STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS
GEOTECHNICAL UNIT

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STRUCTURE SUBSURFACE INVESTIGATION

STATE PROJECT <u>8.1511701</u> I.D. NO. <u>B-3509</u>
F.A. PROJECT <u>BRSTP-700(1)</u>
COUNTY <u>ROCKINGHAM</u>
PROJECT DESCRIPTION <u>BRIDGE NO. 75 ON</u>
<u>-L- (SR 3003) OVER SMITH RIVER AT</u>
<u>-L- STATION 15+67.5</u>

 STATE
 STATE PROJECT REFERENCE NO.
 SUPET STATE STATE SHEETS

 N.C.
 8.1511701 (B-3509)
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INVESTIGATED BY T.P. MOOREFIELD

CHECKED BY D.N. ARGENBRIGHT

SUBMITTED BY D.N. ARGENBRIGHT

H.R. CONLEY

DATE NOVEMBER 2003

W.T. DUGGINS



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CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

STATE PROJECT NO. SHEET NO. TOTAL SHEET

8,1511701

R-3509

DIVISION OF HIGHWAYS

GEOTECHNICAL UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS TERMS AND DEFINITIONS SOIL DESCRIPTION ROCK DESCRIPTION WELL GRADED INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARS.

UNIFORM-INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE, (ALSO POORLY CAPACITY) HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WHEN TESTED WOULD VIELD SPT REFUSAL AN INFERRED ALLUVIUM (ALLUV.) - SOILS WHICH HAVE BEEN TRANSPORTED BY WATER. HARD MOCK IS NOW-COMSINE THE LEVEL AT WHICH NON-COSTAL PLAN MATERIAL WOULD TIELD SPT REFUSAL, AN UNFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COSTAL PLAN MATERIAL WOULD TIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. SOIL IS CONSIDERED TO BE THE HINCONSOLIDATED. SEMI-CONSOLIDATED OR MEATHERED FARTH MATERIALS SUIL IS CONSIDERED TO BE THE DISCONSOLIDITED, SENT-CONSOLIDITED OF WERTHREND FROM THE HEAD.

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 INCL AQUIFER - A WATER BEARING FORMATION OR STRATA. AP-GRADED- INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZON ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ANGULARITY OF GRAINS CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE: ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLDWS: ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, THE ANGULARITY OR ROUNDNESS OF 90IL GRAINS ARE DESIGNATED BY THE TERMS; ANGULAR, NON-COASTAL PLAIN MATERIAL THAT YIELDS SPT N VALUES > 100 BLOWS OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION AS SHALE SLATE ETC. WEATHERED SUBANGULAR, SUBROUNDED, DR ROUNDED VERY STIFF, GRAY SUTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6 PER FOOT. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL MINERALOGICAL COMPOSITION SOIL LEGEND AND AASHTO CLASSIFICATION IS IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT CRYSTALLINE ROCK (CR) MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE. OULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GROUND SURFACE. GENERAL GRANUI AR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS GNEISS, GABBRO, SCHIST, ETC CALCAREOUS (CALC.) - SOILS WHICH CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. THE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAT COMPRESSIBILITY A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5 FINE TO CORNSE GRAIN PETAMORPHIC AND NUM-CURSTAL PLAIN
SEDIMENTARY POCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE
INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.
COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM A-1 A-3 GROUP CLASS. A-1-A A-1-b A-2-4 A-2-5 A-2-6 A-2-SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 30 COASTAL PLAIN SEDIMENTARY ROCK MODERATELY COMPRESSIBLE HIGHLY COMPRESSIBLE <u>CORE RECOVERY (REC.)</u> - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SYMBOL JOUID LIMIT GREATER THAN 50 SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.
WEATHERING PERCENTAGE OF MATERIAL PASSING DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT MUCK, PEAT SILT- CLAY ROCKS OR CUTS MASSIVE ROCK. ORGANIC MATERIAL OTHER MATERIAL SOILS SOILS SOILS ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER SON S FRESH DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE ACE OF ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% 40 MX41 MN 40 MX41 MN 40 MX41 MN 40 MX41 MN LIDUID LIMIT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, <u>DIP DIRECTION (DIP AZIMUTH) -</u> THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. MODERATELY ORGANIC 5 - 102 12 - 20% N.P. 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN ASTIC INDEX 6 MX (V. SL1.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY, ROCK RINGS UNDER HAMMER BLOWS IF IGHLY ORGANIC >10% >20% LITTLE OR HIGHLY 35% AND ABOVE DE A CRYSTALLINE NATURE. GROUND WATER GROUP INDEX 0 0 0 4 MX 8 MX 12 MX 16 MX NO MX FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE USUAL TYPES STONE FRAGS. FINE SILTY OR CLAIR. SAND GRAVEL AND SAND ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO AMOUNTS OF SOILS BIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE ORGANIC WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING. (SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. CRYSTALS ARE DULL AND DISCOLORED, CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS. SOILS SOILS **Y**___ STATIC WATER LEVEL AFTER 24 HOURS. MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING FEFFCTS. IN FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. GEN RATIN GRANITOID ROCKS, MOST FELOSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY, ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED VPW PERCHED WATER, SATURATED ZONE OR WATER BEARING STRATA POOR (LOOD PLAIN (F.P.) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. SUBGRADI OM-SPRING OR SEEPAGE P.I. OF A-7-5 ≤ L.L. - 30 : P.I. OF A-7-6 > L.L. MODERATELY 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 CONSISTENCY OR DENSENES MISCELLANEOUS SYMBOLS ORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN (MOD, SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. SPT CPT
DPT DMT TEST BORING COMPACTNESS OR ROADWAY EMBANKMENT PRIMARY SOIL TYPE PENETRATION RESISTENCE COMPRESSIVE STRENGTH (TONS/FT²) JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. CONSISTENCY WITH SOIL DESCRIPTION (N-VALUE) DESIGNATIONS ALL ROCKS EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED SEVERE LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. VERY LOOSE \oplus IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME AUGER BORING SOIL SYMBOL GENERALLY S- BULK SAMPLE EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. 4 TO 10 LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS MEDIUM DENSE SS- SPLIT SPOON 10 TO 30 ARTIFICIAL FILL OTHER THAN IF TESTED, YIELDS SPT N VALUES > 100 BPF MATERIAL ROADWAY EMBANKMENTS CORE BORING MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN (NON-COHESIVE) SAMPLE VERY SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FARRIC FLEMENTS ARE DISCERNIBLE RUT VERY DENSE DILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. >50 ST- SHELBY TUBE THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK INFERRED SOIL BOUNDARIES <u>PERCHED WATER</u> - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN VERY SOFT ******O REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINI MONITORING WELL SAMPLE 2 TO 4 4 TO 8 VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. IF TESTED, YIELDS SPT N VALUES < 100 BPF TERVENING IMPERVIOUS STRATUM. 0.25 TO 0.5 RS- ROCK SAMPLE INFERRED ROCK LINE PIEZOMETER MEDIUM STIFF 0.5 TO 1 1 TO 2 2 TO 4 >4 STIT-CLAY RESIDUAL SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND STIFF 8 TO 15 INSTALLATION RT- RECOMPACTED SCATTERED CONCENTRATIONS, QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS, SAPROLITE IS 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 VERY STIFF (COHESIVE) SLOPE INDICATOR \bigcirc DIP/DIP DIRECTION OF CBR - CBR SAMPLE ROCK HARDNESS ROCK STRUCTURES TEXTURE OR GRAIN SIZ \bigcirc SPT N-VALUE SAPROLITE (SAP.) - RESIDUAL SOIL WHICH RETAINS THE RELIC STRUCTURE OR FABRIC OF THE CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES - SOUNDING ROD REF- SPT REFUSAL U.S. STD. SIEVE SIZE 60 SEVERAL HARD BLOWS OF THE GEOLOGISTS PICK. SILL - AN INTRUSIVE BODY OF IGNEOUS BOCK OF APPROXIMATELY UNIFORM THICKNESS AND 0.42 0.25 CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY, HARD HAMMER BLOWS REQUIRED ABBREVIATIONS TREATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, MICH HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS TO DETACH HAND SPECIMEN. AR - AUGER REFUSAL PMT - PRESSUREMETER TEST MODERATEL Y CAN BE SCRATCHED BY KNIFE OR PICK, GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE (RLDR.) (COB.) (GR.) (SL₂) (CL.) SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR BT - BORING TERMINATED SD. - SAND, SANDY EXCAVATED BY HARD BLOW OF A GEOLOGISTS PICK, HAND SPECIMENS CAN BE DETACHED - SILT, SILTY - CLAY GRAIN MM 305 SIZE IN 12° 0.05 0.005 BY MODERATE BLOWS. 2.0 0.25 CPT - CONE PENETRATION TEST STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR B.R.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 CAN BE GROOVED OR GOUGED 8.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. TCR - TRICONE REFUSAL CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE - DILATOMETER TEST SOIL MOISTURE - CORRELATION OF TERMS POINT OF A GEOLOGISTS PICK. DPT - DYNAMIC PENETRATION TEST WITH 60 BLOWS. SOIL MOISTURE SCALE FIELD MOISTURE 7d - DRY UNIT WEIGHT VOID RATIO CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS GUIDE FOR FIELD MOISTURE DESCRIPTION SOFT (ATTERBERG LIMITS) DESCRIPTION STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT, SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE. W - MOISTURE CONTENT FOSS. - FOSSILIFEROUS V. - VERY - SATURATED HISHALLY LIDUID: VERY WET, USUALLY FRAC. - FRACTURED VST - VANE SHEAR TEST STRATA ROCK QUALITY DESIGNATION (S.R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: CAN BE CARVED WITH KNIFE CAN BE EXCAVATED BEADILY WITH POINT OF PICK. PIECES 1 INCH (SAT.) 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. FRAGS. - FRAGMENTS OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY LIQUID LIMIT FINGERNAIL ASTIC SEMISOLID: REQUIRES DRYING TO TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER RANGE - WET - (W) EQUIPMENT USED ON SUBJECT PROJECT FRACTURE SPACING ATTAIN OPTIMUM MOISTURE TERM TH1CKNESS PLASTIC LIMIT BENCH MARK: USGS-CAP, -L- STA. 14+02, OFFSET 22.5' RT **TERM** SPACING HAMMER TYPE: ADVANCING TOOLS DRILL UNITS: VERY THICKLY BEDDED > 4 FEET VERY WIDE MORE THAN 10 FEET SOLID: AT OR NEAR OPTIMUM MOISTURE AUTOMATIC MANUAL 1.5 - 4 FEET - MOIST - (M) THICKLY BEDDED OPTIMUM MOISTURE CLAY BITS 3 TO 10 FEET ELEVATION: 527.0 MOBILE B-___ 0.16 - 1.5 FEET SHRINKAGE LIMIT MODERATELY CLOSE VERY THINLY BEDDED 6° CONTINUOUS FLIGHT AUGER CORE SIZE: 0.16 TO 1 FEET REQUIRES ADDITIONAL WATER TO NOTES: THICKLY LAMINATED 0.008 - 0.03 FEET - DRY - (D) BK-51 VERY CLOSE LESS THAN 0.16 FEET THINLY LAMINATED ATTAIN OPTIMUM MOISTURE 8º HOLLOW AUGERS < 0.008 FEET _____ INDURATION PLASTICITY HARD FACED FINGER BITS CME-45C NXWL_ FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. PLASTICITY INDEX (PI) DRY STRENGTH TUNG.-CARBIDE INSERTS __H___ **⊠** CME-55Ø RUBBING WITH FINGER FREES NUMEROUS GRAINS NONPLASTIC VERY LOW 0-5 FRIABLE CASING W/ ADVANCER GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE SLIGHT LOW PLASTICITY 6-15 HAND TOOLS: MEDIUM PORTABLE HOIST TRICONE___ *STEEL TEETH POST HOLE DIGGER GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; MODERATELY INDURATED HIGH PLASTICITY 26 OR MORE BREAKS EASILY WHEN HIT WITH HAMMER. TRICONE HAND AUGER OTHER GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE: INDURATED SOUNDING ROD CORE BIT DIFFICULT TO BREAK WITH HAMMER. DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN. RED. YEL-BRN, BLUE-GRAY) VANE SHEAR TEST OTHER_ OTHER SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE. EXTREMELY INDURATED OTHER SAMPLE BREAKS ACROSS GRAINS. REVISED 09/15/00



STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

Michael F. Easley GOVERNOR P.O. BOX 25201, RALEIGH, N.C. 27611-5201

Lyndo Tippett SECRETARY

November 13, 2003

STATE PROJECT:

8.1511701 (B-3509)

FEDERAL PROJECT:

BRSTP-700(1)

COUNTY:

Rockingham

DESCRIPTION:

Bridge No. 75 on -L- (SR 3003) over Smith River

SUBJECT:

Geotechnical Report – Structure Inventory

Project Description

This project consists of a 345-foot long four span bridge to be constructed over the Smith River along the existing -L- alignment on NC 700/SR 3003 (Meadow Road) in the town Eden. The proposed bridge has a 90° skew and will replace the existing 340-foot long structure. A temporary detour bridge is to be constructed north of the existing structure. The western end of the bridge is adjacent to an historic district which includes a textile mill and associated buildings, along with several more recent businesses. The eastern portion of the project consists of a wooded area left of -L-, and several businesses and parking areas to the right of -L-. A brick and concrete structure is located directly adjacent to the existing bridge on the east side of the river (see Site Photograph Sheet No. 21). Several large water lines lead out from the building, suggesting that the structure may have served as a water intake and pumping station in the past. In addition, a sewer line and easement is located beneath the bridge between existing Interior Bents 6 and 7.

The geotechnical field investigation was conducted in April and September, 2003. Borings were advanced using a BK-51 and CME-550 ATV-mounted drill machines with automatic hammers. All borings were advanced until non-crystalline rock was encountered. Borings B1-B, B2-A, and B3-A were cored using NXWL core equipment to recover rock samples from non-crystalline rock. Standard Penetration Tests were performed at selected locations and one additional boring was advanced using continuous flight augers. Representative soil samples were collected for visual classification in the field and for laboratory analysis by the Materials and Tests Unit. Seven rock core samples were sent to the Materials and Test Unit to determine Unit Weight, Compressive Strength, and Young's Modulus.

Physiography and Geology

The project is located in gently rolling, moderately hilly terrain at the western edge of the Piedmont Physiographic Province. The project occurs within the Dan River Triassic Basin

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geologic province. The underlying bedrock consists of sandstone, conglomeratic sandstone, and mudstone of the Cow Branch and Stoneville formations.

Soil Properties

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

Roadway embankment fill soil occurs at both ends of the existing bridge. Approximately fourteen feet of embankment fill soil occurs at End Bent 1. The fill soil consists of soft to medium stiff, dry to moist, silty sandy clay (AASHTO classification of A-6) and highly plastic sandy clay (A-7-6), and very loose to loose, dry clayey sand (A-2-6). The fill soil at End Bent 1 overlies alluvial soil. At End Bent 2, east of the river, ten of fifteen feet of embankment fill was encountered. The embankment fill soil consists of brown, medium stiff to very stiff, dry sandy silt (A-4) and sandy silty clay (A-6), as well as loose, dry silty sand (A-2-4) with gravel-size rock fragments. The embankment fill soil at End Bent 2 overlies either alluvial soil or weathered Triassic rock.

Alluvial soils occur at all bent locations on this project. At End Bent 1, eleven to thirteen feet of alluvial soil occurs beneath embankment fill soil and consists of soft to very stiff, sandy silt (A-4) overlying a thin zone of very loose, coarse sand (A-3) with gravel and cobbles. Thirteen to eighteen feet of alluvial soil was encountered at Bent 3 and End Bent 2. The majority of this alluvial soil consists of gray-brown, soft to very stiff, moist to wet, sandy silt (A-4). A zone of very soft, micaecous silty clay (A-7-5) occurs on the left side of Bent 3. One to two feet of very loose, coarse sand (A-3) with gravel and cobbles occurs in the river channel at Bents 1 and 2. The alluvial soils generally overlie weathered Triassic bedrock, except at End Bent 1 where the alluvial soils are underlain by residual Triassic soil.

Residual soil is present only at End Bent 1, and consists of loose to medium dense, silty sand (A-2-4) and coarse sand (A-2-4). These sandy residual soils are derived from the in-place weathering of the underlying Triassic sandstone. The residual soil grades into weathered rock with depth.

Rock Properties

Weathered rock, which is derived from the underlying Triassic sandstone and mudstone bedrock, varies in thickness from two feet or less in the river channel, to as much as 12 feet at End Bent 2.

Non-crystalline Triassic rock was encountered at each boring. Rock core was recovered from the B1-B, B2-A, and B3-A borings. Three general types of Triassic rock were noted in the rock core. The most common rock type is gray, interbedded sandstone and conglomeratic sandstone. These sandstones are generally fresh, moderately hard to hard, indurated, with close to widely spaced fractures. The sandstones are arkosic in nature, consisting of medium- to coarse-sand-sized quartz and feldspar grains. Three to four inch thick conglomeratic zones of slightly angular, gravel-sized quartz clasts are common. The second type of Triassic rock consists of interbedded sandstone and mudstone. The alternating sandstone and mudstone layers are generally 0.1 to 0.2 feet in thickness. This rock type tends to be slightly more fractured than the sandstone- and conglomerate-type. A third, less common rock type occurs as a nearly 3-foot thick mudstone in Core Run No. 2 in the B3-A boring.

Bedding dips in the rock cores range from 30 to 35 degrees, consistent with the measured dips in the rock outcrops east of the bridge. Core recovery ranged from 44% to 100%, with an average of 91%. Rock Quality Designation (RQD) values ranged from 0% to 100%, with an average of 63%. Ultimate compressive strength of the sandstone/conglomerate rock samples ranged from 11.8 to 17.6 ksi; whereas, the interbedded sandstone/mudstone samples ranged from 4.6 to 13.3 ksi. More detailed rock descriptions can be found in the Core Boring Reports.

The degree of fracturing, as well as the prescence of slickensides, in the B2-A core suggest that bedrock in the vicinity of Bent 2 may have been deformed by faulting in the past. Core recovery and RQD values of the B2-A core are consistent lower than the values for B1-B and B3-A core.

Temporary Detour Structure

A temporary detour structure will be constructed approximately 55 feet north of the existing bridge at -L DETOUR- Sta. 15+49.75. The structure has a total length of 350 feet. Borings EB1-DET and EB2-DET (see Sheet No. 17 for borelogs) were drilled along the -L DETOUR-alignment to provide additional data for the detour structure. Geologic conditions along the -L DETOUR- alignment should correlate directly to those encountered along the main structure.

Groundwater

Groundwater was encountered at each bent location. Groundwater elevations ranged from 522 feet at boring EB2-A to 504 feet at boring EB1-B. The water elevation in the Smith River was was measured at 503 feet on September 10, 2003.

Potential Hazardous Site

A strong petroleum odor was detected in samples of the alluvial soil from the End Bent 1 borings. The GeoEnvironmental Section of the Geotechnical Unit was notified of the potential contamination in April, 2003.

