

CONTRACT: ID: 33368.1.1

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL UNIT

STRUCTURE SUBSURFACE INVESTIGATION

STATE PROJECT 33368.1.1 I.D. NO. B-4000
F.A. PROJECT BRZ-1002(11)
COUNTY ALAMANCE
PROJECT DESCRIPTION BRIDGE NO. 45 ON
-L- (SR 1002, JEFFRIES CROSS ROAD)
OVER JORDAN CREEK AT STATION
21 + 09.5

INVENTORY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	33368.1.1(B-4000)	1	17
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.

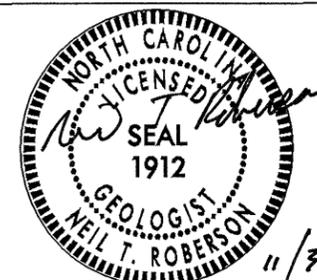
GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE, THE LABORATORY SAMPLE DATA AND 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.

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INVESTIGATED BY J.I. MILKOVITS, JR. PERSONNEL O.B. OTI
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 DATE NOVEMBER 2005 D.W. DIXON



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 UNIT

ID	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
B-4000	33368.1.1	2	17

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 (AASHTO 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>		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 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:		ALLUVIUM (ALLUV.) - SOILS WHICH 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 IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. CALCAREOUS (CALC.) - SOILS WHICH 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 (F.P.) - 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 SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (R.Q.D.) - 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 WHICH 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, WHICH 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 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. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (S.R.Q.D.) - 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. TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.	
GENERAL CLASS. GRANULAR MATERIALS (>5% PASSING #200) SILT-CLAY MATERIALS (>5% 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 YIELDS SPT N VALUES > 100 BLOWS PER FOOT. 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. 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.		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. 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 ROCKS EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR 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 B.P.F.</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 < 100 B.P.F.</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.	
SOIL LEGEND AND AASHTO CLASSIFICATION		MINERALOGICAL COMPOSITION		ROCK DESCRIPTION		TERMS AND DEFINITIONS	
GROUP CLASS. A-1-a, A-1-b, A-2, A-2-4, A-2-5, A-2-6, A-2-7, A-4, A-5, A-6, A-7, A-7-5, A-7-6		COMPRESSIBILITY SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 30 MODERATELY COMPRESSIBLE LIQUID LIMIT 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50		PERCENTAGE OF MATERIAL ORGANIC MATERIAL GRANULAR SOILS SILT-CLAY SOILS OTHER MATERIAL TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC >10% >20% HIGHLY 35% AND ABOVE		GROUND WATER ▽ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING. ▽ STATIC WATER LEVEL AFTER 24 HOURS. ▽ Pw PERCHED WATER, SATURATED ZONE OR WATER BEARING STRATA ○ SPRING OR SEEPAGE	
% PASSING #10 50 MX #40 30 MX 50 MX 51 MN #200 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN		LIQUID LIMIT PLASTIC INDEX GROUP INDEX		USUAL TYPES OF MAJOR MATERIALS GEN. RATINGS AS A SUBGRADE		MISCELLANEOUS SYMBOLS ROADWAY EMBANKMENT WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL OTHER THAN ROADWAY EMBANKMENTS INFERRED SOIL BOUNDARIES INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY DIP/DIP DIRECTION OF ROCK STRUCTURES SOUNDING ROD	
CONSISTENCY OR DENSENESS PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)		TEXTURE OR GRAIN SIZE U.S. STD. SIEVE SIZE (OPENING (MM))		ABBREVIATIONS AR - AUGER REFUSAL BT - BORING TERMINATED CL - CLAY CPT - CONE PENETRATION TEST CSE - COARSE DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST e - VOID RATIO f - FINE FOSS. - FOSSILIFEROUS FRAC. - FRACTURED FRAGS. - FRAGMENTS MED. - MEDIUM PMT - PRESSUREMETER TEST SD. - SAND, SANDY SL. - SILT, SILTY SLL - SLIGHTLY TCR - TRICONE REFUSAL γ - UNIT WEIGHT γ _d - DRY UNIT WEIGHT w - MOISTURE CONTENT v - VERY VST - VANE SHEAR TEST		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. 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 GROUVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. SOFT CAN BE GROUVED 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.	
SOIL MOISTURE - CORRELATION OF TERMS SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION		EQUIPMENT USED ON SUBJECT PROJECT DRILL UNITS: MOBILE B- BK-51 CME-45C CME-550 PORTABLE HOIST OTHER OTHER 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 OTHER HAMMER TYPE: AUTOMATIC MANUAL CORE SIZE: -B -N -H HAND TOOLS: POST HOLE DIGGER HAND AUGER SOUNDING ROD VANE SHEAR TEST OTHER		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 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. 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.			
PLASTICITY NONPLASTIC LOW PLASTICITY MED. PLASTICITY HIGH PLASTICITY		COLOR DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YEL.-BRN, BLUE-GRAY) MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.		BENCH MARK: -BL-3 PINC 14+34.25, -TI- 9+44.72 ELEVATION: 568.46'		NOTES:	



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

Michael F. Easley
GOVERNOR

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

Lyndo Tippet
SECRETARY

November 3, 2005

STATE PROJECT: 33368.1.1 (B-4000)
F.A. PROJECT: BRZ-1002 (11)
COUNTY: Alamance
DESCRIPTION: Bridge No. 45 on -L- (SR 1002, Jeffries Cross Road) over Jordan Creek at -L- Station 21+09.50.
SUBJECT: Geotechnical Report - Structure Inventory

Project Description

A three-span bridge, 235 feet in length with a 90° skew, is proposed on -L- (SR 1002, Jeffries Cross Road) over Jordan Creek to replace the existing structure. The new bridge will be 35 feet longer than the existing bridge. The project is located in Alamance County approximately 6 miles north of Burlington.

