

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	33309.1.1 (B-3863)	1	18

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

STRUCTURE
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 33309.1.1 (B-3863) F.A. PROJ. BRZ-1722(2)
COUNTY JOHNSTON
PROJECT DESCRIPTION BRIDGE NO. 151 ON -L- (SR 1722, MUDHAM RD.) OVER LITTLE RIVER

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CAUTION NOTICE

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

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

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

PROJECT: 33309.1.1 ID: B-3863

PERSONNEL

C.D. CZAJKA

H.R. CONLEY

D.W. DIXON

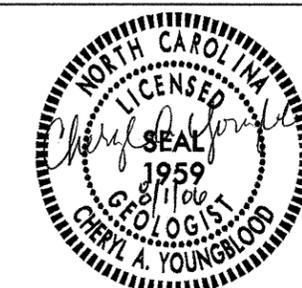
M.L. REEDER

INVESTIGATED BY G.A. YOUNGBLOOD

CHECKED BY N.T. ROBERSON

SUBMITTED BY N.T. ROBERSON

DATE AUGUST 2006



DRAWN BY: T.T. WALKER & C.D. CZAJKA

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

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

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

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 T208, 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, SILTY 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. ANGULARITY OF GRAINS THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: <u>ANGULAR</u> , <u>SUBANGULAR</u> , <u>SUBROUNDED</u> , OR <u>ROUNDED</u> .	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS: 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. 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.	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 DISLOGGED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FMJ) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SCREC) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. 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SOIL LEGEND AND AASHTO CLASSIFICATION <table border="1" style="width: 100%; border-collapse: collapse; font-size: 6px;"> <tr> <th>GENERAL CLASS.</th> <th colspan="2">GRANULAR MATERIALS (≤ 35% PASSING #200)</th> <th colspan="2">SILT-CLAY MATERIALS (> 35% PASSING #200)</th> <th colspan="2">ORGANIC MATERIALS</th> </tr> <tr> <th>GROUP CLASS.</th> <th>A-1</th> <th>A-3</th> <th>A-2</th> <th>A-4</th> <th>A-5</th> <th>A-6</th> </tr> <tr> <th>SYMBOL</th> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <th>% PASSING</th> <td>#10 #40 #200</td> <td>50 MX 30 MX 15 MX</td> <td>51 MN 10 MX 10 MX</td> <td>35 MX 35 MX 35 MX</td> <td>35 MX 35 MX 35 MX</td> <td>36 MN 36 MN 36 MN</td> </tr> <tr> <th>LIQUID LIMIT</th> <td></td> <td>40 MX 10 MX</td> <td>41 MN 10 MX</td> <td>42 MN 10 MX</td> <td>43 MN 10 MX</td> <td>44 MN 10 MX</td> </tr> <tr> <th>PLASTIC INDEX</th> <td></td> <td>6 MX</td> <td>NP</td> <td>10 MX 11 MN</td> <td>10 MX 11 MN</td> <td>10 MX 11 MN</td> </tr> <tr> <th>GROUP INDEX</th> <td></td> <td>0</td> <td>0</td> <td>4 MX</td> <td>8 MX</td> <td>12 MX</td> </tr> <tr> <th>USUAL TYPES OF MAJOR MATERIALS</th> <td>STONE FRAGS, GRAVEL, AND SAND</td> <td>FINE SAND</td> <td>SILTY OR CLAYEY GRAVEL AND SAND</td> <td>SILTY SOILS</td> <td>CLAYEY SOILS</td> <td></td> </tr> <tr> <th>GENERAL RATING AS A SUBGRADE</th> <td colspan="2">EXCELLENT TO GOOD</td> <td colspan="2">FAIR TO POOR</td> <td>FAIR TO POOR</td> <td>POOR</td> </tr> </table>	GENERAL CLASS.	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VERY SLIGHT (V SLI.) - ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE. SLIGHT (SLI.) - ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS. MODERATE (MOD.) - SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK. MODERATELY SEVERE (MOD. SEV.) - ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i> SEVERE (SEV.) - ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT, SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. <i>IF TESTED, YIELDS SPT N VALUES > 100 BPF</i> VERY SEVERE (V SEV.) - ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. <i>IF TESTED, YIELDS SPT N VALUES < 100 BPF</i> COMPLETE - ROCK REDUCED TO SOIL, ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.
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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 TIPPETT
SECRETARY

August 1, 2006

STATE PROJECT: 33309.1.1 (B-3863)
FEDERAL PROJECT: BRZ-1722(2)
COUNTY: Johnston
DESCRIPTION: Bridge No. 151 on -L- (SR 1722, Mudham Rd.) over the Little River
SUBJECT: Geotechnical Report – Structure Inventory

Project Description

This project consists of a 195-foot long three span bridge to be constructed over the Little River to replace the existing structure. Proposed span lengths are two at 75 feet and one at 45 feet. The bridge will be built on a 90° skew. The project is located in Johnston County about four miles southeast of Wendell.

The subsurface investigation was conducted during June of 2006 using both an ATV-mounted CME-550 drill machine and an ATV-mounted CME-45C drill machine. Standard Penetration Test borings were performed at each of the four proposed bent locations. All borings were advanced until crystalline rock was encountered. Additionally, two hand auger borings were performed on the northeast side of the project in order to characterize the soil properties for the design of a rock buttress. All interior bent borings were cored using NXWL core equipment. Representative soil and rock samples were obtained for visual classification in the field and selected samples were sent to the Materials and Tests Unit for laboratory analysis.

Physiography and Geology

The project is located in the gently rolling terrain of the Piedmont Physiographic Province. Geologically, the site is located within the Raleigh Belt and is underlain by massive granitic rock. The area consists of wooded land and sparse homes.

Soil Properties

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

Roadway embankment soils are present in all end bent borings and range in thickness from 5.5 to 7.8 feet. These soils consist primarily of orange-brown, soft to medium stiff, moist, sandy clay (A-6). A brown,

loose, moist, silty sand (A-2-4) is present at EB1-B. Roadway embankment soils are underlain by residual and alluvial soils.

Alluvial soils are present at all the bent locations and range in thickness from 7.0 to 14.5 feet. These soils consist primarily of gray, loose to medium dense, moist to wet, coarse sand (A-1-b); orange-brown and gray, very soft, wet, sandy silt (A-4); and orange, brown and blue-gray, very soft to stiff, moist, sandy clay (A-6). Minor amounts of gray and orange-brown, very loose, wet, silty sand (A-2-4) are present at EB2-A. The alluvial soils were deposited on residual soils and weathered rock.