Notice

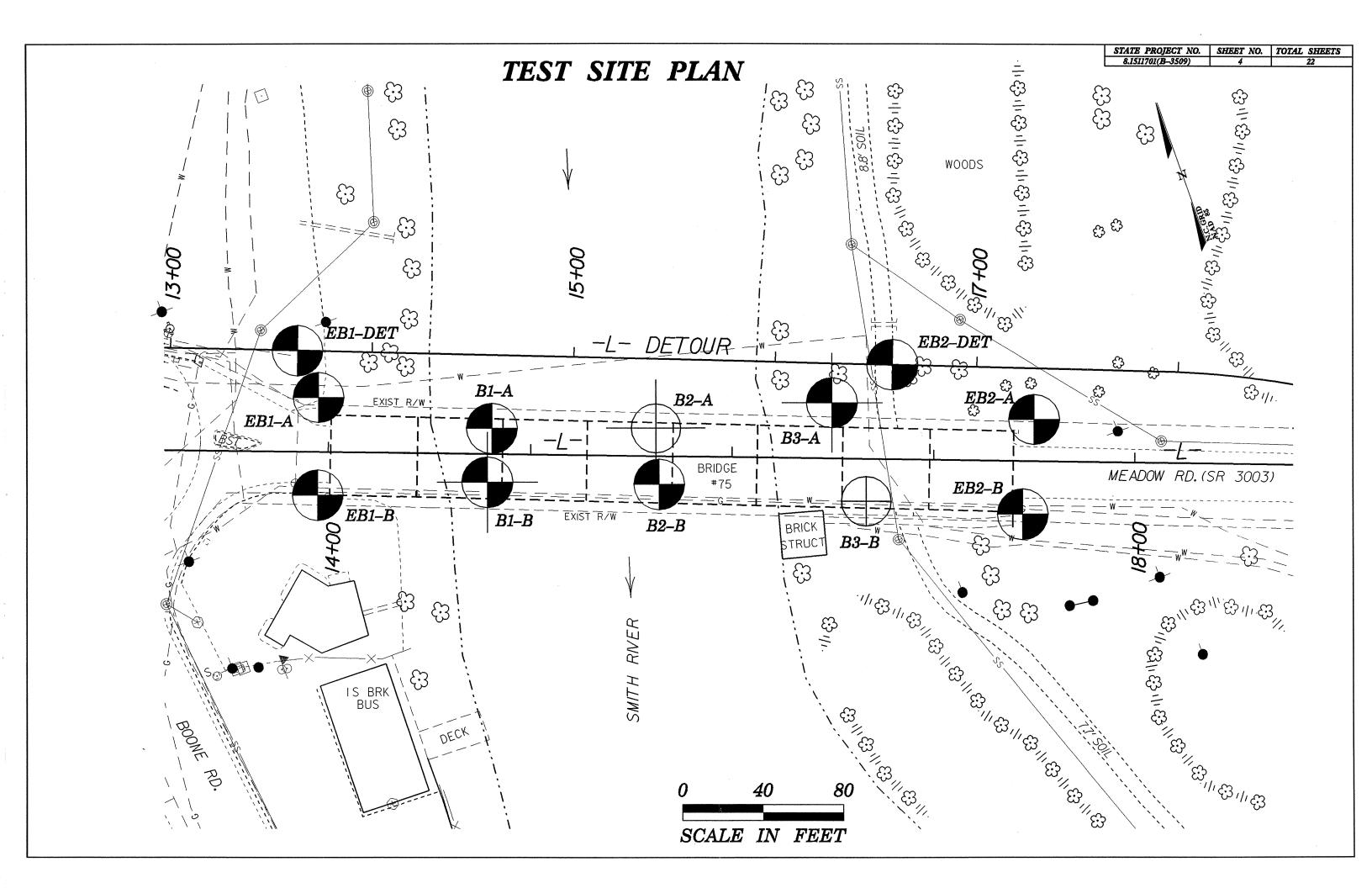
This Geotechnical foundation report is based on the bent locations provided in the memo "Verification of Bent Locations and Request for Foundation Recommendations", dated October 2, 2003, and the Hydraulic Bridge Survey Report dated October 1, 2003. If significant changes are made in the design, or location of the proposed structure, the subsurface information should be reviewed and modified as necessary.

Respectfully submitted,

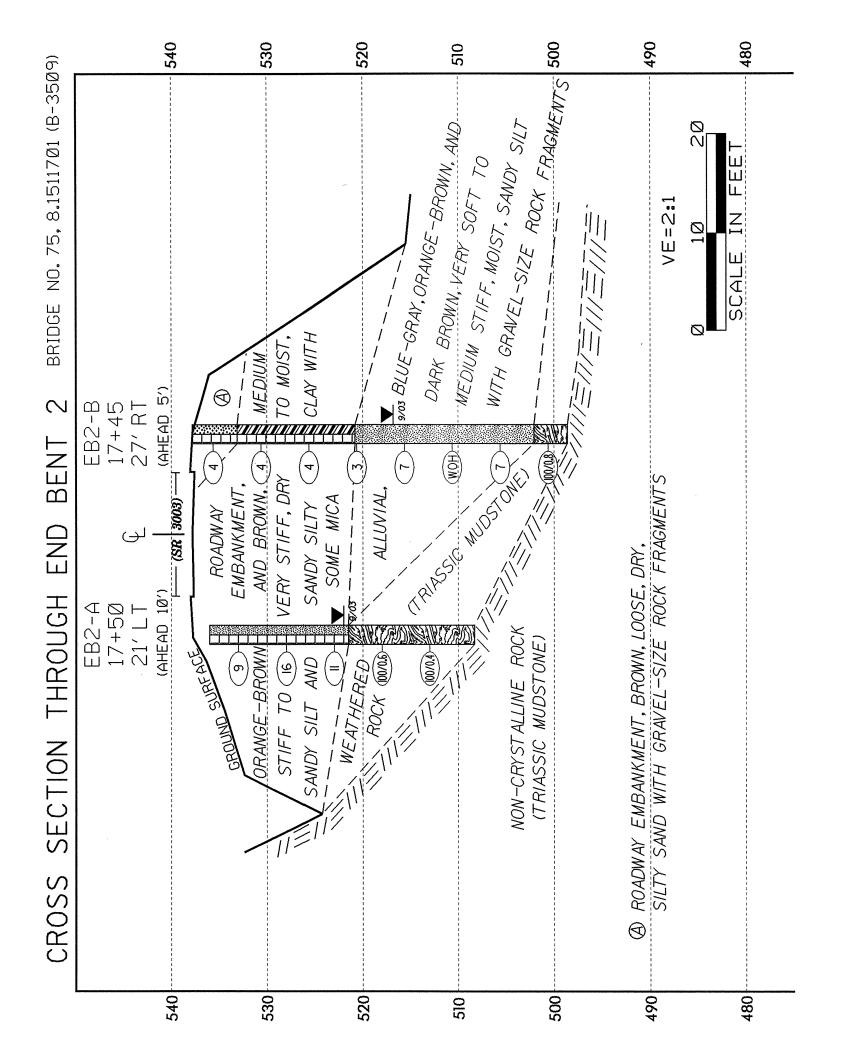
Ten P. Monfill

Thomas P. Moorefield, LG

Project Geologist



										STATE PROJECT NO.	SHEET NO.	TOTAL SHEE
		P	ROFILE TH	IROUGH B	ORINGS	PROJE	CTED AL	ONG -L	•	8.1511701 (B-3509)	5	22
·			EB1+A 13+95	B1-B 14+7		B2-A 15+62	B3-A 16+5Ø		EB2-A 17+50			
540			28′ LT	14′ R	1 1 1	14' L T	28' LT		21' LT			54
. !									,	- WALLAT		
									R0/	DWAY-EMBANKMENT, WN AND ORANGE-BROWN, TO VERY STIFF,		
30				 					BR(NN AND ORANGE-BROWN. FF TO VERY STIFF. TO MOIST. SANDY SILT H GRAVEL-SIZE ROCK FRAGN	-	53
; 1 1 1 1			🖂					Q.	16 DRY	TO MOIST SANDY SILI	ENTS	
		RO	ADWAY 7					8,	₩[f	H GRAVEL		
20			NKWENT	1								52
1		RED-BROWN, TO MEDIUM S DRY TO MO	TIFF,	1				- Julia	(00/0.6)			
		PLASTIC SAND	Y CLAY 3					Alle	(TRI	ASSIC MUDSTONE)		
10		ALLUVIAL,GRAY-BR	OWN. (21)		SMITH RIV	ER		WENT HERED	ROCK	-77=7		5
		ALLUVIAL,GRAY-BR MED.STIFF TO V.S DRY TO WET,MICAC	TIFF. 9/03 EOUS 9/03		9/07		22	9/03 WEATHERED		///='		
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00			GRAY, 9 VERY L	00SE, SAT. 60/0.1	E. SAND WITH GRAVE	AND COBBL	ES / 60/01	71117	IASSIC SANDSTONE	AND MODSTORE)		50
		RESIDUAL,ORANGE-BRO AND DARK BROWN,LOOSE MED.DENSE,DRY TO MO SILTY SAND AND COARSE	MN TO									
90		SILTY SAND AND COARSE	SAND 23	SANDSTOME								49
- 			HERED ROCK									
		WEA	THERED ROUN			No. 100.00						
80					NTERBEDDED TRIASSIO	SANDSTONE,	CONGLOWERATIC	WDSTONE, MUDSTONE	9			48
! ! !		111=11	60/0.0			A STATE OF THE STA						
70					1 1							4
 										50 1	00	
	(A) ROADWAY FURANKUFNT F	BROWN, MEDIUM STIFF, DRY, SIITY SA	NDY CLAY						<u> </u>			
60		BROWN, MEDIUM STIFF, DRY, SILTY SA THERED FRAGMENTS (DEPTH 5.5° ERY SOFT, MOIST, MICACEOUS SILTY	ł I						SC	ALE IN FEET		40
		TIFF, MOIST, SANDY SILT WITH THIN WEATHERED ROCK FRAGMENTS										
!	SAND AND GRAVEL-SIZE	13+00	14+00		5+00		-00	17+00		18+00		



north carolina department of transportation $\overline{}$ north carolina department of transportation $\overline{}$ GEOTECHNICAL UNIT BORING LOG