A subsurface investigation was conducted during March of 1999 for a previous structure design. Four borings were drilled during the investigation utilizing a trailer-mounted CME 45C-drill machine. Due to the change in the design, another subsurface investigation was conducted in August of 2005 using a CME 550-drill machine with an automatic hammer. Standard Penetration Test borings were performed at each of the proposed bent locations. All borings were advanced until crystalline rock was encountered. Interior bent borings B1-A and B2-B were cored using NWD4 coring equipment to recover rock samples from crystalline rock. 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. Four rock core samples were also sent to the Materials and Tests Unit to determine Unit Weight, Compressive Strength and Young's Modulus.

Physiography and Geology

The project is located in rolling terrain of the Piedmont Physiographic Province. Geologically, the site is located within the Carolina Slate Belt and is underlain by granite with diabase dikes.

Soil Properties

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

Roadway embankment soils are present at the End Bent 1 location and have a thickness of 6.0 feet. These soils consist predominantly of tan-brown, moist, soft to medium stiff, sandy clay (A-6). Embankment soils are underlain by alluvial soils.

Alluvial soils are present in all borings and range in thickness from 9.5 to 17.0 feet. Alluvial soils consist of light gray to gray and tan-brown to tan gray, moist to wet, very loose to loose, coarse and silty sand (A-1-b, A-2-4). Red-brown and tan-gray, moist to wet, very soft to stiff, sandy silt (A-4) and red-brown, moist to wet, soft, sandy clay (A-6) are also present. The alluvial soils were deposited on residual soil and/or weathered rock.

Residual soils are present in all borings except EB2-B. The thickness ranges from 4.5 to 11.0 feet. The soils consist of white-black to white-gray, wet, medium dense to very dense, coarse and silty sand (A-1-b, A-2-4). Weathered rock and/or crystalline rock underlie residual soils.

Rock Properties

Weathered rock is derived from the underlying metamorphosed granite and ranges in thickness from 1.7 to 17.0 feet. The top of weathered rock was encountered at elevations ranging from 549.2 at EB2-B to 538.6 feet at B1-A.

Crystalline Rock is present at each bent location and rock cores were obtained in two borings (B1-A, B2-B) utilizing NWD4 coring tools. The rock in boring B1-A consists of hard, fresh coarse-grained granite with two (1.0 to 2.4 foot) seams of moderately to extremely fractured, moderately to moderately severely weathered granite. Core recovery ranged from 33 to 100 percent and RQD's ranged from 20 to 100 percent. The material cored in boring B2-B consists of extremely fractured, severely weathered coarse-grained granite. Core recovery ranged from 22 to 30 percent and RQD's were 0 percent. There were no joints present. More detailed descriptions can be found in the Core Boring Reports

Goundwater

Groundwater was encountered at each bent location. Groundwater elevations range from 562.8 at B2-B and 560.0 feet at EB1-B

Notice

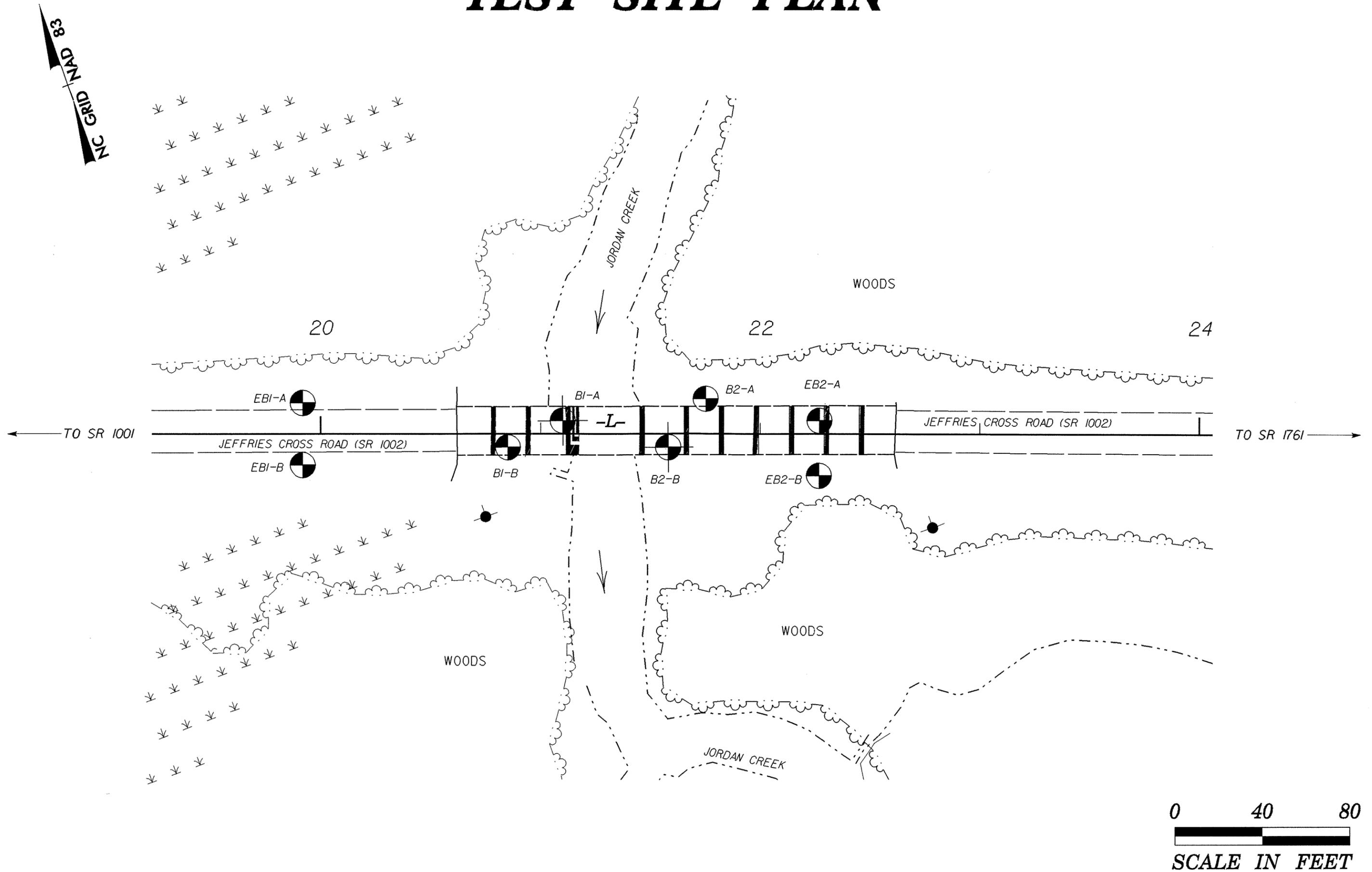
This Geotechnical foundation report is based on the bridge survey and hydraulic design report for Bridge No. 45 on -L- (SR 1002, Jeffries Creek Road) over Jordan Creek dated March 28, 2005. If significant changes are made in the design or location of the proposed structure, the subsurface information should be reviewed and modified as necessary.