Residual soils are present at the B2 and EB2 bents and range in thickness from 1.6 to 11.5 feet. These soils consist of white, tan-brown, and black, dense to very dense, dry to moist, silty sand (A-2-4). Residual soils are derived from weathering of the underlying weathered and crystalline rock.

Rock Properties

Weathered rock is present at each boring location except for EB1-B and B2-A. Weathered rock is derived from the underlying crystalline rock and ranges in thickness from 0.3 to 11.5 feet. Weathered rock was cored at boring B2-B with core recovery (REC) of 12% and rock quality designation (RQD) of 0%. The top of weathered rock was encountered at elevations ranging from 188.3 to 196.3 feet.

Crystalline rock was encountered at each boring location. The top of crystalline rock ranges in elevation from 179.8 to 198.8 feet. Rock core was obtained from all four interior bent borings. Crystalline rock consists of pink, white and black, moderately severely weathered to fresh, medium hard to hard, close to widely fractured, granite. Core recovery (REC) for the individual core runs ranges from 70% to 100% and rock quality designation (RQD) ranges from 44% to 100%. More detailed rock descriptions can be found in the core boring reports. Four rock core samples were submitted to the Materials and Tests Unit laboratory to determine Unconfined Compressive Strength and Unit Weight. Compressive strengths range from 0.68 to 6.43 ksi.

Groundwater

Groundwater was encountered at all boring locations. At the time of the investigation, groundwater elevations ranged from 201.6 to 203.2 feet and the surface water elevation of the Little River was 201.7 feet.

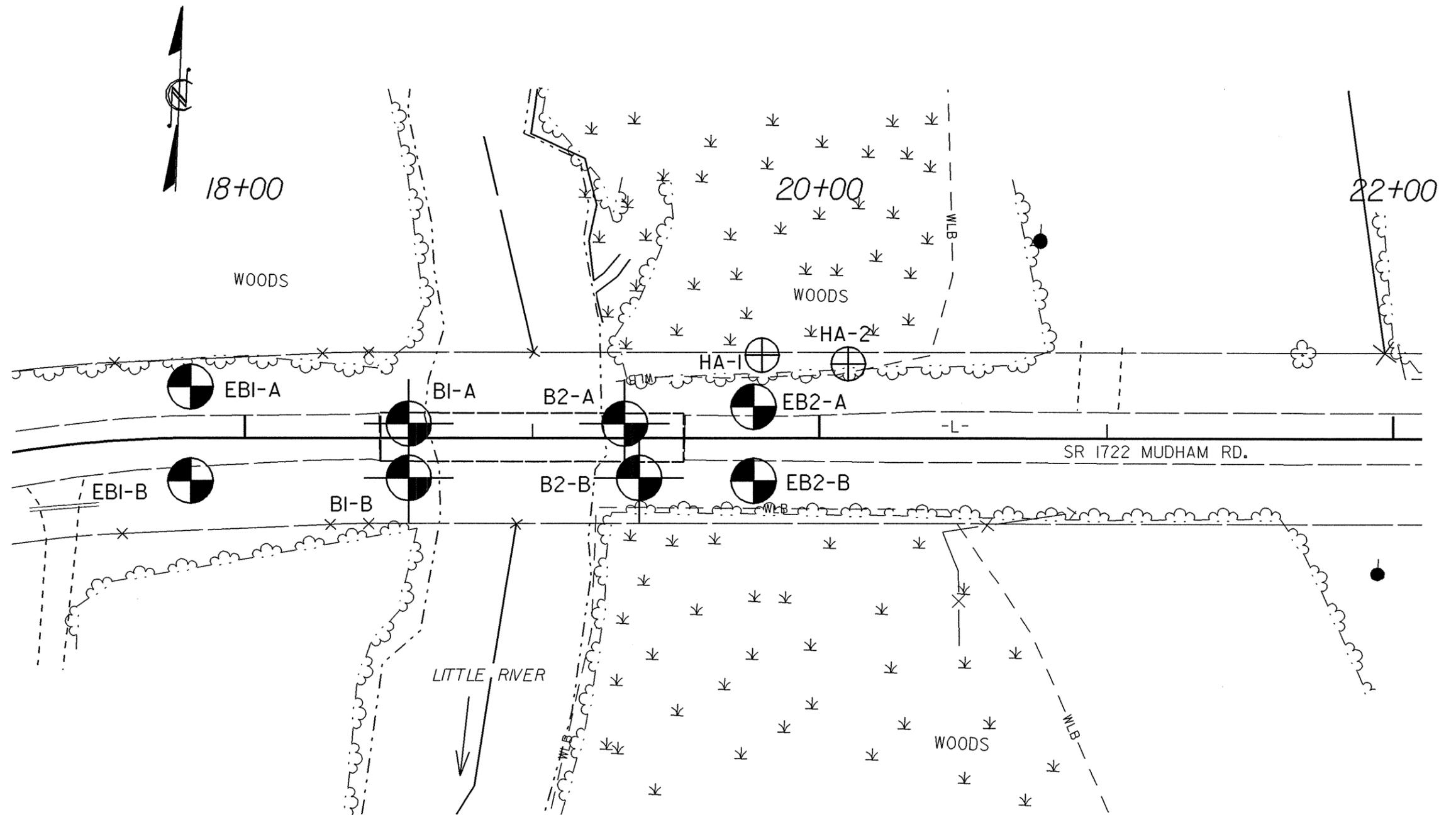
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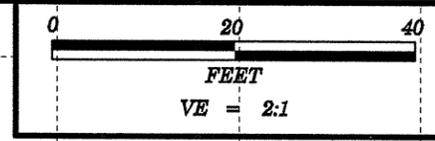
This Geotechnical foundation report is based on the Preliminary General Drawing dated March 13, 2006 and the Bridge Survey & Hydraulic Design Report dated April 3, 2006. If significant changes are made in the design or location of the proposed structure, the subsurface information should be reviewed and modified as necessary.

