.0	32.9	14.1	100	98	54	-	-
SS-22	4' LT	12+90	4.1-4.7	A-2-4(0)	26	NP	67.1	22.2	6.7	4.0	96	60	12	-	-
SS-23	4' LT	12+90	7.5-9.0	A-1-b(0)	30	NP	56.2	24.8	10.9	8.1	73	41	17	-	-

**B1-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-31	4' RT	12+95	0.0-1.0	A-4(0)	24	5	20.6	41.8	19.4	18.2	99	93	41	-	-
SS-32	4' RT	12+95	1.0-1.5	A-4(0)	20	NP	6.1	49.1	26.7	18.2	100	99	53	26.5	-
SS-33	4' RT	12+95	2.3-3.0	A-4(2)	25	7	6.9	40.0	34.9	18.2	100	98	62	-	-
SS-34	4' RT	12+95	3.0-3.5	A-2-4(0)	29	NP	62.4	28.5	5.1	4.0	99	72	11	-	-
SS-35	4' RT	12+95	22.1-23.6	A-1-b(0)	28	NP	58.0	24.2	13.7	4.0	61	33	14	-	-

**B2-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-29	5' LT	13+51	6.0-7.5	A-2-4(0)	25	NP	57.2	28.3	6.5	8.1	100	85	16	-	-
SS-30	5' LT	13+51	11.0-12.5	A-1-b(0)	26	NP	62.0	21.8	12.1	4.0	72	35	14	-	-

**B2-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-24	5' RT	13+56	0.0-1.5	A-6(2)	36	16	32.1	18.6	19.0	30.3	78	63	40	-	-
SS-25	5' RT	13+56	2.1-3.6	A-4(1)	26	8	29.7	26.3	21.8	22.2	99	82	47	-	-
SS-26	5' RT	13+56	7.1-8.6	A-4(3)	26	9	4.2	41.4	24.0	30.3	100	100	59	45.3	-
SS-27	5' RT	13+56	12.1-13.6	A-1-b(0)	26	NP	63.4	21.8	10.7	4.0	82	41	15	-	-
SS-28	5' RT	13+56	27.1-28.6	A-1-b(0)	26	NP	64.0	19.6	12.3	4.0	85	42	17	-	-

**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-6	11' LT	13+98	18.4-19.9	A-4(0)	18	NP	5.5	49.5	28.7	16.2	100	99	52	-	-

**EB2-C**

<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-20	12' RT	14+10	11.6-13.1	A-6(9)	40	22	31.9	18.4	17.4	32.3	100	79	56	18.0	-
SS-21	12' RT	14+10	16.6-17.6	A-7-6(20)	43	20	2.2	7.3	42.0	48.5	100	99	93	34.2	6.3
SS-22	12' RT	14+10	19.1-2.10	A-4(0)	20	3	7.9	42.2	25.7	24.2	100	99	59	22.8	-
SS-23	12' RT	14+10	21.6-22.2	A-4(0)	22	2	8.9	50.9	20.0	20.2	100	99	47	-	-
SS-24	12' RT	14+10	22.2-23.1	A-4(0)	24	4	10.3	45.7	23.8	20.2	100	98	61	-	-
SS-25A	12' RT	14+10	24.1-24.8	A-2-4(0)	24	NP	56.4	23.8	13.7	6.1	96	58	22	-	-
SS-25B	12' RT	14+10	24.8-25.6	A-2-4(0)	27	NP	58.0	21.2	14.7	6.1	90	51	23	-	-

**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-1	13' RT	14+12	3.2-4.7	A-7-6(15)	49	26	22.3	16.2	22.8	38.6	100	86	65	-	-
SS-2	13' RT	14+12	13.2-14.7	A-6(2)	28	12	36.1	22.5	19.0	22.3	97	76	43	-	-
SS-3	13' RT	14+12	18.2-19.7	A-6(11)	33	14	1.6	19.5	38.3	40.6	100	100	83	-	-
ST-1 #1	12' RT	14+15	21.0-21.7	A-2-4(0)	20	NP	21.3	54.7	9.9	14.1	100	96	28	-	-
ST-1 #2	12' RT	14+15	21.7-22.3	A-2-4(0)	20	NP	14.1	60.8	11.1	14.1	100	99	30	-	-
ST-1 #3	12' RT	14+15	22.3-23.0	A-4(0)	21	2	8.9	54.9	18.1	18.1	100	99	42	-	-
SS-4	13' RT	14+12	23.2-24.7	A-3(0)	25	NP	62.9	31.3	3.8	2.0	100	81	8	-	-
SS-5	13' RT	14+12	33.2-34.7	A-1-b(0)	28	NP	61.7	20.3	13.9	4.1	91	48	19	-	-

PROJECT: 8.2522101 ID: B-3824 COUNTY: Chatham

DESCRIPTION(1): Bridge No. 88 on -L- (SR 1525) over Ferrell's Creek

**INFORMATION ON EXISTING BRIDGE**

Information obtained from:  field inspection  
 microfilm (Reel: \_\_\_\_\_ Pos: \_\_\_\_\_)  
 other: \_\_\_\_\_

BR. NO.: 88 BR. LENGTH: 116 ft. NO. BENTS: 4 NO. BENTS IN: CHANNEL: 2 FLOODPLAIN: 2

FOUNDATION TYPE: Timber piles

**EVIDENCE OF SCOUR(2):**

ABUTMENTS OR END BENT SLOPES: None visible

INTERIOR BENTS: One to two feet of local scour around piles.