Respectfully submitted,

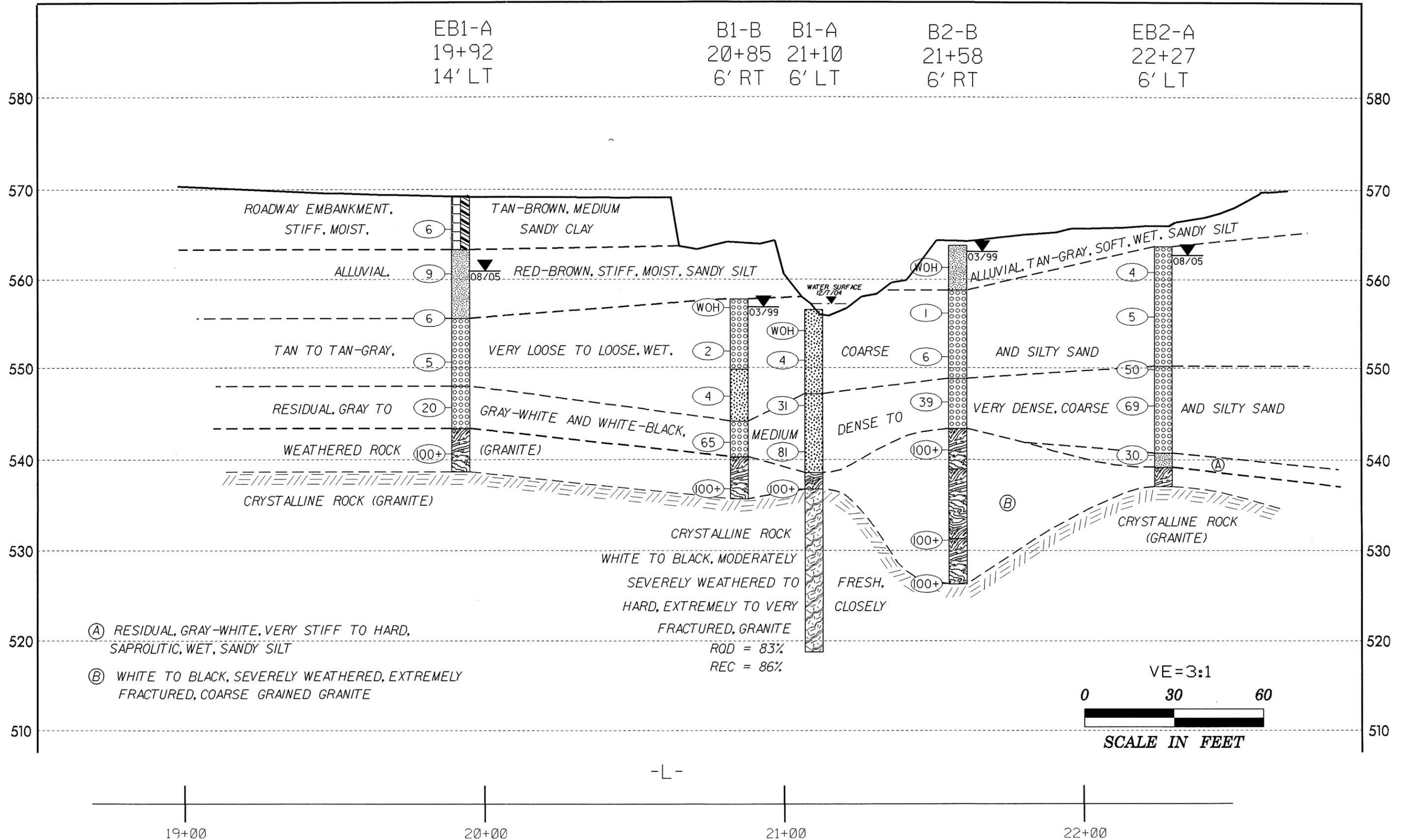
A handwritten signature in black ink that reads "Joseph I. Milkovits, Jr." with a stylized flourish at the end.