Respectfully Submitted,

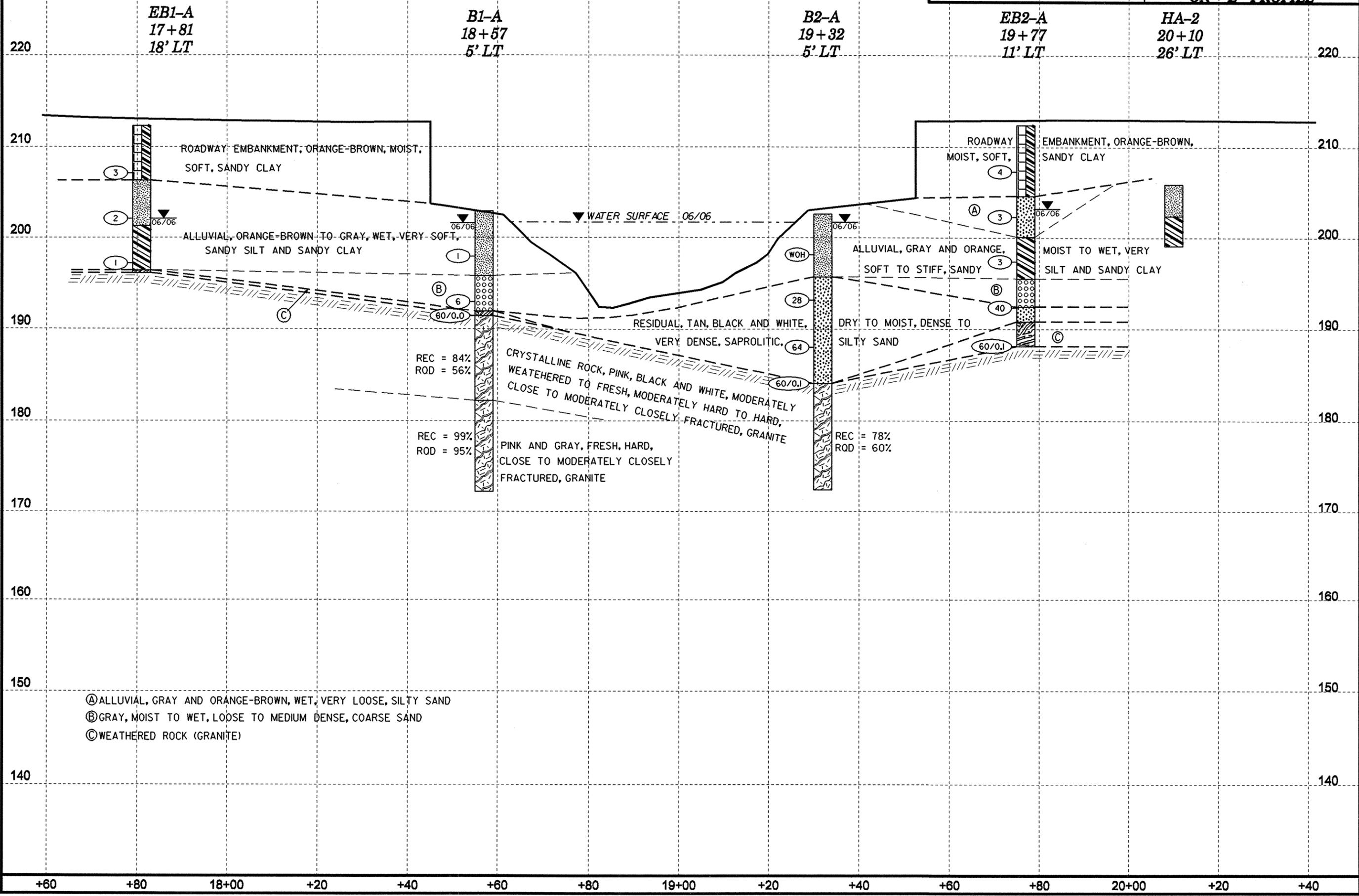
A handwritten signature in cursive script that reads "Cheryl A. Youngblood".

Cheryl A. Youngblood, LG
Project Geological Engineer



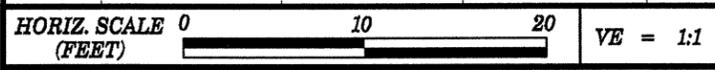
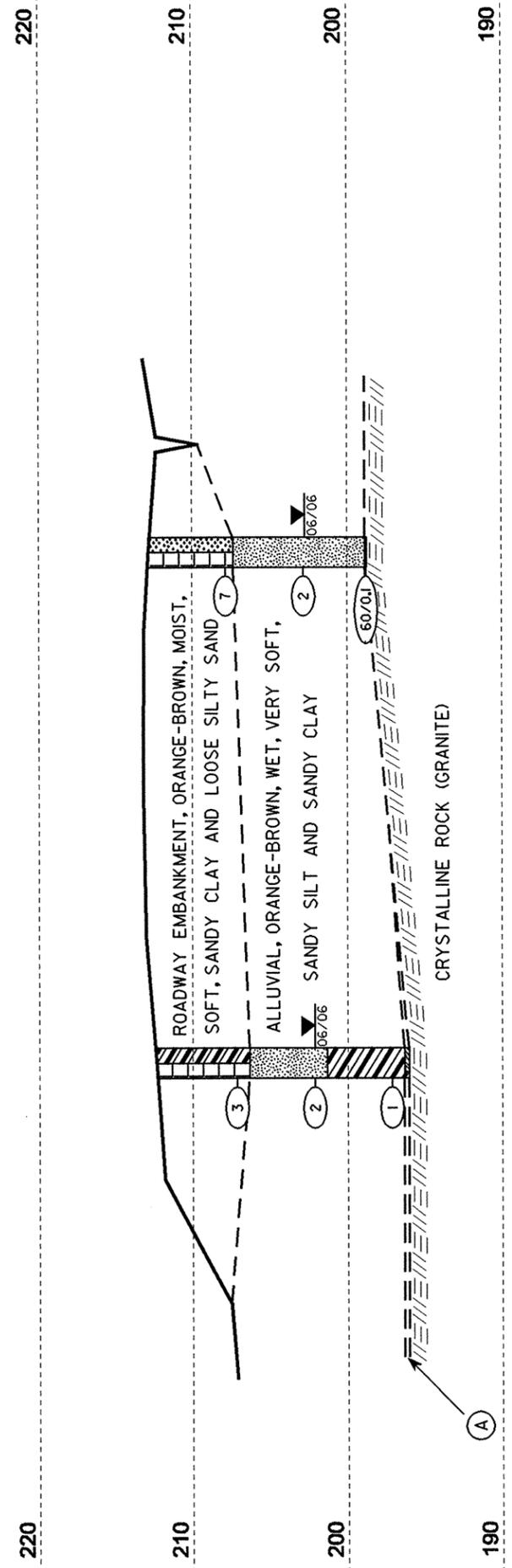