CHANNEL BED: None visible

CHANNEL BANKS: Eroding channel banks, approximately 2 to 3 feet in height.

**EXISTING SCOUR PROTECTION:**

TYPE(3): Timber abutments at both end bents. Concrete reinforcement around the base of Bent 1 piles.

EXTENT(4): Abutments extend approximately 10 feet from the outside edge of the bridge.

EFFECTIVENESS(5): Effective

OBSTRUCTIONS(6) (DAMS, DEBRIS, ETC.): Small limbs and branches around Bent 1

**DESIGN INFORMATION**

CHANNEL BED MATERIAL(7) (SAMPLE RESULTS ATTACHED): Alluvial, tan-gray, soft to medium

stiff, sandy silt (SS-6 and SS-25) and brown, very loose, coarse sand (SS-22).

CHANNEL BANK MATERIAL(8) (SAMPLE RESULTS ATTACHED): Alluvial gray, very soft, sandy clay (SS-3)

and tan-brown and gray, very soft, sandy silt (SS-31 and 32).

CHANNEL BANK COVER(10): Trees, shrubs, and brush

FLOOD PLAIN WIDTH(11): +/- 150 feet

FLOOD PLAIN COVER(12): Grass, trees, and brush

**DESIGN INFORMATION CONT.**

STREAM IS: \_\_\_\_\_ DEGRADING  AGGRADING (13)

OTHER OBSERVATIONS AND COMMENTS: \_\_\_\_\_

CHANNEL MIGRATION TENDENCY (14): West, towards End Bent 1

GEOTECHNICALLY ADJUSTED SCOUR ELEVATIONS(15):

	<u>Elevation (feet)</u>
Bent 1	355.5
Bent 2	355.5

The GASE scour elevations agree with the Hydraulic Unit's predicted scour elevations.

REPORTED BY: Tom P. M. [Signature] DATE: August 16, 2004  
(field observations by J. L. Love, July 17, 2003)

**INSTRUCTIONS**

- (1) GIVE THE DESCRIPTION OF THE SPECIFIC SITE GIVING ROUTE NUMBER AND BODY OF WATER CROSSED.
- (2) NOTE ANY EVIDENCE OF SCOUR AT THE EXISTING END BENTS OR ABUTMENTS (UNDERMINING, SLOUGHING, SCOUR LOCATIONS, DEGRADATIONS, ETC.)
- (3) NOTE ANY EXISTING SCOUR PROTECTION (RIP RAP, ETC.)
- (4) DESCRIBE THE EXTENT OF ANY EXISTING SCOUR PROTECTION.
- (5) DESCRIBE WHETHER OR NOT THE SCOUR PROTECTION APPEARS TO BE WORKING.
- (6) NOTE ANY DAMS, FALLEN TREES, DEBRIS AT BENTS, ETC.
- (7) DESCRIBE THE CHANNEL BED MATERIAL: A SAMPLE SHOULD BE TAKEN FOR GRAIN SIZE DISTRIBUTION.
- (8) DESCRIBE THE CHANNEL BANK MATERIAL: A SAMPLE SHOULD BE TAKEN FOR GRAIN SIZE DISTRIBUTION, ATTACH LAB RESULTS.
- (9) DESCRIBE THE FOUNDATION BEARING MATERIAL.
- (10) DESCRIBE THE BANK COVERING (GRASS, TREES, RIP RAP, NONE, ETC.)
- (11) GIVE THE APPROXIMATE FLOOD PLAIN WIDTH (ESTIMATE).
- (12) DESCRIBE THE FLOOD PLAIN COVERING (GRASS, TREES, CROPS, ETC.)
- (13) CHECK THE APPROPRIATE SPACE AS TO WHETHER THE STREAM IS DEGRADING OR AGGRADING
- (14) DESCRIBE THE POTENTIAL OF THE BODY OF WATER TO MIGRATE Laterally DURING THE LIFE OF THE BRIDGE (APPROXIMATELY 100 YEARS).
- (15) GIVE THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION EXPECTED OVER THE LIFE OF THE BRIDGE (APPROXIMATELY 100 YEARS). THIS CAN BE GIVEN AS AN ELEVATION RANGE ACROSS THE SITE, OR ON A BENT BY BENT BASIS WHERE VARIATIONS EXIST. DISCUSS THE RELATIONSHIP BETWEEN THE HYDRAULICS THEORETICAL SCOUR AND THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION. IF THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION IS DEPENDENT ON SCOUR COUNTER MEASURES, EXPLAIN. (RIPRAP ARMORING ON SLOPES, ETC.) THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION IS BASED ON THE ERODABILITY OF MATERIALS WITH CONSIDERATION FOR JOINTING, FOLIATION, BEDDING ORIENTATION AND FREQUENCY; CORE RECOVERY PERCENTAGE; PERCENTAGE RQD; DIFFERENTIAL WEATHERING, SHEAR STRENGTH; OBSERVATIONS AT EXISTING STRUCTURES; OTHER TESTS DEEMED APPROPRIATE; AND OVERALL GEOLOGIC CONDITIONS AT THE SITE.

# SITE PHOTOGRAPHS

Bridge No. 88 on -L- (SR 1525) over Ferrell's Creek