Joseph I. Milkovits, Jr.
Project Geologist

TEST SITE PLAN

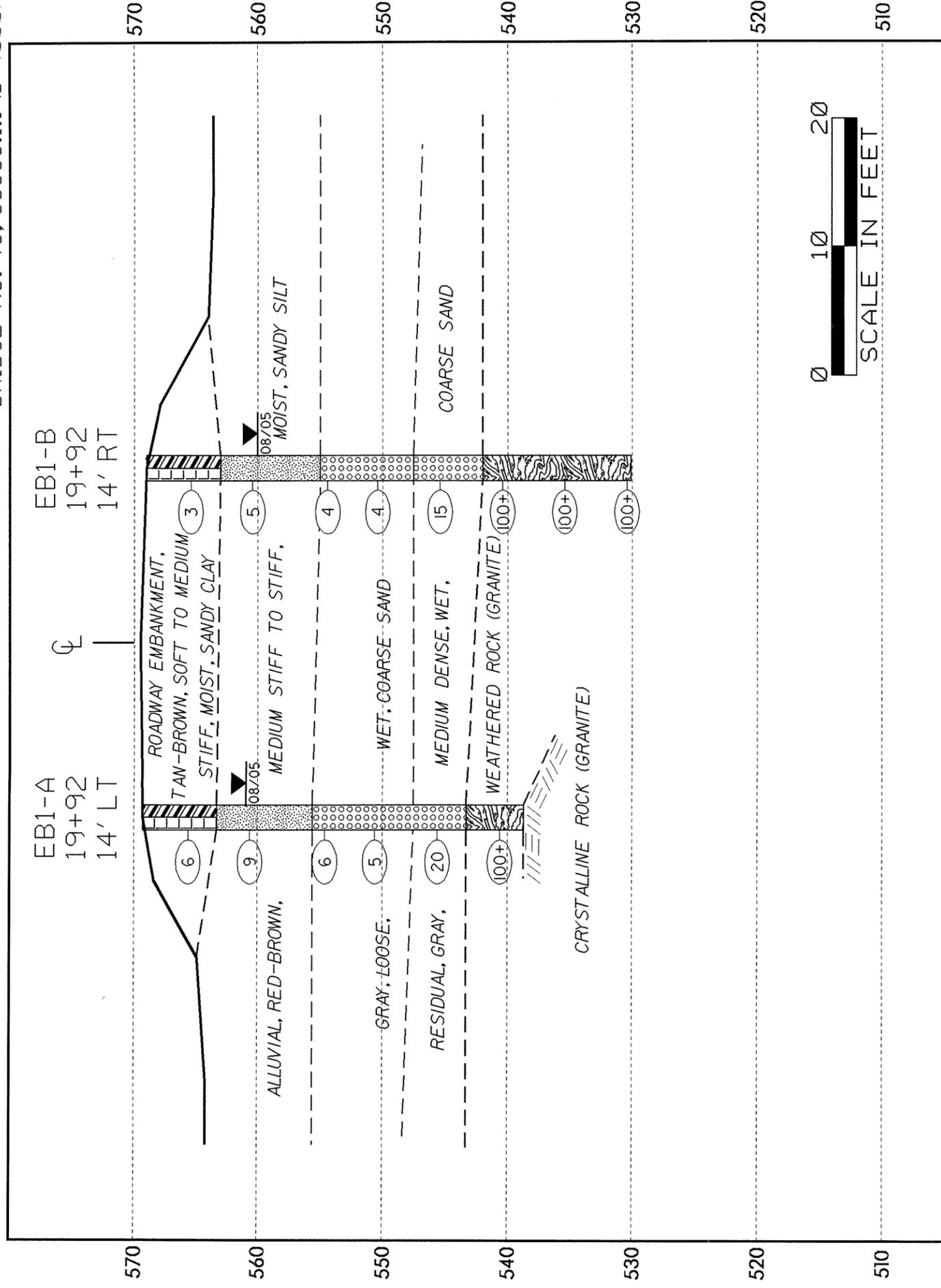


PROFILE THROUGH BORINGS PROJECTED ALONG -L-



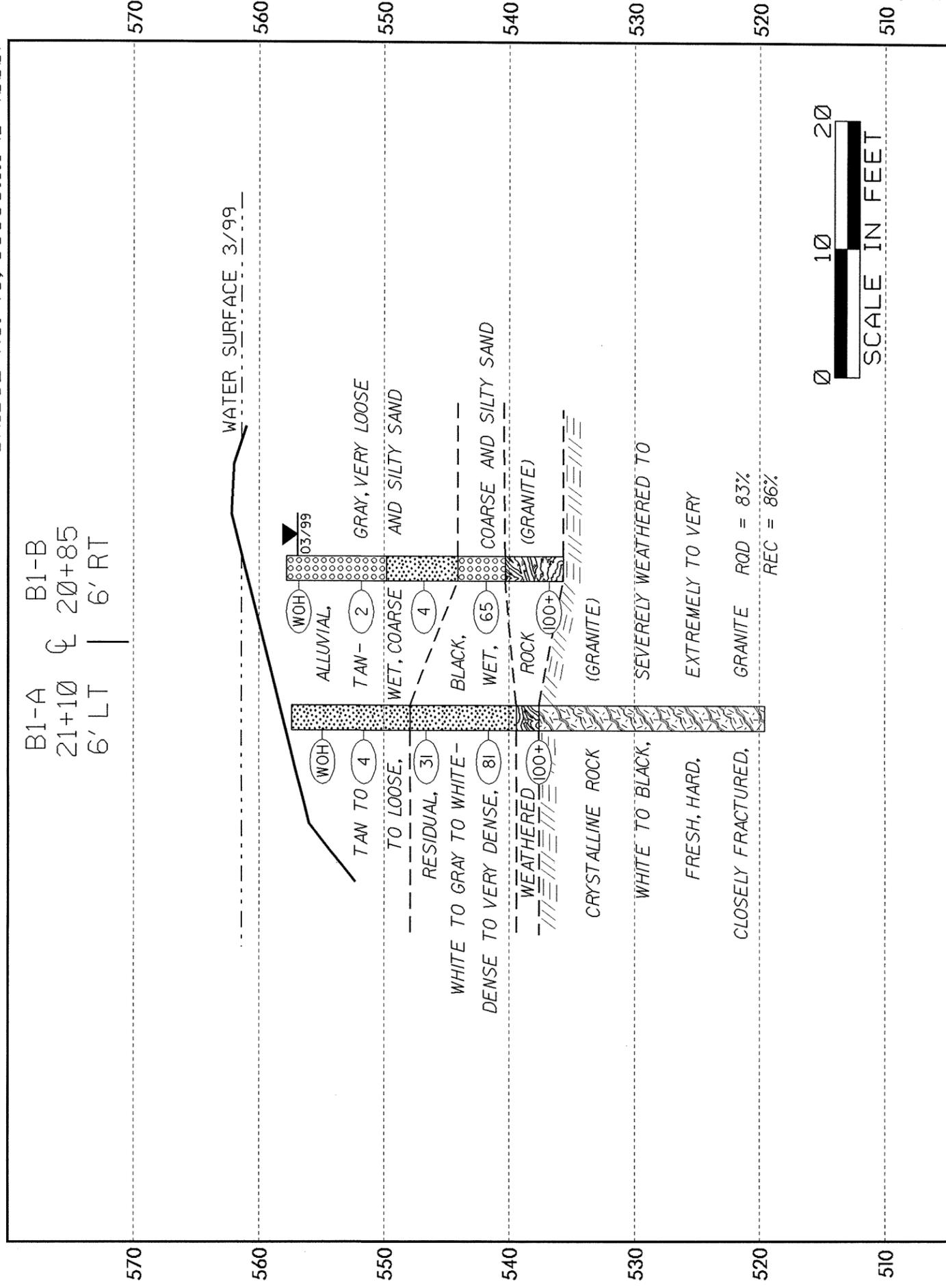
CROSS SECTION THROUGH END BENT I

BRIDGE NO. 45, 33368.1.1 (B-4000)