PROJECT REFERENCE NO.	SHEET
33309.1.1 (B-3863)	5
BORINGS PROJECTED ON -L- PROFILE	



EB1-B
17+81
15' RT

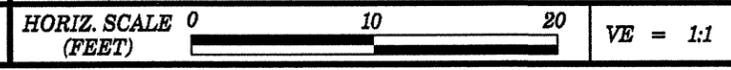
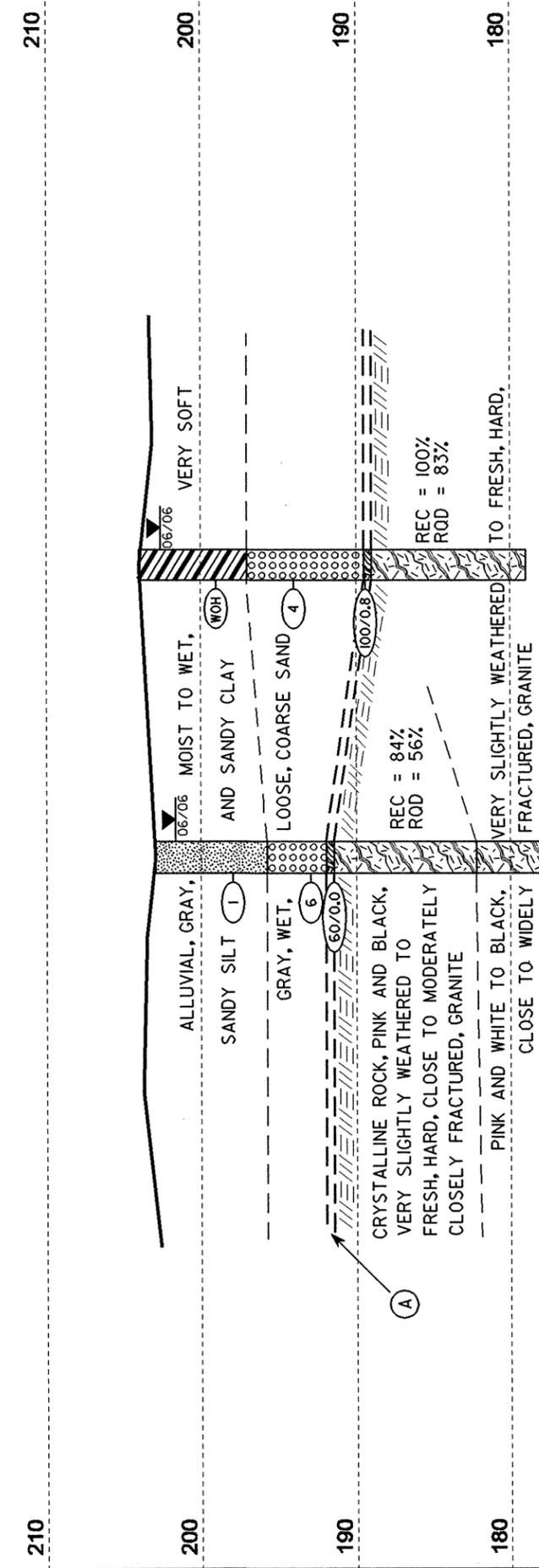
EB1-A
17+81
18' LT



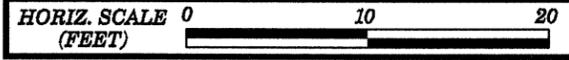
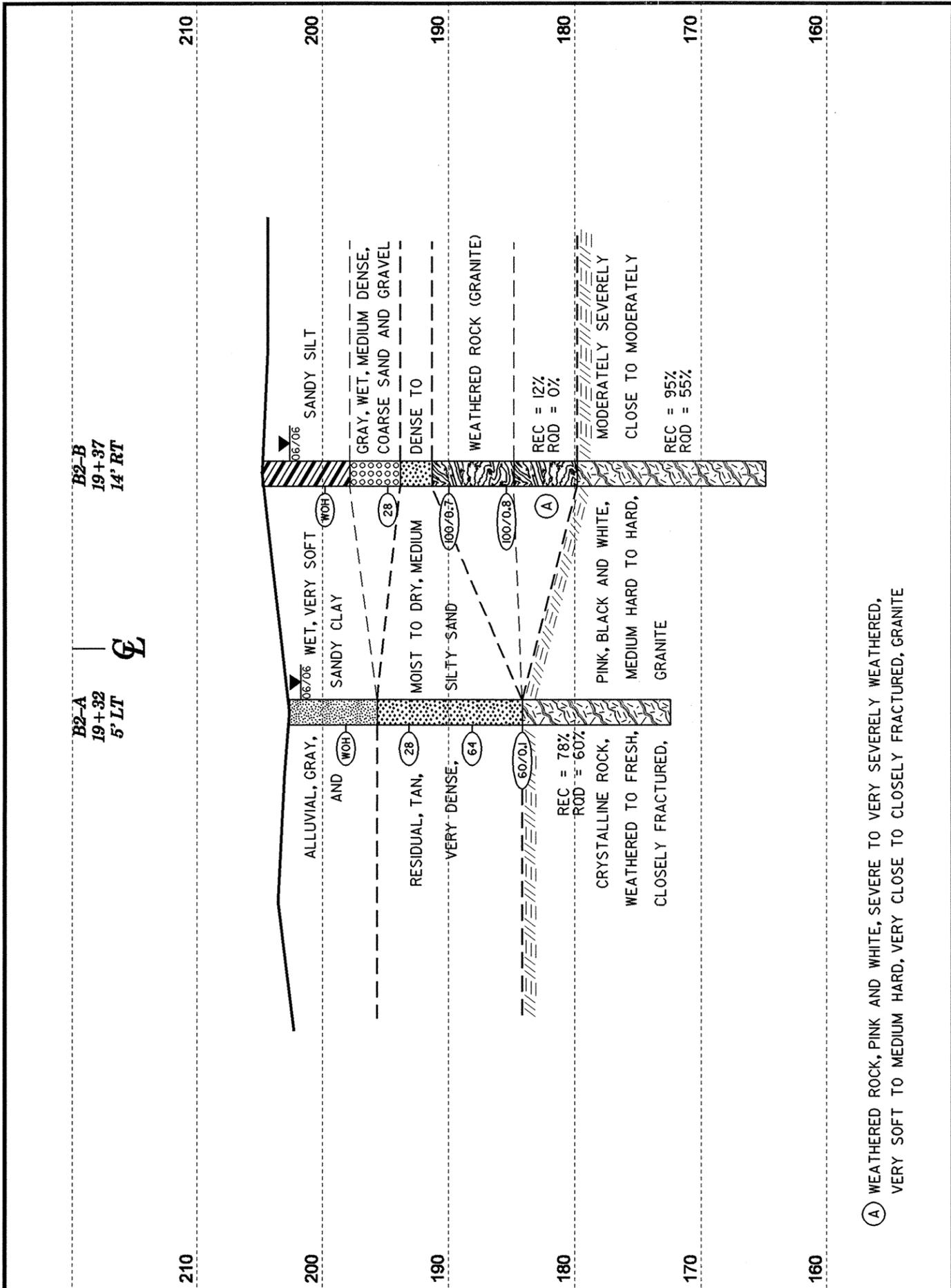
CROSS SECTION THROUGH END BENT 1