GEOTECHNICAL UNIT BORING LOG

PROJECT	NO . 8	.151170			ID.	B-350)9	CO	UNTY	ROCKIN	GHAM	G	EOLOGIS	ST J. L. LOVE		PROJECT	' NO. 8	3.15117	701	T	ID. F	3-3509	CC	DUNTY	ROCKIN	GHAM	GRO	LOGIST	J. L. LOV	SHEET 9 OF 22
SITE DESC											MITH RIV				GROUND WATER						<u> </u>					MITH RIV		DOOLUI	0. L. LOV	GROUND WATER
BORING N						ATION		3+95			1 28' LT		LIGNME	ENT -L-	0 HR. DRY	BORING				SORING			13+95		·····	22' RT		SNMEN'	T -L-	0 HR. DRY
COLLAR I			526.			ORTHI		1003	363		EASTIN		17771		24 HR. 21.0'	COLLAR						ORTHING		317		EASTIN		77103		24 HR. 22.4′
TOTAL DI					MACI	IINE C				RILL MET	HOD H.S.		RS	HAMMER T	YPE AUTOMATIC		DEPTH					INE CME-			RILL MET	HOD H.S.				TYPE AUTOMATIC
START DA								re 9/			RFACE WAT				O ROCK 43.1'	START			03		COMPL	ETION DA	ATE 9/			RFACE WAT				TO ROCK 35.6'
	DEPTI	HBL0	W C	TNUC	PEN.		BL0	WS PE	ER FO	OT	SAMPLE		11	SOIL AN	· · · · · · · · · · · · · · · · · · ·	1 = . =	DEPT	HBL(OW C	OUNT	PEN.	BL	OWS P	ER FO	ОТ	SAMPLE				ID ROCK
ELEV.	(FT.)	0.5	10 . 5	10.5	(FT.)	Q	25	5	0	75 10	NUMBER		1111	DESCRI		ELEV	' (FT.) 0.5	510.5	10.5	(FT.)	<u>γ</u> 2	5 5	50	75 100	NUMBER	MOI.	G	DESCR	
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525.0 -	-						- F							ROADWAY E	MBANKMENT.	526.1 525.0	+	, ,	\prod_{α}	\prod_{α}						66.00		7.7.7		
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520.0	Ŧ					F	- -			1				JILTI JA		_{520.0}	Ŧ					H			71				•	EY SAND WITH
520.0	፲ 8.៲ʹ	2	2	4	1.0	-X-6	- <u>-</u>]	SS-25	М		RED-E	BROWN.] 320.0	± 7.2	2' 2	1	2	1.0	X3	L I	<u> </u>	33		DE		WEATHERED R	OCK FRAGMENTS
	± '						-			<u> </u>					C SANDY CLAY		<u> </u>						L	<u> </u>	<u> </u>				GRAY	-GREEN,
515.0 -	+ 17 1/	, ,			1,0	 	-			 				WITH SC	ME MICA	515.0	+12.2	2' 2	4	26	1.0		× 30	<u> </u>		SS-2I	,,	1	SILTY SAND	Y CLAY WITH
	† 13 . 1′	1	2	1	1.0	15/3-				 						-	+ 12.6	- -		20	1.0	====		<u> </u>	 	33 21	101			ASSIC SANDSTONE M 13.2' TO 14.7'
510.0	+					>	<u> </u>			 						510.0	#					/-	<u> </u>	+	 					
	‡ 18 . 1'	1 7	11	10	1.0		X2	21				D			IVIAL,		± 17.2	2' 1	1	2	1.0	X3	<u> </u>	 	11	SS-22	D		ALL	UVIAL.
	‡	İ					/- 		‡ <i>===</i>	 	-	Y			BROWN,		‡					#===		‡===	 					GRAY-BROWN.
505.0 -	士 士 23.I	ı' 1	3	2	1.0	X 5	- = 					l w		MICACEOUS	SANDT SILT	505.0	+ 22.	21 1	1	1	1.0	*2	<u> </u>	‡ = = =	1		T		MICACEOUS	SANDY SILT
	‡			_	""	 					-	"					‡					#===		‡===	 					
500.0 -	丰					 	<u>-</u>			 			****	GRAY, CSE. SAI	ND WITH GRAVEL	500.0	+,,		١.			 	F = = = :	‡===	 	66 07				
	‡ 28.I	2	4	5	1.0		9			I		M					± 27.	2 1	1	4	1.0	M2	<u> </u>	I =	II	SS-23	W		RES GREEN BLACK	DUAL, AND TAN-BROWN,
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733.0	‡ 33.1	7	10	13	1.0	<u> </u>	-\	23			SS-26	D		SILTY AND		433.0	± 32.	3′ 5	4	4	1.0	- × 8 -		1	1		M			
	‡									<u> </u>	-						‡								1				WEATHE	RED ROCK SANDSTONE)
490.0 -	+ + 38.1	1 23	42	58	0.9		-=		‡===	100+	X		777			490.0	#					AUC	ER_RE	FUSAL	AL				CIRIASSIC	SANDSTONE
	‡ ***		'-		"				 						RED ROCK		‡					FLE VAI	HUN 4	40.5 +	ROCK					
485.0 -	 								ļ — — — <u> </u>				S	(TRIASSIC	SANDSTONE)	485.0	+					- +T-RHA	SSIE-	SANDS	TONE)-					
	‡ 43 . l	r' 60			0.0		-		6	3070.07	*			NON COVET	ALLINE DOOK	1	Ŧ		İ				F		7					
190 0 -	Ξ					[]					ALLINE ROCK SANDSTONE)	480.0	$\overline{\pm}$							<u> </u>						
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SITE DESC											ITH RIVI		VLV	O101	U.D. CLAC	GROUND WATE
BORING N					LOCA		14+81	3003			13′ LT		IGN	MENT	-L-	0 HR. N/A
COLLAR E			01.6			ORTHING		319	1		EASTING			7195		24 HR. N/A
TOTAL DE						INE CME			DRILL	METH	OD NW-C				HAMMER 1	TYPE AUTOMATIC
START DA							ATE 9/	9/03		SUR	FACE WAT	ER DEP	TH	2.5′	DEPTH 7	TO ROCK 2.0'
CL CV	DEPTH	BLOV	V CC	TNUC	PEN.		OWS P		OOT		SAMPLE	∇	L		SOIL AN	ID ROCK
ELEV.	(FT.)	0.51	0.5	0.5	(FT.)	ο 2	25 5	50	75	100	NUMBER	MOI.	Ğ		DESCR	IPTION
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501.6				ļ		 		+==	= - 60 <i>7</i> -	<u> </u>		S			ΔΙΙΙΙΝΙΔΙ Ω	RAY COARSE
500.0 -	1.9'	60			0.1	<u> </u>				^		-	****	7-S	AND GRAVEL	RAY, COARSE . AND COBBLES ALLINE ROCK
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SHEET 10 **OF** 22

PROJECT NO.	8.15	511701			ID. E	3-3509	COUNT	Ϋ́	ROCKING	НАМ	GE	OLO	GIST C.D. CZAJK	7
SITE DESCRIPT	ION	BRI	DGE	NC). 75	ON -L- (SR 300)3)(GROUND WATER
BORING NO.	BI-E					ATION 14+			OFFSET				MENT -L-	0 HR. N/A
COLLAR ELEV.			01.2		 		03294			EASTING			7184	24 HR. N/A
TOTAL DEPTH						INE CME-550			RILL METH					E AUTOMATIC
START DATE					,	ETION DATE				ACE WAT				ROCK 2.0'
$\vdash \vdash \vdash \lor \vdash \lor$	1				PEN. (FT.)		PER 50			SAMPLE NUMBER	MOI.	200	SOIL AND DESCRIP	
501.2						 	+-				S		ΔΙΙΙΝΙΔΙ . GRΔ	Y COARSE
500.0 ± 1.	.9′	60			0.1	t		6	0/01/		3	****	ALLUVIAL, GRA SAND, GRAVEL.	AND COBBLES _
+							‡ _ ·						NON-CRYSTALI	
495.0 +							+-						GRAY AND DA SLIGHTLY WEATHER	
Ŧ]				MODERATELY HA	RD TO HARD,
490.0 🛨										DC C			WIDE TO MOD. CLO	
‡										RS-6			THICKLY BEDDED, I INDURATED, TRIASS	
485.0 +	l						‡						CONGLOMERATE SA	
‡													MUDST	
480.0										RS-7			AVG REC=95%	AVG RQD=88%
100.0						_CORING_	LERMIN	ATE	DAT					
‡						ELEVATION-CRY								
475.0 +							FRIASS	IC	+					
Ŧ						MUDSTO	VE/SAI	ADS.	TONE)					
470.0 +									11					
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SHEET 11 OF 22

						С	ORE BORING REPORT
PRO	JECT:	8.15117	01	ID:	B-3	509	COUNTY: Rockingham BORING NO: B1-B
DES	CRIPTIC	ON: Brid	lge No.	75 on -	-L- (SR	3003) ove	er Smith River
LOC	ATION (OF BORIN	1G:	-L- Sta	. 14+79	9, Offset 1	4' RT COMPLETION DATE: 9/8/03
COL	LAR or 0	GROUND	ELEV	ATION:	501	.2ft	CORE SIZE: NXWL GEOLOGIST: C. D. Czajka
COR	E EQUI	PMENT:			СМЕ	E-550, NW	- Casing, NXWL DRILLER: H. R. Conley
		DRILL		REC	RQD		
	DEPTH	RATE	RUN	(ft)	(ft)	SAMPLE	FIELD CLASSIFICATION and REMARKS
(ft) 497.2	(ft) 4.0	(min/ft) 1:55	(ft)	(%)	(%)	NUMBER	(5.1'-6.6') Gray, slightly weathered to fresh, hard, moderately close fractured, thickly bedded, indurated,
		1:47		2.0	1.5		interbedded Triassic sandstone and conglomeratic sandstone with one vertical fracture
		1:08/0.5	2.6	(77%)	(58%)		Washed away 1.1'
494.6	6.6			(11 /0)	(0070)		vvasieu avvay 1.1
494.6	6.6	1:49		4.8	4.0		Gray, fresh, hard, wide fractured, thickly bedded, indurated, Triassic sandstone and
		1:49 2:06	5.0	4.0	4.8		conglomeratic sandstone, 40 degree fracture at 9.6', 30 degree bedding dip
		1:36		(96%)	(96%)		
489.6 489.6	11.6 11.6	1:35 0:55				RS-6	(11.6'-12.9') Gray to dark gray, fresh, moderately hard, thinnly laminated, moderately indurated,
,00.0	11.0	1:34		5.0	4.2	12.6-13.3	Triassic mudstone
		1:50	5.0	(4000()	(0.40()		(12.9'-16.6') Gray, fresh, hard, wide fractured, thickly bedded, indurated, Triassic sandstone and
484.6	16.6	1:55 1:24		(100%)	(84%)		conglomeratic sandstone
484.6	16.6	1:48				RS-7	Gray, fresh, hard, wide fractured, thickly bedded, indurated, Triassic sandstone and conglomeratic
		1:58 2:15	5.0	5.0	5.0	20.1-20.7	sandstone, one vertical fracture at 21.3'-21.6'
		2:14	3.0	(100%)	(100%)		
479.6	21.6	1:27					
						:	
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					<u> </u>		
							BOREHOLE TERMINATED AT ELEVATION OF 479.6 FEET, IN NCR.