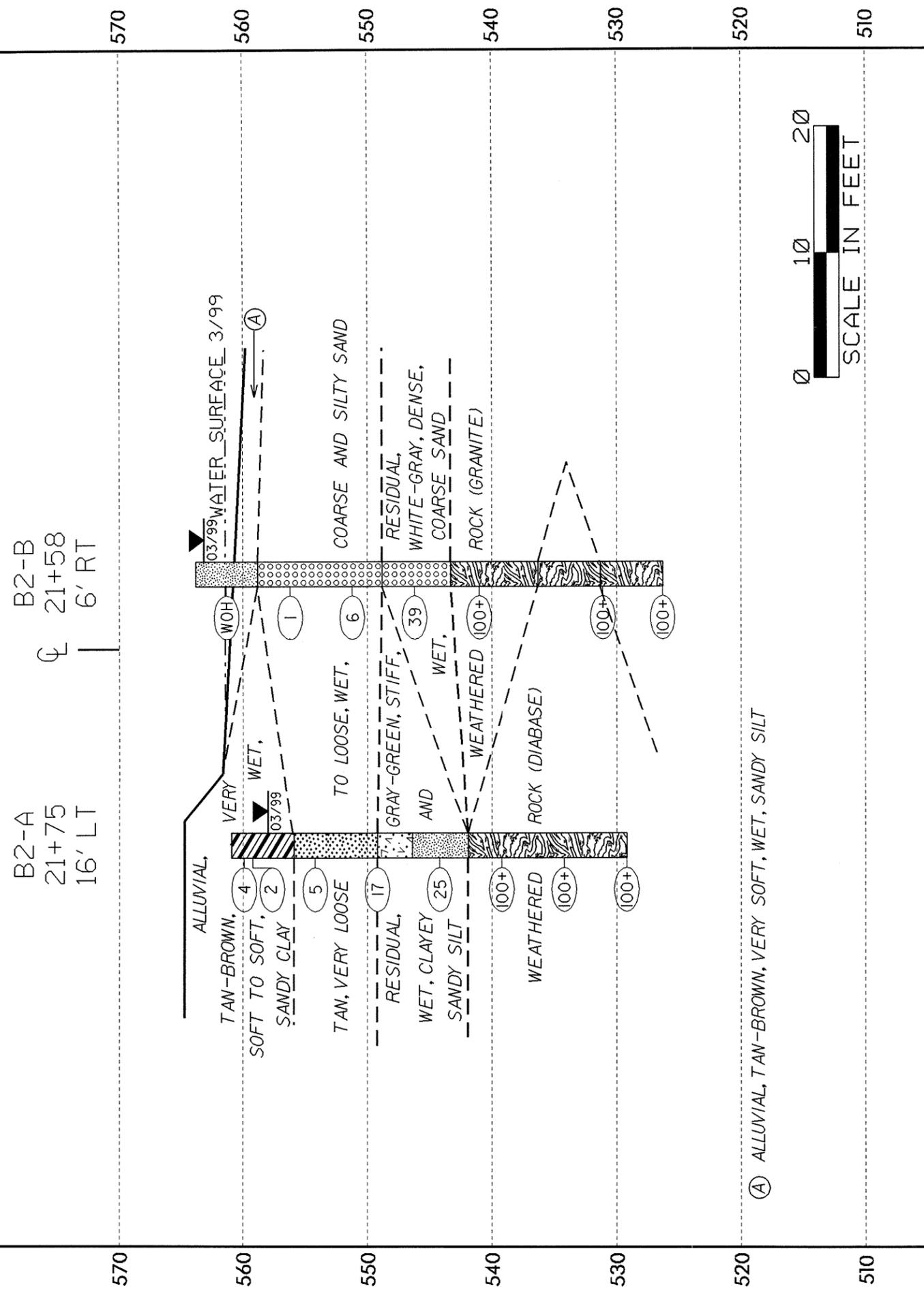


CROSS SECTION THROUGH BENT I

BRIDGE NO. 45, 33368.1.1 (B-4000)