BI-B
18+57
14' RT

BI-A
18+57
5' LT

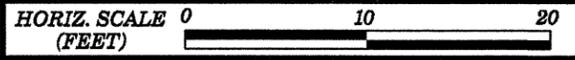
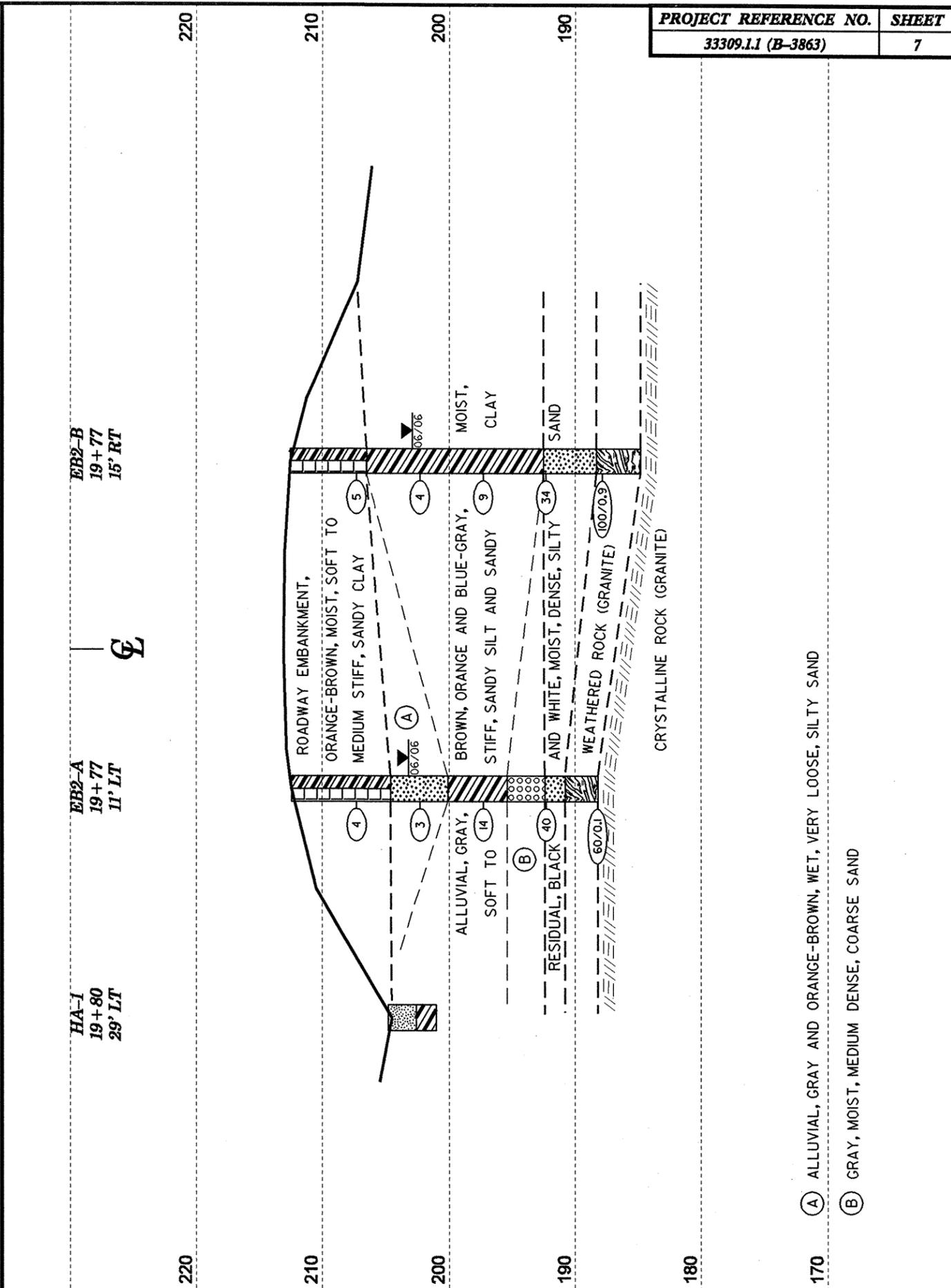