PROJECT :	NO. 8.1	51170		ID . B				OUN		ROCK				OLO	GIST	C.D. CZ	۵JK	Δ
SITE DESC				 					03)			ITH RIV						GROUND WATER
BORING N				 LOCA			15+62		.,	OFFS	ET	14' LT			MENT	<u>-L-</u>		O HR. N/A
COLLAR E			500.	 	ORTHI		100	329		DILL M	Gent t	EASTING			7271	TT A MAKEDE	/03/1	24 HR. N/A
TOTAL DE				 MACHI				(1)				OD NW-C						PE AUTOMATIC
START DA				 			ATE 9					FACE WAT		11	2.7			ROCK 1.7'
ELEV.	DEPTH (FT.)	1				2	OWS I	50 				SAMPLE NUMBER	MOI.	С		SOIL A		
- -	<u>+</u>					=		-		<u> </u>								
500:4					===	_		+		<u> </u>	+		S	::::		ALLUVIAL	, GRA	Y, COARSE ND COBBLES
1 -	<u> </u>							- ‡ -			-				S	AND. GRAV	EL A	ND COBBLES
495.0	<u> </u>					_		-		<u> </u>						•		
-								-	·	<u> </u>		RS-3						
490.0 -	 -							-		 	-							
-	<u> </u>				= = =					<u> </u>						NON-CRYS	TALI	INE ROCK,
485.0	+							-		 					GRA	Y, SEVERE	LY V	WEATHERED TO HARD TO HARD,
480.0	_					_		=		<u> </u>					MOD.	CLOSE TO	CLO	SE FRACTURED,
-	+						<u> </u>	- ‡ -			-				9	SANDSTONE	, CON	URATED, TRIASSIC NGLOMERATIC
475.0 -	<u> </u>]	-							D MUDSTONE RAINED MICA
-	‡					_		=		 		RS-4				10 DE0 00	.,	11/0 DOD 40#
470.0	<u> </u>							-		<u> </u>	-	RS-5			A۷	G REC=86	%	AVG RQD=42%
-	‡							-		 	-	113 3						
465.0	F					- -		- [-			-							
-	‡							- ‡ -			-							
460.0 -	<u> </u>							-			-							
155 O	<u>+</u> <u>+</u>				CO	RIN	G IE	RM	NATI	ED AI								
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450.0 -	‡				===	A	ND-M	HUD	5+UN	 								
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445.0	 					 -		-		 	-							
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440.0	<u> </u>						 	-		<u> </u>								
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435.0	-				E	_		-	 									
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430.0	 - -				<u> </u>	:		+-		<u> </u>	_							
425.0 -	_				===			-			-							
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SHEET 12 OF 22

PROJECT: 9.1511701 DE B-3599 COUNTY; Rockingham BORING NO: B2.A							С	ORE BORING REPORT
DESCRIPTION: Bridge No. 75 on -L (SR 3003) over Smith River	PRO	JECT:	8.15117	01_	ID:	B-3	509	COUNTY: Rockingham BORING NO: B2-A
LOCATION OF BORING: _L. Sta_ 15+62, Offset 14* LT	DES	CRIPTIC	NV Brid	lae No	75 on -	J _ (SP	3003) ove	
COLLAR or GROUND ELEVATION: 500.4 ft CORE SIZE: NXWL GEOLOGIST: C. D. Czajka	DES	OIXIF IIC	7N	ige ivo.	75 011 -	.L- (SIX	3003) 046	ei Siriitti Rivei
COLLAR or GROUND ELEVATION: 500.4 ft CORE SIZE: NXWL GEOLOGIST: C. D. Czajka								
Core Core	LOC	ATION (OF BORIN	IG:	-L- Sta	. 15+62	2, Offset 1	4' LT COMPLETION DATE: 9/11/03
Delil	COL	LAR or (GROUND	ELEV	ATION:	500	<u>4</u> ft	CORE SIZE: NXWL GEOLOGIST: C. D. Czajka
Fig. Fig.	COR	E EQUI	PMENT:			СМЕ	-550, NW	/-Casing, NXWL DRILLER: H. R. Conley
Fig. Fig.			DRILL		REC	ROD		
497.8 2.6 2.16	ELEV	DEPTH		RUN			SAMPLE	FIELD CLASSIFICATION and REMARKS
1				(ft)	(%)	(%)	NUMBER	
497.8 2.6	498.7	1.7	1:15/0.9		0.4	0.0		
497.8 2.6				0.9				, and the second
497.8 2.6 2.15 1.11 1.10 5.0 4.0 0.0 (0%) (0%	497 R	26			(44%)	(0%)		
1-10			2:15					Gray, very slightly weathered to fresh, moderately hard to hard, close to very close fractured,
1.0			~		4.0	0.0		·
				5.0	(80%)	(0%)		some tractures filled with calcite, tractures run from 75 degrees to near vertical
1.38	492.8	7.6			(667.0)	(470)		i i
12.6	492.8	7.6				0.7		· · · · · · · · · · · · · · · · · · ·
12.6				5.0	3.6	2.7	8.9-9.4	
483.8 12.6 0.56 0.50 0.50 0.50 0.50 0.55 1.55 0.55 1.55 0.56 0.56 1.55 0.56 0.56 1.55 0.56 0.56 1.55 0.56 0.56 1.55 0.56					(72%)	(54%)		and the degree of the second s
17.3 1.73								
No. 1.7.3	487.8	12.6			3.0	0.0		
483.1 17.3 17.3 17.3 17.4 483.1 17.3 4.9 2.3 4.9 2.3 4.9 2.3 4.9 2.3 4.9 4.9 2.3 4.9 4.9 2.3 4.9 4				4.7		5,5		
483.1 17.3 0.54 0.40 0.49 0.40 0.49 0.47 0.47 0.47 0.47 0.48					(64%)	(0%)		
0.40								Gray, fresh, hard, close fractured, thickly hedded, indurated. Triassic conglomeratic sandstone
1.25					4.9	2.3		· · · · · · · · · · · · · · · · · · ·
478.1 22.3 0:56 478.1 22.3 1:25 1:04 4.8 2.1 Gray, fresh, hard, close to very close fractured, thickly bedded, indurated, Triassic sandstone with coarse-grained mica 473.1 27.3 0:39 4.8 2.1 Sandstone and conglomeratic sandstone with coarse-grained mica 473.1 27.3 2:24 4.3 3.1 27.5-28.0 Triassic sandstone and conglomeratic sandstone with coarse-grained mica and thin mudstone laminae 468.1 32.3 2:09 5.0 (86%) (62%) RS-5 31.5-31.9 Dark and light gray, fresh, moderately hard to hard, moderately close to close fractured, thickly laminated, indurated, Triassic sandstone and mudstone with coarse grained mica, one 30 degree fracture at 33.9', four 45 degree fractures at 33.5', 35.1', 35.6', and 35.9', and one nearly vertical fracture at 35.9'-37.0' with slickensides present in the vertical fracture 463.1 37.3 1:25 5.0 4.1 Gray, fresh, hard, moderately close to close fractured, thickly bedded, indurated, Triassic sandstone and rundstone with coarse-grained mica and thin mudstone laminae 463.1 37.3 1:45 5.0 (100%) (58%) Gray, fresh, hard, moderately close to close fractures at 33.5', 35.1', 35.6', and 35.9', and one nearly vertical fracture at 35.9'-37.				5.0	(000()	(4004)		
478.1 22.3 1:25 1:04 0:59 0:46 4.8 2.1 Gray, fresh, hard, close to very close fractured, thickly bedded, indurated, Triassic sandstone and conglomeratic sandstone with coarse-grained mica 473.1 27.3 2:24 1:25 6:09 1:31 4.3 3.1 27.5-28.0 7.5-28.0 86% (62% RS-5 31.5-31.9 5.0 1:41 1:19 5.0 (100%) (58%) (58%) (58%) (58%) (58%) (58%) (58%) (58%) (58%) (58%) (58%)	478.1	22.3			(98%)	(46%)		1
1.31								Gray, fresh, hard, close to very close fractured, thickly bedded, indurated, Triassic
131 27.3 2					4.8	2.1		sandstone and conglomeratic sandstone with coarse-grained mica
473.1 27.3 0:39 RS-4 Gray, fresh, hard, moderately close to close fractured, thickly bedded, indurated, 473.1 27.3 2:24 4.3 3.1 27.5-28.0 Triassic sandstone and conglomeratic sandstone with coarse-grained mica and thin mudstone laminae 468.1 32.3 2:09 86%) 66%) RS-5 31.5-31.9 468.1 32.3 1:35 5.0 2.9 Dark and light gray, fresh, moderately hard to hard, moderately close to close fractured, thickly laminated, indurated, Triassic sandstone and mudstone with coarse grained mica, one 30 degree fracture at 33.9°, four 45 degree fractures at 33.5°, 35.1°, 35.6°, and 35.9°, and one nearly vertical fracture at 35.9°-37.0° with slickensides present in the vertical fracture 463.1 37.3 1:34 5.0 4.1 Gray, fresh, hard, moderately close to close fractured, thickly bedded, indurated, Triassic sandstone and conglomeratic sandstone with coarse-grained mica, two 30 degree fractures at 41.4° and 41.8°, two 40 degree fractures at 38.3° and 39.2°, and one 45 degree fracture at 39.6°, one healed fracture from 38.2°-40.9° filled with calcite				5.0	(96%)	(42%)		
1:25	473.1	27.3		ļ	` '''	,		
6:09	473.1	27.3			4.0	2.4		
1:31				5.0	4.3	3.1	21.5-28.0	j v
468.1 32.3 1:35 1:41 1:19 5.0 2.9 Dark and light gray, fresh, moderately hard to hard, moderately close to close fractured, thickly laminated, indurated, Triassic sandstone and mudstone with coarse grained mica, one 30 degree fracture at 33.9', four 45 degree fractures at 33.5', 35.1', 35.6', and 35.9', and one nearly vertical fracture at 35.9'-37.0' with slickensides present in the vertical fracture 463.1 37.3 1:34 1:56 1:45 5.0 4.1 Gray, fresh, hard, moderately close to close fractured, thickly bedded, indurated, Triassic sandstone and conglomeratic sandstone with coarse-grained mica, one 30 degree fractured at 35.9', and one 45 degree fractures at 41.4' and 41.8', two 40 degree fractures at 38.3' and 39.2', and one 45 degree fracture at 39.6', one healed fracture from 38.2'-40.9' filled with calcite					(86%)	(62%)	RS-5	
1:41 5.0 2.9 laminated, indurated, Triassic sandstone and mudstone with coarse grained mica, one 30 degree fracture at 33.9', four 45 degree fractures at 33.5', 35.1', 35.6', and 35.9', and one nearly vertical fracture at 33.9' four 45 degree fractures at 33.5', 35.1', 35.6', and 35.9', and one nearly vertical fracture at 35.9'-37.0' with slickensides present in the vertical fracture 463.1 37.3 1:34							31.5-31.9	
1:19 5.0 (100%) (58%) fracture at 33.9', four 45 degree fractures at 33.5', 35.1', 35.6', and 35.9', and one nearly vertical fracture at 35.9'-37.0' with slickensides present in the vertical fracture 463.1 37.3 1:25 463.1 37.3 1:34 1:56 5.0 4.1 Gray, fresh, hard, moderately close to close fractured, thickly bedded, indurated, Triassic sandstone and conglomeratic sandstone with coarse-grained mica, two 30 degree fractures at 41.4' and 41.8', two 40 degree fractures at 38.3' and 39.2', and one 45 degree fracture at 39.6', one healed fracture from 38.2'-40.9' filled with calcite	468.1	32.3			5.0	2.9		
463.1 37.3 1:25 463.1 37.3 1:34 1:56 1:45 1:49 4.1 Gray, fresh, hard, moderately close to close fractured, thickly bedded, indurated, Triassic sandstone and conglomeratic sandstone with coarse-grained mica, two 30 degree fractures at 41.4' and 41.8', two 40 degree fractures at 38.3' and 39.2', and one 45 degree fracture at 39.6', one healed fracture from 38.2'-40.9' filled with calcite				5.0				
463.1 37.3 1:34 5.0 5.0 4.1 Gray, fresh, hard, moderately close to close fractured, thickly bedded, indurated, Triassic sandstone and conglomeratic sandstone with coarse-grained mica, two 30 degree fractures at 41.4' and 41.8', two 40 degree fractures at 38.3' and 39.2', and one 45 degree fracture at 39.6', one healed fracture from 38.2'-40.9' filled with calcite	400.4	27.0			(100%)	(58%)		fracture at 35.9'-37.0' with slickensides present in the vertical fracture
1:56 1:45 1:49 5.0 4.1 and conglomeratic sandstone with coarse-grained mica, two 30 degree fractures at 41.4' and 41.8', two 40 degree fractures at 38.3' and 39.2', and one 45 degree fracture at 39.6', one healed fracture from 38.2'-40.9' filled with calcite				 		l		Gray, fresh, hard, moderately close to close fractured, thickly bedded, indurated. Triassic sandstone
1:49 (100%) (82%) from 38.2'-40.9' filled with calcite					5.0	4.1		
				5.0	(4000)	(800)		· ·
458.1 42.3 1:38	458.1	42.3	1:49 1:38		(100%)	(02%)		III JO.2 -40.5 IIIIEU WIRII GAIGIE
PORCHOLE TERMINATED AT ELEVATION OF 450 4 FEET, IN TRIACCIO CAMPOTONE								BOREHOLE TERMINATED AT ELEVATION OF 458.1 FEET, IN TRIASSIC SANDSTONE.
■ BOREHOLE LERMINATED AT ELEVATION OF AS THEFT INTRIASSIC SANDS ONE	L							SOLETION TELEVISION OF TOUT LET, IN INFROOD OFFICE