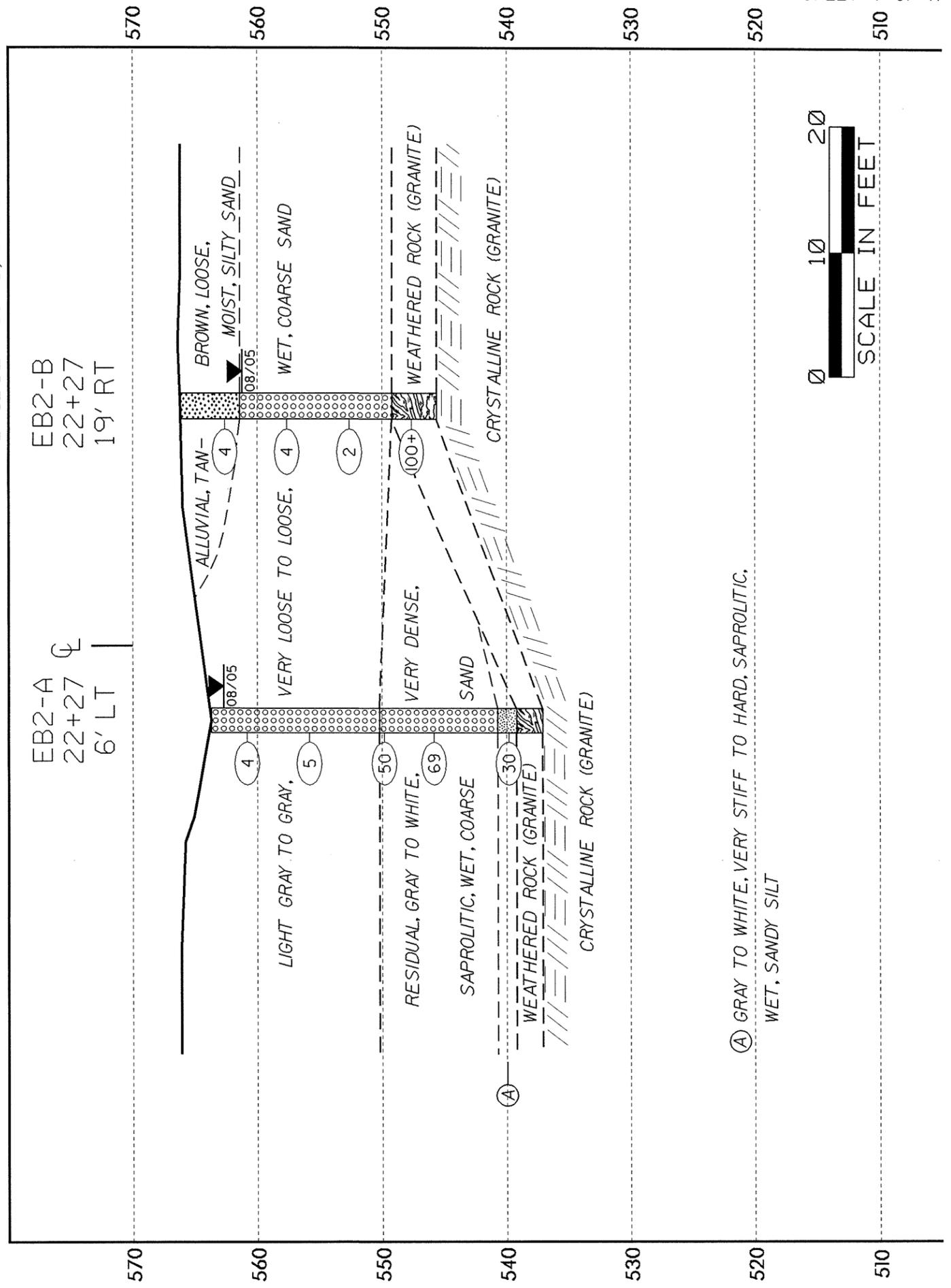


CROSS SECTION THROUGH BENT 2 BRIDGE NO. 45, 33368.1.1 (B-4000)



(A) ALLUVIAL, TAN-BROWN, VERY SOFT, WET, SANDY SILT

CROSS SECTION THROUGH END BENT 2 BRIDGE NO. 45, 33368.1.1 (B-4000)



(A) GRAY TO WHITE, VERY STIFF TO HARD, SAPROLITIC, WET, SANDY SILT

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

SHEET 13

PROJECT NO. 33368.1.1	ID. B-4000	COUNTY ALAMANCE	GEOLOGIST O.B. OTI
SITE DESCRIPTION BRIDGE NO. 45 ON -L- (SR 1002, JEFFRIES CROSS ROAD) OVER JORDAN CREEK			GROUND WATER
BORING NO. EB2-A	BORING LOCATION 22+27	OFFSET 6' LT	ALIGNMENT -L-
COLLAR ELEVATION 563.7'	NORTHING 893794	EASTING 1886968	0 HR. WET 24 HR. 1.0'
TOTAL DEPTH 26.6'	DRILL MACHINE CME-550	DRILL METHOD H.S. AUGERS	HAMMER TYPE AUTOMATIC
START DATE 8/3/05	COMPLETION DATE 8/3/05	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 26.6'

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	100					
563.7															
560.0	2.9	WOH	1	3	1.0	X 4									ALLUVIAL, LIGHT GRAY TO GRAY, COARSE SAND
555.0	7.9		2	3	1.0	X 5								SS-1	W
550.0	12.9		3	40	1.0			X 50						SS-2	W
545.0	17.9		21	29	1.0			X 69						SS-3	W
540.0	22.9		9	16	1.0	X 30								SS-4	W
535.0		AUGER REFUSAL AT ELEVATION 537.1 FEET ON CRYSTALLINE ROCK (GRANITE)													

PROJECT NO. 33368.1.1	ID. B-4000	COUNTY ALAMANCE	GEOLOGIST O.B. OTI
SITE DESCRIPTION BRIDGE NO. 45 ON -L- (SR 1002, JEFFRIES CROSS ROAD) OVER JORDAN CREEK			GROUND WATER
BORING NO. EB2-B	BORING LOCATION 22+27	OFFSET 19' RT	ALIGNMENT -L-
COLLAR ELEVATION 566.2'	NORTHING 893771	EASTING 1886960	0 HR. 5.8' 24 HR. 5.0'
TOTAL DEPTH 20.6'	DRILL MACHINE CME-550	DRILL METHOD H.S. AUGERS	HAMMER TYPE AUTOMATIC
START DATE 8/3/05	COMPLETION DATE 8/3/05	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 20.6'

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	100					
566.2															
565.0															
560.0	3.6		2	2	1.0	X 4								SS-5	M
555.0	8.6		2	2	1.0	X 4									
550.0	13.6		1	1	1.0	X 2									GRAY, COARSE SAND
545.0	18.6		100		0.4					100+X					WEATHERED ROCK (GRANITE)
540.0		AUGER REFUSAL AT ELEVATION 545.6 FEET ON CRYSTALLINE ROCK (GRANITE)													

EB1-A

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			%	%
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-6	14' LT	19+92	3.7-5.2	A-6(3)	38	17	38.2	15.6	19.8	26.4	88	61	43	-	-
SS-7	14' LT	19+92	8.7-10.2	A-4(5)	26	9	5.7	26.4	39.5	28.4	100	96	77	-	-
SS-8	14' LT	19+92	13.7-15.0	A-1-b(0)	22	NP	84.6	9.7	1.6	4.1	82	27	5	-	-

B1-B

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			%	%
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-1A	6' RT	20+85	5.0-6.5	A-1-b(0)	25	NP	61.6	20.0	10.3	8.1	87	44	18	-	-
SS-2A	6' RT	20+85	10.0-11.5	A-2-4(0)	25	NP	43.2	43.4	9.3	4.0	98	77	17	-	-
SS-3A	6' RT	20+85	15.0-16.0	A-1-b(0)	26	NP	59.2	24.8	11.9	4.0	86	48	17	-	-