CROSS SECTION THROUGH BENT 1



VE = 1:1

CROSS SECTION THROUGH BENT 2



VE = 1:1

CROSS SECTION THROUGH END BENT 2

- (A) ALLUVIAL, GRAY AND ORANGE-BROWN, WET, VERY LOOSE, SILTY SAND
- (B) GRAY, MOIST, MEDIUM DENSE, COARSE SAND

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 33309.1.1		ID. B-3863		COUNTY JOHNSTON		GEOLOGIST C.D. CZAJKA							
SITE DESCRIPTION BRIDGE NO. 151 ON -L- (SR 1722, MUDHAM RD.) OVER LITTLE RIVER							GROUND WATER						
BORING NO. EB2-A		BORING LOCATION 19+77		OFFSET 11' LT		ALIGNMENT -L-							
COLLAR ELEVATION 212.4'		NORTHING 736530'		EASTING 2204118'		0 HR. 13.7'							
TOTAL DEPTH 24.2'		DRILL MACHINE CME-45C		DRILL METHOD H.S. AUGERS		HAMMER TYPE AUTOMATIC							
START DATE 6/29/06		COMPLETION DATE 6/29/06		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 24.1'							
ELEV. (FT.)	DEPTH (FT.)	BLOW COUNT			PEN. (FT.)	BLOWS PER FOOT				SAMPLE NUMBER	LOG	SOIL AND ROCK DESCRIPTION	
		0.5'	0.5'	0.5'		0	25	50	75				100
212.4													
210.0	4.1	2	2	2	1.0							M	ROADWAY EMBANKMENT, ORANGE-BROWN, SANDY CLAY
205.0	9.1	2	2	1	1.0							SS-12	ALLUVIAL, GRAY AND ORANGE-BROWN, SILTY SAND
200.0	14.1	3	6	8	1.0							SS-13	GRAY AND ORANGE, SANDY CLAY
195.0	19.1	4	8	32	1.0							M	GRAY, SILTY SAND
190.0	24.1	60			0.1							M	RESIDUAL, BLACK AND WHITE, SILTY SAND
185.0													WEATHERED ROCK (GRANITE)
SPT REFUSAL AT ELEVATION 188.2 FEET ON CRYSTALLINE ROCK (GRANITE)													

PROJECT NO. 33309.1.1		ID. B-3863		COUNTY JOHNSTON		GEOLOGIST C.D. CZAJKA							
SITE DESCRIPTION BRIDGE NO. 151 ON -L- (SR 1722, MUDHAM RD.) OVER LITTLE RIVER							GROUND WATER						
BORING NO. EB2-B		BORING LOCATION 19+77		OFFSET 15' RT		ALIGNMENT -L-							
COLLAR ELEVATION 212.5'		NORTHING 736504'		EASTING 2204119'		0 HR. 13.0'							
TOTAL DEPTH 27.7'		DRILL MACHINE CME-45C		DRILL METHOD H.S. AUGERS		HAMMER TYPE AUTOMATIC							
START DATE 6/28/06		COMPLETION DATE 6/28/06		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 27.7'							
ELEV. (FT.)	DEPTH (FT.)	BLOW COUNT			PEN. (FT.)	BLOWS PER FOOT				SAMPLE NUMBER	LOG	SOIL AND ROCK DESCRIPTION	
		0.5'	0.5'	0.5'		0	25	50	75				100
212.5													
210.0	4.2	1	2	3	1.0							M	ROADWAY EMBANKMENT, ORANGE-BROWN, SANDY CLAY
205.0	9.2	1	2	2	1.0							▼	ALLUVIAL, GRAY, BROWN, AND BLUE-GRAY, SANDY
200.0	14.2	3	4	5	1.0							SS-II	CLAY
195.0	19.2	2	22	12	1.0							M	RESIDUAL, BLACK AND WHITE, SILTY SAND
190.0	24.2	24	76		0.9							M	WEATHERED ROCK (GRANITE)
185.0													ADGER REFUSAL AT ELEVATION 184.8 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-10	18' LT	17+81	4.2-5.7	A-6(1)	32	12	40.6	22.7	16.3	20.3	93	65	37	-	-

EB1-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-14	15' RT	17+81	4.0-5.5	A-2-4(0)	14	NP	42.2	45.3	8.4	4.1	97	70	18	-	-

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-3	5' LT	18+57	9.0-10.5	A-1-b(0)	23	NP	76.2	19.5	2.2	2.0	90	35	6	-	-

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-6	14' RT	18+57	4.0-5.5	A-6(6)	30	11	2.8	36.5	28.1	32.5	100	99	69	-	-

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-1	5' LT	19+32	3.5-5.0	A-4(0)	23	4	20.7	44.7	18.4	16.2	100	90	43	-	-
SS-2	5' LT	19+32	8.5-10.0	A-2-4(0)	24	NP	60.2	27.6	9.1	3.0	96	52	16	-	-

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-4	14' RT	19+37	4.0-5.5	A-6(9)	34	15	6.1	27.8	27.5	38.6	100	98	72	-	-
SS-5	14' RT	19+37	9.0-10.5	A-1-b(0)	21	NP	54.7	25.5	9.6	10.2	78	50	18	-	-

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-12	11' LT	19+77	9.1-10.6	A-2-4(0)	26	7	49.6	23.9	10.3	16.2	90	58	27	-	-
SS-13	11' LT	19+77	14.1-15.6	A-6(4)	29	11	4.7	44.1	28.9	22.3	100	99	61	-	-

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-11	15' RT	19+77	14.2-15.7	A-6(3)	30	11	20.5	28.8	26.3	24.4	97	84	55	-	-

HA-1

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		
S-9	29' LT	19+80	2.2-3.8	A-6(5)	27	11	5.5	36.5	27.5	30.5	100	97	70	-	-

HA-2

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		
S-7	26' LT	20+10	1.5-3.0	A-4(0)	23	6	28.8	36.3	20.6	14.2	97	79	40	-	-
S-8	26' LT	20+10	4.5-6.0	A-6(3)	30	12	26.6	24.4	26.7	22.3	97	79	52	-	-



**FIELD
 SCOUR REPORT**

WBS: 33309.1.1 TIP: B-3863 COUNTY: Johnston

DESCRIPTION(1): Bridge No. 151 On -L- (SR 1722, Mudham Rd.) over the Little River

EXISTING BRIDGE

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

Bridge No.: 151 Length: 106' Total Bents: 4 Bents in Channel: 2 Bents in Floodplain: 2
 Foundation Type: Timber Piles

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: None

Interior Bents: None

Channel Bed: None

Channel Bank: None

EXISTING SCOUR PROTECTION

Type(3): None

Extent(4): N/A

Effectiveness(5): N/A

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 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): Sandy Silt (A-4)

Channel Bank Material(8): Sandy Silt (A-4), Sandy Clay (A-6), and Coarse Sand (A-1-b)

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

Floodplain Width(10): ~75 - 100'

Floodplain Cover(11): Trees, Shrubs and Grass

Stream is(12): Aggrading _____ Degrading _____ Static X

Channel Migration Tendency(13): East

Observations and Other Comments: _____

DESIGN SCOUR ELEVATIONS(14) Feet X Meters _____

		BENTS											
		1	2										
Left	189.0	186.8											
Right	189.0	188.5											

Comparison of DSE to Hydraulics Unit theoretical scour:
 DSE ranges between elevation 189.0' to 186.8' compared to the Hydraulics Unit theoretical scour elevation of 180.0'.