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PROJECT					- 516			3509		 UNTY		ROCKING		<u> </u>		LOGIS	ľ	C.D. CZAJ		מנותו א מ
SITE DE										 300.	5) (VER SI		VER		ימעזאי	NTTP.		GROUND	
BORING COLLAR		B2-E				LOC		ON THING	15+	 264		orrott	14' RT	NC		772		<u>-L-</u>	0 HR. N/ 24 HR. N/	
				98.8						 264	nn.	TI I VITANI	EASTI			112	64	TTANCED O		
TOTAL								CME		 <u> </u>		ILL METH							YPE AUTOM	
START								ION D		 			FACE WA		71		<u>.6′</u>		O ROCK 4.	4′
ELEV	DEP					1			.OWS	 ER F	7		SAMPLI	E A	MOI.	ōΙ		SOIL AN		
	(F	•) C).5 ₁	<u>0.5</u> ′	0.5	(FT.)	Ц.		/	 		5 100	NUMBE	K /	<u> 101. (</u>	G		DESCRI	PIIUN	
498.8	‡						Ħ		==	 			S-34	+ :	s ;			ALLUVIAL, G	RAY, COARSE	
(A)		- 1		68		0.7	1 -		ΙΞ.	 ‡ <i></i>		_100+X					Si	AND. GRAVEL	AND COBBLE	<u>s</u> _/
495.0	+ 4.	4' 6	5Ø			0.0	 -		‡= -	 ‡==	<u>-6</u>	<u>0-∕0-0</u> 4			- 5			(TRIASSIC	RED ROCK MUDSTONE)	
490.0 485.0	‡							<u>_</u>		DVA					l	`			······································	
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475.0	+						11		<u> </u>	 ‡==	= =									
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455.0	Ŧ						1=		F	 										
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445.0	+						11		<u> </u>	 <u> </u>										
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SHEET 13 **OF** 22

PROJECT NO. 8.	.1511701	ID.	B-3509	COUI	NTY RO	CKING	HAM	GEO	LOGIST	J. L. LOVE	
SITE DESCRIPTION			75 ON -L-								GROUND WATER
7,407 1,5		BORING LO	,	16+50		OFFSET	28' LT		GNMENT	-L-	0 HR. N/A
COLLAR ELEVATI			NORTHING	10032		Y 3255	EASTING		77359	77	24 HR. 7.3′
TOTAL DEPTH 4			CHINE CME-				DD NW-C				PE AUTOMATIC
START DATE 9/	1BLOW C		APLETION DA				ACE WATE	K DEPT	<u>H</u>		ROCK 15.3'
L ## 1	0.510.5	1		OWS PEF 5 50			SAMPLE NUMBER	MOI.	Б G	SOIL AND DESCRIP	
513.I 510.0 505.0 5.2'	2 6 ' woh woh	16 1.0	O * WOH-	22	60 	/OJ/**	SS-32 SS-33 RS-I		CIR WID SAN	NON-CRYSTAL RAY AND DARK IODERATELY HA E TO MOD. CLO ICKLY LAMINATI IDDED, INDURAT SANDSTONE, CO	SILT WITH OARSE SAND E WEATHERED EMENTS MICACEOUS CLAY D ROCK NE/SANDSTONE) LINE ROCK, GRAY, FRESH, IRD TO HARD, ISE FRACTURED, ED TO THICKLY TED, TRIASSIC NGLOMERATIC MUDSTONE WITH
470.0 465.0 460.0 455.0 450.0 445.0 435.0 435.0 			CORINELEVA NONE TRIA	IG I I ERM FION -47 2RYSTAL -SSIC - SA	UNAJED 2.9 - FEE LINE R ANDSTO	AI - EF HN OCK - NE) -					

SHEET 14 OF 22

				<u> </u>		С	ORE BORING REPORT	
PRO	JECT:	8.15117	01	ID:	B-3	509	COUNTY: Rockingham BORING	NO: B3-A
DES	CRIPTIC	DN: Bric	lge No.	75 on -	·L- (SR	3303) ove	er Smith River	

LOC	ATION C	OF BORIN	IG:	-L- Sta	. 16+50), Offset 2	8' LT COMPLETION DA	ATE: 9/5/03
COL	LAR or 0	GROUND	ELEV	ATION:	513.	.1 ft	CORE SIZE: NXWL GEOLOGIST: C. [D. Czajka
COF	E EQUII	PMENT:			СМЕ	-550, NW	- Casing, NXWL DRILLER: H. F	R. Conley
		DRILL		REC	RQD			
ELEV (ft)	DEPTH	RATE (min/ft)	RUN (ft)	(ft) (%)	(ft) (%)	SAMPLE	FIELD CLASSIFICATION and REMARKS	
497.8	15.3	1:23	(ii)	(10)	(10)	NOWIDER	Gray, fresh, moderately hard to hard, moderately close fractured, thinnly bedded, indu	rated,
		0:57	40	4.4	3.9		Triassic conglomeratic sandstone with mica, 20 degree fractures at 17.0' and 17.6'	
l		1:08	4.9	(90%)	(80%)			
492.9	20.2	0:55/0.9						
492.9	20.2			4.8	3.5	RS-1	1	
		0:57	5.0			23.1-23.9		
487.9	25.2			(96%)	(70%)			
487.9	25.2	1:38					(25.2'-25.6') Gray, fresh, hard, close fractured, thickly bedded, indurated, Triassic cong	lomeratic
İ		1:13	E 0	4.8	4.5		sandstone with coarse grained mica	14.1
		0:58	5.0	(96%)	(90%)			•
482.9	30.2	1:03					27.6', and 28.7', 33 degree bedding dip	
482.9	30.2			4.9	4.3		,	·
	ATION OF BORING:L- Sta. 16+50, Offset 28' LT							
477.9	35.2			(98%)	(86%)			
477.9							(35.2'-38.2') Dark and light gray, fresh, moderately hard, wide fractured, indurated, thic	kly laminated,
l			50	4.9	3.5	i	l ~	tono
			3.0	(98%)	(70%)		(35.2-40.2) Gray, fresh, hard, thickly bedded, indufated, Thassic congromeratic sands	storie
472.9	40.2	1:15						
			1					
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			1					
			1					
	<u></u>		<u></u>	L	L	<u> </u>	DODELIA E TENUNATED A TENUNATE	
							BURLHULE TERMINATED AT ELEVATION OF 472.9 FEET, IN NCR.	

PROJECT	NO.	8.	51170		كا لة		ID.										TY			0C	KINC		AM				GIST		D. C	ZA	JK A	<u> </u>		
SITE DES	CRIP1	rion	BF	RIDG	ΕN	10	. 75	5	0	N	-[_	(SR	} ∶	30	00	3)	٥٧	/EF	R SI	M٦	H RIV	ER								GROUN	D WAT	rer
BORING		В3			ORIN	VG							6+							OF	FSET	2	l' RT				MENT	-L				0 HR.	8.8	
COLLAR											NG				32	22	21						EASTIN				7358					24 HR.	7.6	
TOTAL D					RILI														RII	L			SOLI				RS	H				E AUT		
START D							MOX		T												SUR	FA	CE WAT	ER	DEP	TH			DEP	TH	TO	ROCK	15.3	<u>′</u>
ELEV.	1			W C 10.5		- 1						_0 25		<u>S</u> _		<u> F</u>	<u> </u>	-0	OT 75	-	100		AMPLE UMBER		7/ MOI.	LOG		Ş				ROCK ION		
513.8	+"	1.7	0.5	0.5	10.) -		1				1		_					‡			Ë			WIOI.	<u></u>								
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510.0	Ŧ								<u> </u>	<u> </u>	 	- -	_		 	-		_ 	-	 				۱	W					ΔΙ	LUVI	ΔΙ		
T0T 0	‡											+	_	<u> </u>					 					-	Y					TO	GR	Y-BRO		
505.0	Ŧ								-	_ :		-	_			-] -	 								MI	CACE	2005	S SA	INDY SI	LT	
E00.0	‡								<u> </u>			- -	_		<u> </u>	 		_	 			:	S-36		S									
500.0	\equiv		ļ		-	\downarrow		\parallel		_			_	_					-		==	igdash		 		1/13	(TR	IASS	WE A		REL	ROCK E/SAND	STONE	
405.0	‡								- · 											Ŧ NQ														
495.0	Ŧ								-1	40	-M	-¢	RY	' S'	Ŧ	\L	ŁH	ΝE	+R	90	CK -													
400.0	+								-	. ك 	 TLZ	14λ 4Α	1B 23	-N	TU	D.S	2 L PLAT	θN CC	#)	INE	-													
490.0	Ŧ								E .	_			_	_ _		ļ -	 	_]															
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SHEET 15 **OF** 22

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION NORTH CAROLINA DEPARTMENT OF TRANSPORTATION GEOTECHNICAL UNIT BORING LOG

GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 8.1511701 ID. B-3509 COUNTY ROCKING	HAM GEOLOGIST J. L. LOVE	PROJECT NO. 8.1511701	ID. B-3509 COUNTY ROCKINGHAM	GEOLOGIST C.D. CZAJKA
SITE DESCRIPTION BRIDGE NO. 75 ON -L- (SR 3003) OVER S			10.75 ON -L- (SR 3003) OVER SMITH	
BORING NO. EB2-A BORING LOCATION 17+50 OFFSET			IG LOCATION 17+45 OFFSET 27'	
COLLAR ELEVATION 536.0' NORTHING 1003231		COLLAR ELEVATION 537.8'	NORTHING 1003188 EA	STING 1777429 24 HR. 21.0'
			MACHINE CME-550 DRILL METHOD H	
			11	WATER DEPTH DEPTH TO ROCK 39.2'
ELEV. DEPTH BLOW COUNT PEN. BLOWS PER FOOT (FT.) 0.510.510.5 (FT.) 0 25 50 75 100	SAMPLE O SOIL AND ROCK DESCRIPTION	ELEV. DEPTH BLOW COUN (FT.) 0.510.510.5		PLE O SOIL AND ROCK BER MOI. G DESCRIPTION
536.0		537.8	I.0 X4 SS-	ROADWAY EMBANKMENT, BROWN, SILTY SAND WITH MICA AND WEATHERED ROCK FRAGMENTS
536.8 + 3.0′ 4 6 3 1.0 -	SS-2 D	333.0 + +		AND WEATHERED ROCK FRAGMENTS
530.0 + 8.0′ 4 11 5 1.0 +	BROWN AND ORANGE-BROWN,	530.0 + 7.2' 1 1 3	1.0 X_4 SS-	-28 M ORANGE-BROWN,
525.0 + 13.0′ 2 5 6 1.0 - +11	GRAVEL-SIZE ROCK FRAGMENTS	$\left \begin{array}{c c} \hline 525.0 & \hline \pm 12.2' & 1 & 2 & 2 \end{array}\right $	I.0 X-4	ORANGE-BROWN, SILTY SANDY CLAY WITH SOME MICA
520.0 +	SS-3	520.0 ± 17.2' WOH 1 2	1.0 x 3 SS-	-29 M
515.0 =	SS-3 WEATHERED ROCK (TRIASSIC MUDSTONE)	515.0 = 22.2′ 17 3 4	1.0	M
510.0 + 23.0'100 0.4 +00+ *		510.0 ±27.2 WOH WOH WOH	HI.0 70 SS-	ALLUVIAL, BLUE-GRAY, DARK GRAY, AND ORANGE-BROWN, SANDY SILT
505.0 =		505.0 = 32.2 1 3 4		
T		500.0 + 37.2 72 28	0.8	WEATHERED ROCK (TRIASSIC MUDSTONE)
495.0 +		495.0	AUGER_REFUSAL_AT -ELEVATION 498.57 FEET- ON NON-CRYSTALLINE ROCK	
490.0		490.0	(TRIASSIC-MUDSTONE)	
485.0 +		485.0 +		
480.0 +		480.0 +		
475.0 +		475.0 =		
470.0 +		470.0 +		
465.0 +		465.0 +		
460.0		460.0		

north carolina department of transportation on the north carolina department of transportation GEOTECHNICAL UNIT BORING LOG

GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 8.1511701 ID. B-3509 COUNTY RO	INGHAM GEOLOGIST J. L. LOVE	PROJECT NO. 8.1511701 ID. B-3509 COUNTY ROCKINGHAM GEOLOGIST J.L. LOVE
SITE DESCRIPTION BRIDGE NO. 75 ON -L- (SR 3003) OV		SITE DESCRIPTION BRIDGE NO. 75 ON -L- (SR 3003) OVER SMITH RIVER GROUND WATER
		BORING NO. EB2-DET BORING LOCATION 16+58 OFFSET CL ALIGNMENT-L-(DETOUR) 0 HR. 10.0'
COLLAR ELEVATION 525.6' NORTHING 1003389	EASTING 1777118 24 HR. FIAD	COLLAR ELEVATION 517.0' NORTHING 1003282 EASTING 1777393 24 HR. 6.5'
	IETHOD H.S. AUGERS HAMMER TYPE AUTOMATIC	TOTAL DEPTH 19.1' DRILL MACHINE BK-51 DRILL METHOD H.S. AUGERS HAMMER TYPE AUTOMATIC
START DATE 4/29/03 COMPLETION DATE 4/29/03	SURFACE WATER DEPTH N/A DEPTH TO ROCK N/A	START DATE 4/23/03 COMPLETION DATE 4/23/03 SURFACE WATER DEPTH N/A DEPTH TO ROCK 19.1'
ELEV. DEPTH BLOW COUNT PEN. BLOWS PER FOOT (FT.) 0.510.510.5 (FT.) 0 25 50 75	SAMPLE SOIL AND ROCK DESCRIPTION	ELEV. DEPTH BLOW COUNT PEN. BLOWS PER FOOT SAMPLE OF SOIL AND ROCK OF STORY OF SAMPLE OF SOIL AND ROCK DESCRIPTION
<u> </u>		517.0
525:8 + 3.7′ 6 3 4 1.0 + *7 - +		515.0 + 3.2' 2 2 2 1.0 x4 SS-I M
520.0 = 3.7′ 6 3 4 1.0 - * 7	SS-4 D ARTIFICIAL FILL, BROWN TO RED-BROWN, SILTY	SIO.0 + 8.2' WOH 1 1 1 I.O +
515.0 + 8.7′ 3 2 3 1.0 +5	SS-5 M SANDY CLAY, HIGHLY PLASTIC FROM 7.5' TO 15.2'	FINE SANDY SILT, MICACEOUS, WITH TRACES OF WOOD AND QUARTZ GRAVEL
510.0 = 13.7' 2 4 5 1.0 = 1.0 = 1.0 = 1.0	M	500.0
505.0 = 18.7′ 2 4 4 1.0 = 1.0 = 1.0 = 1.0	ALLUVIAL, SS-6 M BROWN, SILTY SAND, MICACEOUS	18.2' 20 80 0.9 +0070.4 * WEATHERED ROCK 495.0
BORING_TERMINATED		ELEVATION 197.9 FEET
500.0 - ELEVATION SO3.1 EEET TALCUVIAL SICTY SAI		490.0 +
495.0 =	 	485.0 +
490.0 +	 	480.0 +
485.0 +		475.0 +
480.0		470.0 +
475.0	 	465.0 +
470.0		460.0 + 460.0
465.0		455.0 +
460.0 +	 	450.0 +
455.0 ±		445.0 +
450.0		440.0 +

GEOTECHNICAL UNIT FIELD SCOUR REPORT

PROJECT: 8.1511701 ID: B-3509 COUNTY: Rockingham
DESCRIPTION(1): Bridge No. 75 on -L- (SR 3003) over Smith River
INFORMATION ON EXISTING BRIDGE Information obtained from: □ microfilm (Reel:Pos:) □ other: Hydro Report
BR. NO.: 75 BR. LENGTH: 340 NO. BENTS: 9 NO. BENTS IN: CHANNEL: 5 FLOODPLAIN: 2
FOUNDATION TYPE: Uncertain
EVIDENCE OF SCOUR(2):
ABUTMENTS OR END BENT SLOPES: None
INTERIOR BENTS: Floodplain soils are being scoured around bents 5 and 6 during flood events.
CHANNEL BED: River bed submerged during the investigation, no scour could be discerned.
CHANNEL BANKS: Channel banks in the vicinity of the brick building and interior bents 5 & 6 are eroding
during flood events. 3 to 4' deep scour holes have formed in floodplain soils around bents 5 & 6, as
well as behind the brick building.
EXISTING SCOUR PROTECTION:
TYPE(3): Large rocks and concrete chunks appear to have been placed haphazardly on EB1 slope.
EXTENT(4): Area approximately 30' x 40', directly underneath bridge.
EFFECTIVENESS(5): May provide some protection during flooding.
OBSTRUCTIONS(6) (DAMS,DEBRIS,ETC.):Two large tree trunks lodged against bent 5 pier.
DESIGN INFORMATION
CHANNEL BED MATERIAL(7): Gray, very loose, coarse sand with gravel and cobbles (Sample No. S-34)
CHANNEL BANK MATERIAL(8): Alluvial, brown, very stiff, moist sandy silt (Sample No. SS-32) and
gray-brown, very soft, moist micaecous silty clay (Sample No. SS-33).
CHANNEL BANK COVER(9):Trees, grass and brush
FLOOD PLAIN WIDTH(10): 300 ft.+/-
FLOOD PLAIN COVER(11): Trees grass and brush

SHEET 18 OF 22

DESIGN INFORMATION CONT.	
STREAM IS: Slight DEGRADING AGGRADING (12)	
OTHER OBSERVATIONS AND COMMENTS: Several old timber piles protrude from abutment slope	
beneath east end of bridge. Old concrete bridge abutment and approach slab located left of east	
end of bridge.	
CHANNEL MIGRATION TENDENCY (13): Very little migration, tendency to east, if any at all.	
GEOTECHNICALLY ADJUSTED SCOUR ELEVATIONS(14):	***************************************
· ·	
Elevation (feet)	
Bent 1 498.2	
Bent 2 496.6	
Bent 3 503.5	
The elevations for Bent 1 and Bent 2 are approximately 10 feet higher than the Hydraulic Unit's predicted scour elevations. REPORTED BY:	·
(1) GIVE THE DESCRIPTION OF THE SPECIFIC SITE, INCLUDING ROUTE NUMBER AND BODY OF WATER CROSSED NOTE ANY EVIDENCE OF SCOUR AT THE EXISTING END BENTS OR ABUTMENTS (UNDERMINING, SLOUGHING, SCOUR LOCATIONS, DEGRADATIONS, ETC.) (3) NOTE ANY EXISTING SCOUR PROTECTION (RIR 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 BASED ON OBSERVATION AND/OR SAMPLES. (8) DESCRIBE THE CHANNEL BANK MATERIAL BASED ON OBSERVATION AND/OR SAMPLES. (9) DESCRIBE THE BANK COVERING (GRASS, TREES, RIP RAP, NONE, ETC.) (10) GIVE THE APPROXIMATE FLOOD PLAIN WIDTH (ESTIMATE). (11) DESCRIBE THE FLOOD PLAIN COVERING (GRASS, TREES, CROPS, ETC.) (12) CHECK THE APPROPRIATE SPACE AS TO WHETHER THE STREAM IS DEGRADING OR AGGRADING. (13) DESCRIBE THE POTENTIAL OF THE BODY OF WATER TO MIGRATE LATERALLY DURING THE LIFE OF THE BRIDGE (APPROXIMATELY 100 YEARS). (14) 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 IS DEPENDENT ON SOUR COUNTER MEASURES, EXPLAIN. (RIPRAP ARMORING ON SLOPES, ETC.) THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION IS DEPENDENT ON SOUR COUNTER MEASURES, EXPLAIN. (RIPRAP ARMORING ON SLOPES, ETC.) THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION IS DEPENDENT ON SOUR COUNTER MEASURES, EXPLAIN. (RIPRAP ARMORING ON SLOPES, ETC.) THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION IS DEPENDENT ON SOUR 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 OR RIFMETHAL WEATHERING, SHEAR STRENGTH, OBSERVATIONS AT EXISTING STRUCTURES, OT	