B1-A

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			%	%
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-7A	6' LT	21+10	4.8-6.3	A-2-4(0)	24	NP	41.6	38.2	12.1	8.1	100	76	25	-	-
SS-8A	6' LT	21+10	9.8-11.3	A-2-4(0)	33	NP	59.4	25.9	12.7	2.0	92	53	17	-	-

B2-B

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			%	%
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-4A	6' RT	21+58	1.5-3.0	A-4(2)	24	10	19.8	30.9	27.1	22.2	100	96	54	-	-
SS-5A	6' RT	21+58	11.5-13.0	A-1-b(0)	21	NP	80.4	13.1	4.4	2.0	97	35	7	-	-
SS-6A	6' RT	21+58	16.5-18.0	A-1-b(0)	29	NP	65.1	23.0	9.9	2.0	90	45	13	-	-

B2-A

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			%	%
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-9A	16' LT	21+75	0.0-1.5	A-6(7)	35	11	12.3	21.2	34.1	32.3	100	91	72	-	-
SS-10A	16' LT	21+75	6.7-8.2	A-2-4(0)	23	NP	15.8	65.9	12.3	6.1	100	99	25	-	-
SS-11A	16' LT	21+75	11.7-13.2	A-5(7)	41	6	4.4	21.0	64.4	10.1	100	98	85	-	-
SS-12A	16' LT	21+75	16.7-18.2	A-4(4)	32	7	11.7	28.7	51.5	8.1	100	92	70	-	-

EB2-B

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			%	%
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-5	19' RT	22+27	3.6-5.1	A-2-4(0)	25	2	47.7	27.4	14.7	10.2	95	61	27	-	-

EB2-A

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			%	%
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-1	6' LT	22+27	7.9-9.4	A-1-b(0)	22	NP	52.3	32.7	9.9	5.1	81	50	15	-	-
SS-2	6' LT	22+27	12.9-14.4	A-1-b(0)	22	NP	79.8	11.6	4.6	4.1	59	17	6	-	-
SS-3	6' LT	22+27	17.9-19.4	A-1-b(0)	26	NP	60.6	22.4	12.9	4.1	74	38	16	-	-
SS-4	6' LT	22+27	22.9-24.4	A-4(2)	33	3	15.2	23.1	53.5	8.1	94	84	66	-	-



**FIELD
SCOUR REPORT**

WBS: 33368.1.1 TIP: B-4000 COUNTY: Alamance

DESCRIPTION(1): Bridge No.45 on -L- (SR 1002, Jeffries Cross Road) over Jordan Creek

EXISTING BRIDGE

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

Bridge No.: 45 Length: 201' Total Bents: 12 Bents in Channel: 1 Bents in Floodplain: 11
Foundation Type: Concrete footings

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: minor local scour and contraction scour

Interior Bents: Moderate scour, local and contraction on Bent 1, 2, 3, & 4, from 2' to 4' footings exposed

Channel Bed: Minor contraction scour

Extent(4): None

Effectiveness(5): None

Obstructions(6): None

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 geotechnically adjusted scour elevation (GASE) 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 GASE. If the GASE is dependent on scour counter measures, explain (e.g. rip rap armoring on slopes). The GASE 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): Coarse sand and silty sand (A-1-b,A-2-4)

Channel Bank Material(8): Fine to coarse sand (A-1-b) and sandy silt and sandy clay (A-4,A-6)

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

Floodplain Width(10): 450'

Floodplain Cover(11): Woods, shrubs and grass

Stream is(12): Aggrading _____ Degrading Static _____

Channel Migration Tendency(13): Towards southwest

Observations and Other Comments: _____

GEOTECHNICALLY ADJUSTED SCOUR ELEVATIONS(14) Feet Meters _____

Comparison of GASE to Hydraulics Unit theoretical scour:
GASE is unchanged from the Hydraulics Unit's theoretical scour for 100 year event.