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

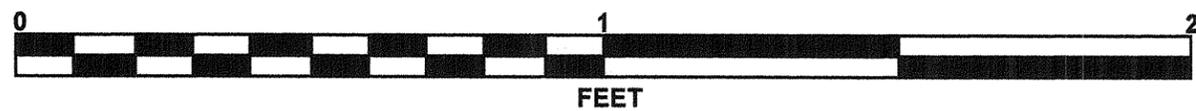
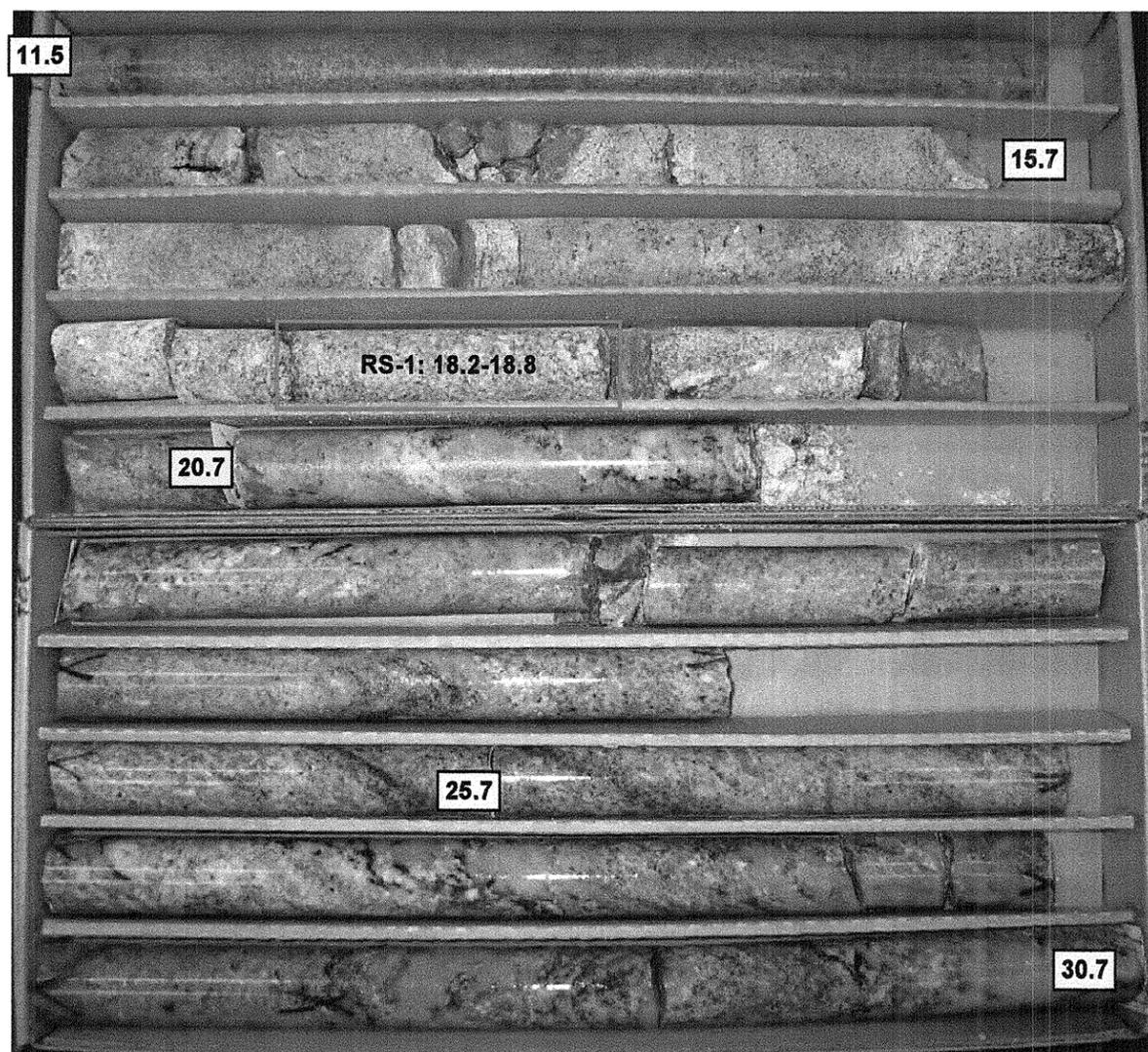
Bed or Bank									
Sample No.									
Retained #4	See Sheet 14, "Soil Test Results", for samples:								
Passed #10									
Passed #40									
Passed #200	SS-1								
Coarse Sand	SS-3								
Fine Sand	SS-4								
Silt	SS-5								
Clay									
LL									
PI									
AASHTO									
Station									
Offset									
Depth									