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

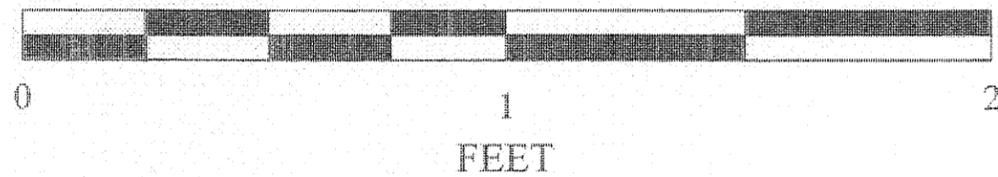
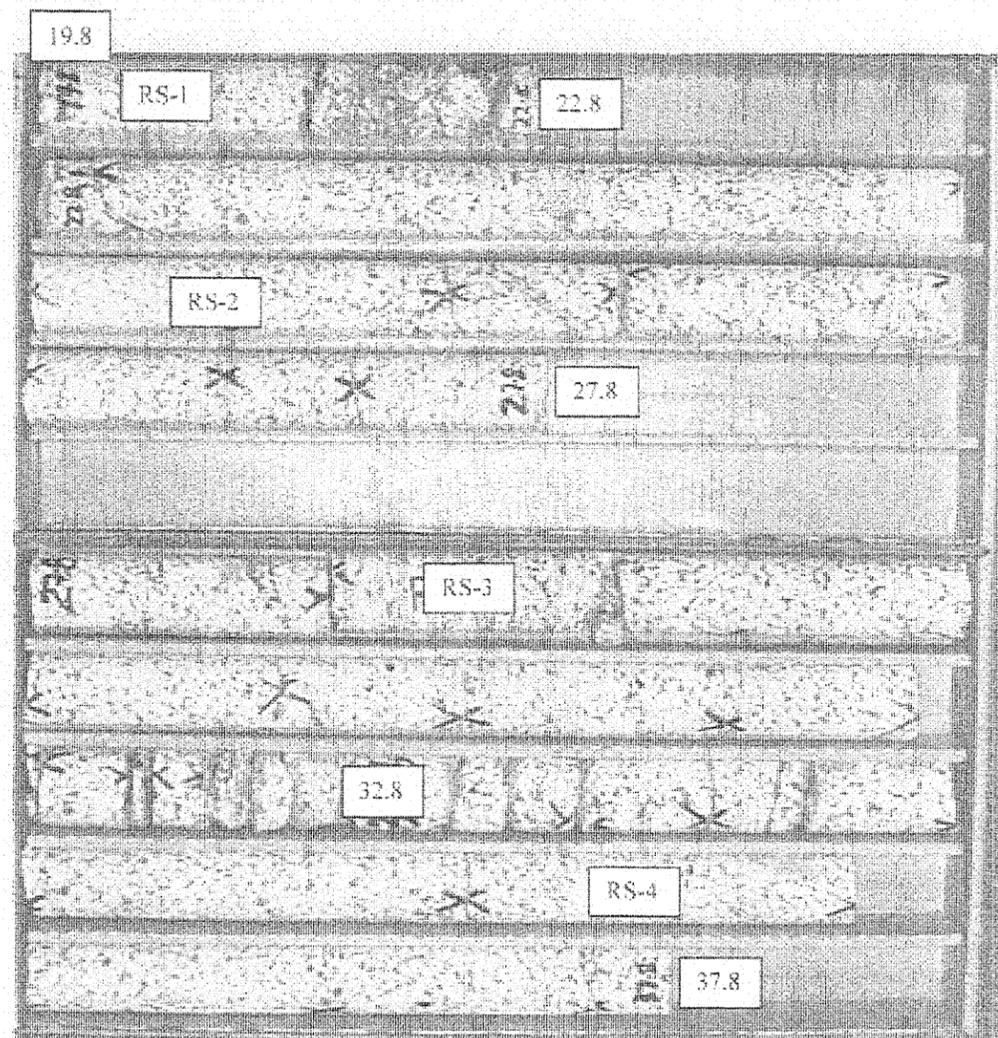
Bed or Bank	Bed	Bank					
Sample No.	SS-1	SS-5					
Retained #4	5	-					
Passed #10	81	95					
Passed #40	50	61					
Passed #200	15	27					
Coarse Sand	52.3	47.7					
Fine Sand	32.7	27.4					
Silt	9.9	14.7					
Clay	5.1	10.2					
LL	22	25					
PI	NP	2					
AASHTO	A-1-b(0)	A-2-4(0)					
Station	22+27	22+27					
Offset	6' LT	19' RT					
Depth	7.9 to 9.4	3.6 to 5.1					

Template Revised 07/18/05

Reported by: *Joseph I. Milkovits, Jr.* Date: 10/14/2005
Joseph I. Milkovits, Jr.

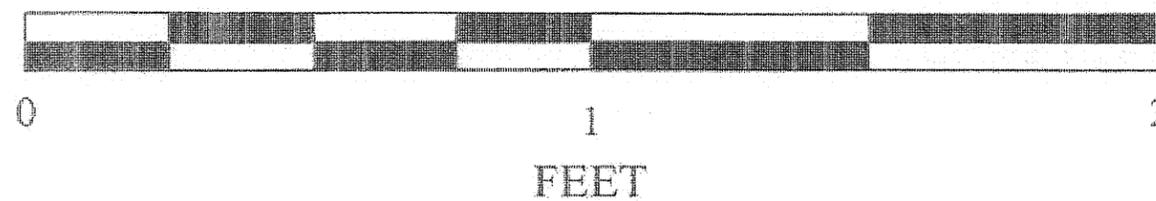
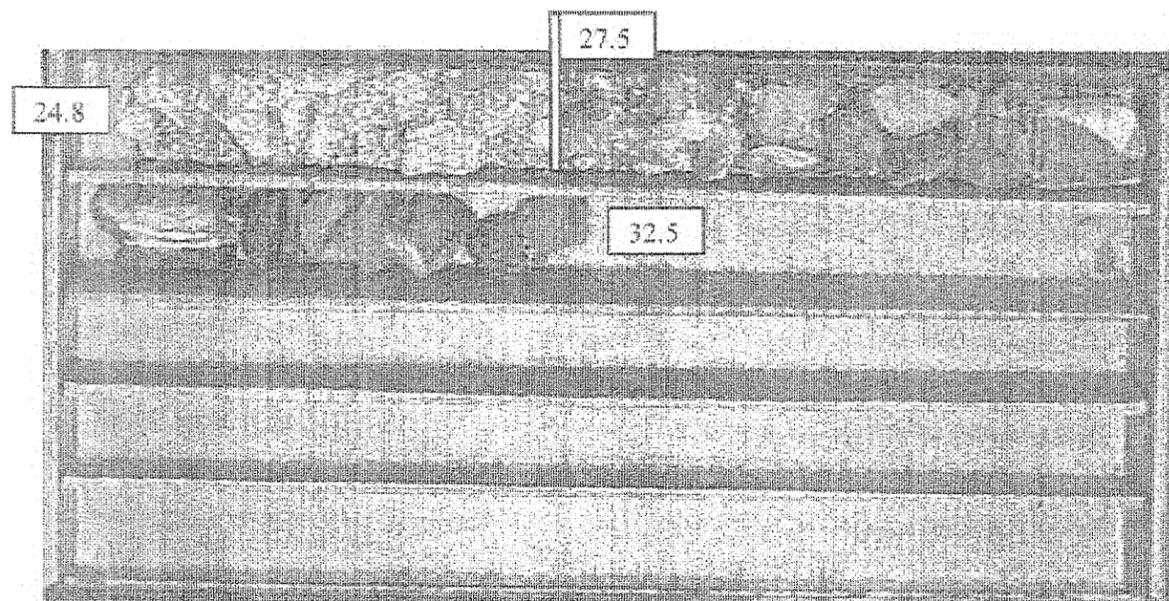
CORE PHOTOGRAPHS

B1-A



CORE PHOTOGRAPHS

B2-B



SITE PHOTOGRAPH

SHEET 17 OF 17
33368.1.1 (B-4000)

Bridge No. 45 on SR 1002 (Jeffries Cross Road) over Jordan Creek at -L- Sta. 21+09.50