Reported by: C. A. Youngblood
 C.A. Youngblood

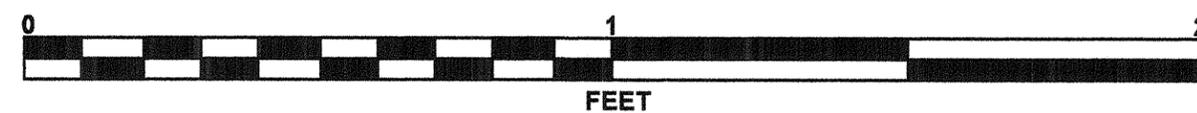
Date: 7/13/2006

CORE PHOTOGRAPHS

B1-A
BOXES 1 & 2: 11.5 - 30.7 FEET

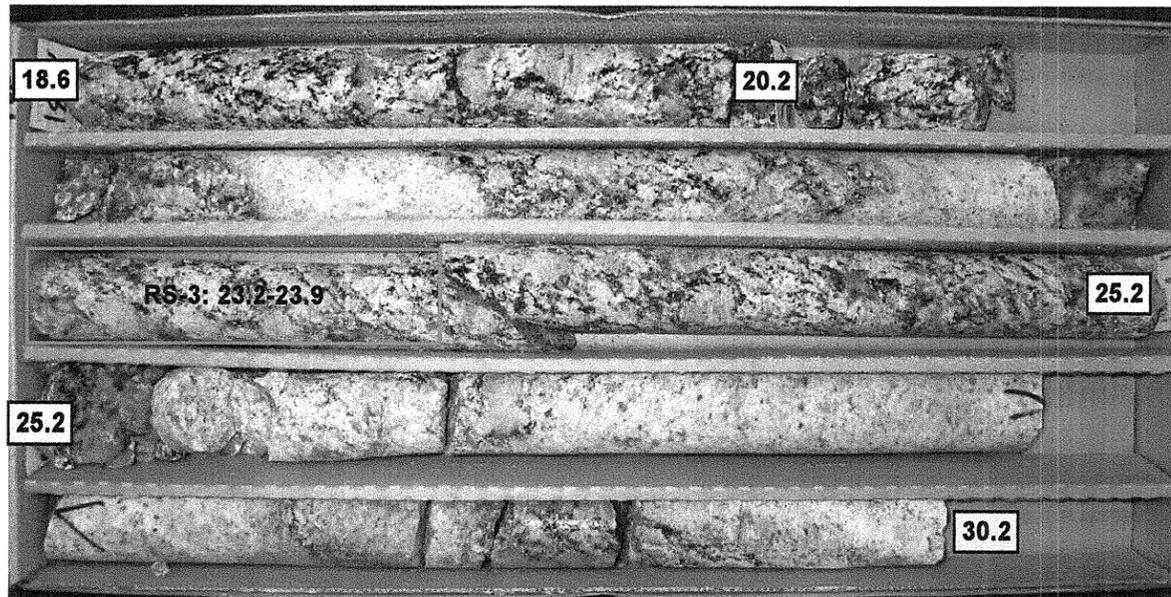


B1-B
BOXES 1: 15.0 - 25.0 FEET

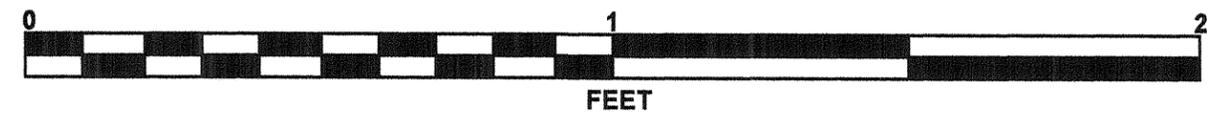
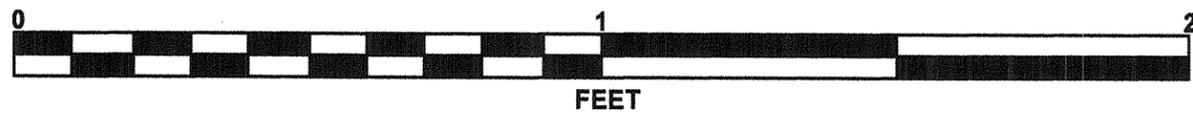
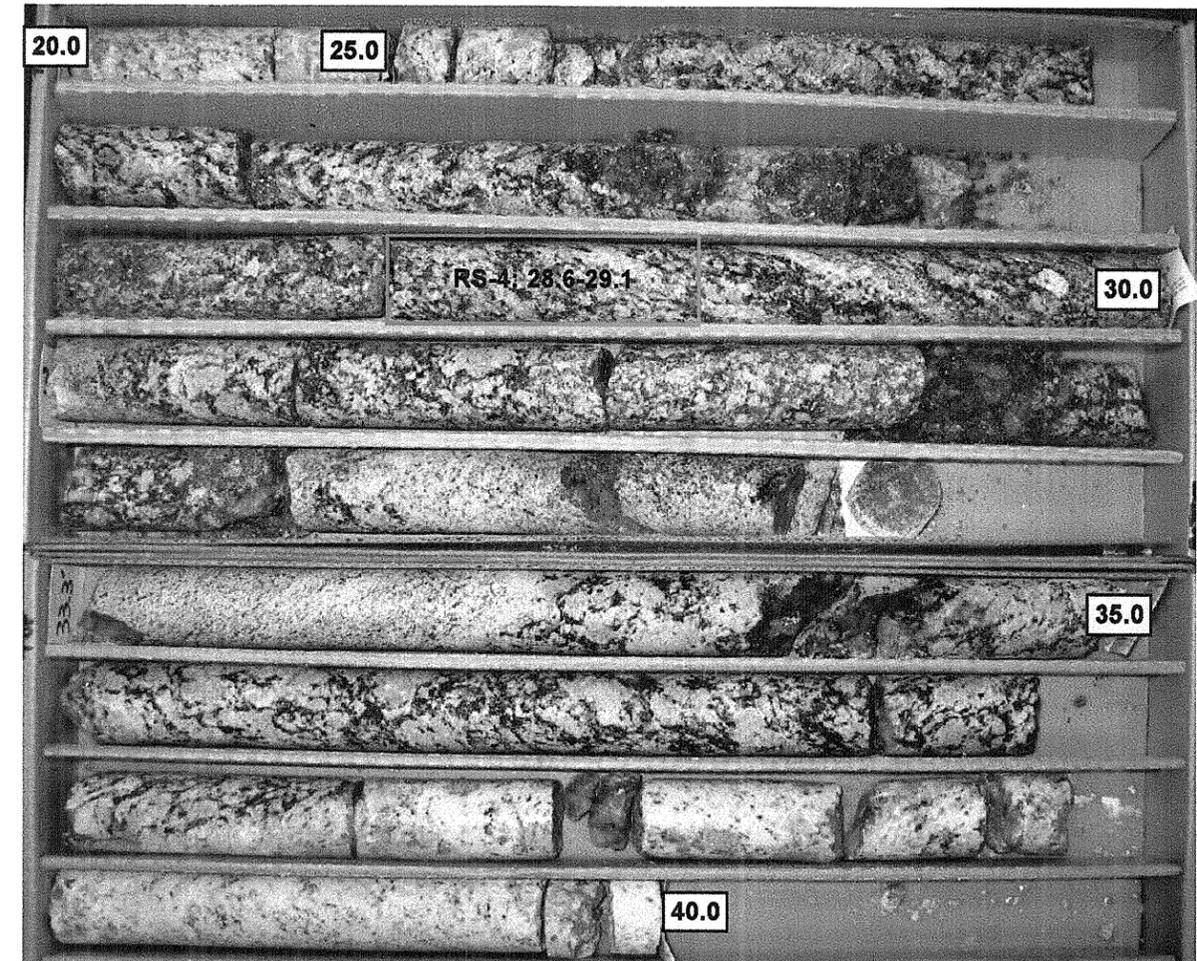


CORE PHOTOGRAPHS

B2-A
BOXES 1: 18.6 - 30.2 FEET



B2-B
BOXES 1 & 2: 20.0 - 40.0 FEET



SITE PHOTOGRAPH

Bridge No. 151 on -L- (SR 1722, Mudham Rd.) over the Little River