PROJ. NO. - 8.1511701 ID NO. - B-3509 COUNTY - Rockingham

EB1-A

			SOIL	TEST	ΓR	ES	SUL	TS					
SAMPLE			DEPTH	AASHTO				% BY W	/EIGHT		% PAS	SING (S	IEVES)
NO.	OFFSET	STATION	INTERVAL	CLASS.	L.L.	P.I.	C.SAND	F.SAND	SILT	CLAY	10	40	200
SS-24	28' LT	13+95	3.1-4.6	A-6(5)	38	14	21.3	28.5	25.8	24.4	95	80	54
SS-25	28' LT	13+95	8.1-9.6	A-7-6(17)	51	33	14.6	22.6	12.0	50.8	90	83	60
SS-26	28' LT	13+95	33.1-34.6	A-2-4(0)	38	NP	60.6	24.0	11.4	4.1	93	53	18

EB1-B

	, , , , , , , , , , , , , , , , , , , ,		SOIL	TEST	ΓR	ES	SUL	TS					
SAMPLE			DEPTH	AASHTO				% BY W	/EIGHT		% PAS	SING (S	IEVES)
NO.	OFFSET	STATION	INTERVAL	CLASS.	L.L.	P.I.	C.SAND	F.SAND	SILT	CLAY	10	40	200
SS-20	22' RT	13+95	2.2-3.7	A-2-6(0)	33	12	31.3	27.0	19.3	22.4	62	48	29
SS-21	22' RT	13+95	12.2-13.7	A-6(9)	39	17	14.8	29.1	17.5	38.6	100	91	62
SS-22	22' RT	13+95	17.2-18.7	A-4(0)	28	NP	12.0	58.1	19.7	10.2	100	98	41
SS-23	22' RT	13+95	27.2-28.7	A-2-5(0)	48	NP	44.3	32.5	19.1	4.1	93	68	27

B2-B

SOIL TEST RESULTS													
SAMPLE			DEPTH	AASHTO			% BY WEIGHT % PASSING (SIEVE						
NO.	OFFSET	STATION	INTERVAL	CLASS.	L.L.	P.I.	C.SAND	F.SAND	SILT	CLAY	10	40	200
S-34	14' RT	15+64	0.0-1.3	A-3(0)	25	NP	60.6	36.6	0.8	2.0	94	64	6

B3-A

	SOIL TEST RESULTS												
SAMPLE		·	DEPTH	AASHTO				% BY W	/EIGHT		% PAS	SING (SI	EVES)
NO.	OFFSET	STATION	INTERVAL	CLASS.	L.L.	P.I.	C.SAND	F.SAND	SILT	CLAY	10	40	200
SS-32	28' LT	16+50	5.2-6.7	A-4(1)	33	10	23.0	29.1	21.5	26.4	75	63	41
SS-33	28' LT	16+50	10.2-11.7	A-7-5(15)	49	13	1.0	19.9	46.5	32.5	100	100	86

B3-B

·			SOIL	TES 7	ΓR	ES	SUL	TS					
SAMPLE			DEPTH	AASHTO				% BY W	EIGHT		% PAS	SING (SI	EVES)
NO.	OFFSET	STATION	INTERVAL	CLASS.	L.L.	P.I.	C.SAND	F.SAND	SILT	CLAY	10	40	200
S-35	21' RT	16+67	1.0-2.5	A-4(0)	24	NP	13.2	57.7	18.9	10.2	94	89	37
S-36	21' RT	16+67	10.0-12.0	A-4(1)	31	5	5.7	53.0	18.9	22.4	100	99	51

EB2-A

			SOIL	TEST	ΓR	ES	<i>UL</i>	TS		x.			
SAMPLE			DEPTH	AASHTO				% BY W	/EIGHT		% PAS	SING (SI	EVES)
NO.	OFFSET	STATION	INTERVAL	CLASS.	L.L.	P.I.	C.SAND	F.SAND	SILT	CLAY	10	40	200
SS-2	21' LT	17+50	3.0-4.5	A-4(0)	30	9	35.9	24.5	19.2	20.4	82	59	36
SS-3	21' LT	17+50	13.0-14.5	A-4(3)	28	10	13.7	37.6	20.2	28.4	100	94	56

EB2-B

	SOIL TEST RESULTS													
SAMPLE DEPTH AASHTO % BY WEIGHT % PASSING (SIEVES)														%
NO.	OFFSET	STATION	INTERVAL	CLASS.	L.L.	P.I.	C.SAND	F.SAND	SILT	CLAY	10	40	200	MOISTURE
SS-27	27' RT	17+45	2.2-3.7	A-2-4(0)	33	10	37.0	25.8	16.9	20.3	63	47	27	-
SS-28	27' RT	17+45	7.2-8.7	A-6(7)	38	16	23.6	21.5	22.4	32.5	95	78	57	•
SS-29	27' RT	17+45	17.2-18.7	A-4(1)	28	5	13.8	33.1	22.6	30.5	99	92	59	•
SS-30	27' RT	17+45	27.2-28.2	A-4(5)	32	9	3.7	44.5	25.4	26.4	100	98	68	35.4
SS-31	27' RT	17+45	32.2-33.7	A-4(7)	33	10	7.7	30.3	29.5	32.5	100	96	75	-

EB1-DET

			SOIL	TES 7	ΓR	ES	<i>UL</i>	TS					
SAMPLE			DEPTH	AASHTO				% BY W	EIGHT		% PASS	SING (S	IEVES)
NO.	OFFSET	STATION	INTERVAL	CLASS.	L.L.	P.I.	C.SAND	F.SAND	SILT	CLAY	10	40	200
SS-4	CL	13+63	3.7-5.2	A-6(1)	32	11	25.9	25.5	24.1	24.5	76	61	42
SS-5	CL	13+63	8.7-10.2	A-7-6(15)	48	27	16.3	23.1	17.8	42.9	97	88	63
SS-6	CL	13+63	18.7-20.2	A-2-4(0)	23	NP	28.0	59.8	8.2	4.1	100	92	18

EB2-DET

SOIL TEST RESULTS													
SAMPLE			DEPTH	AASHTO			% BY WEIGHT				% PASSING (SIEVES)		
NO.	OFFSET	STATION	INTERVAL	CLASS.	L.L.	P.I.	C.SAND	F.SAND	SILT	CLAY	10	40	200
SS-1	CL	16+58	3.2-4.7	A-4(1)	31	9	24.7	36.5	22.4	16.3	85	70	41

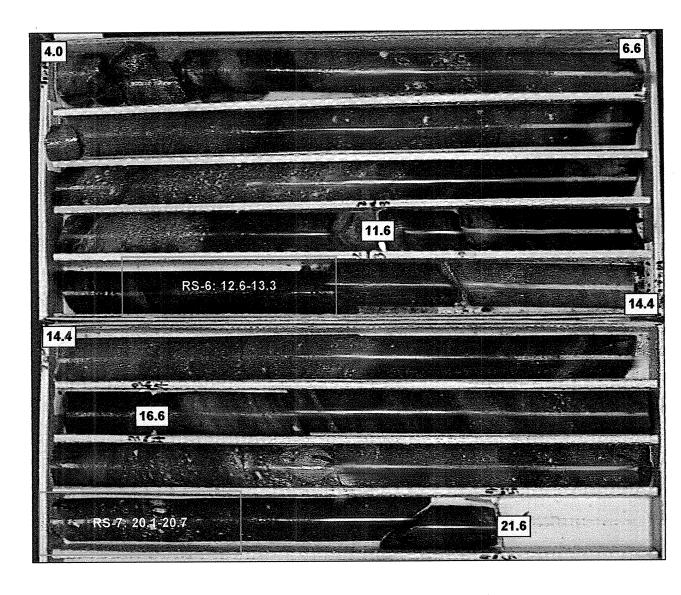
Sheet 20 of 22

CORE PHOTOGRAPHS

8.1511701 (B-3509)/BRDG #75

B1-B

BOXES 1 & 2: 4.0 - 21.6 FEET



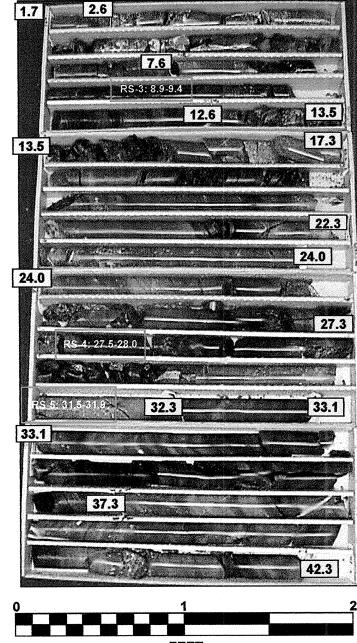


CORE PHOTOGRAPHS

8.1511701 (B-3509)/BRDG #75

B2-A

BOXES 1,2,3 & 4: 1.7 - 42.3 FEET



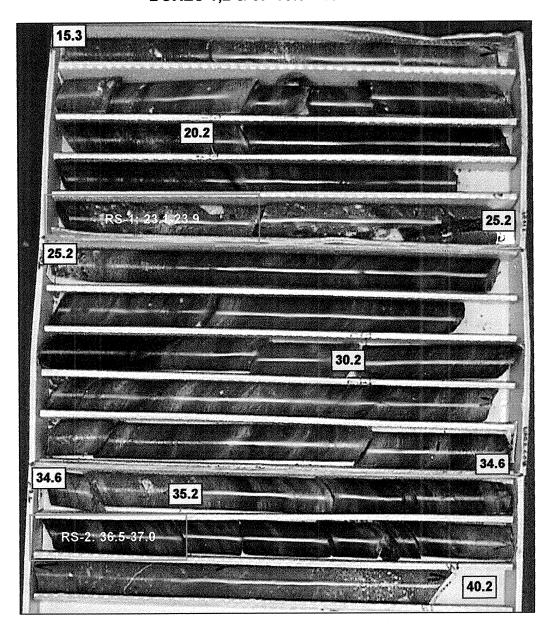
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CORE PHOTOGRAPHS

8.1511701 (B-3509)/BRDG #75

B3-A

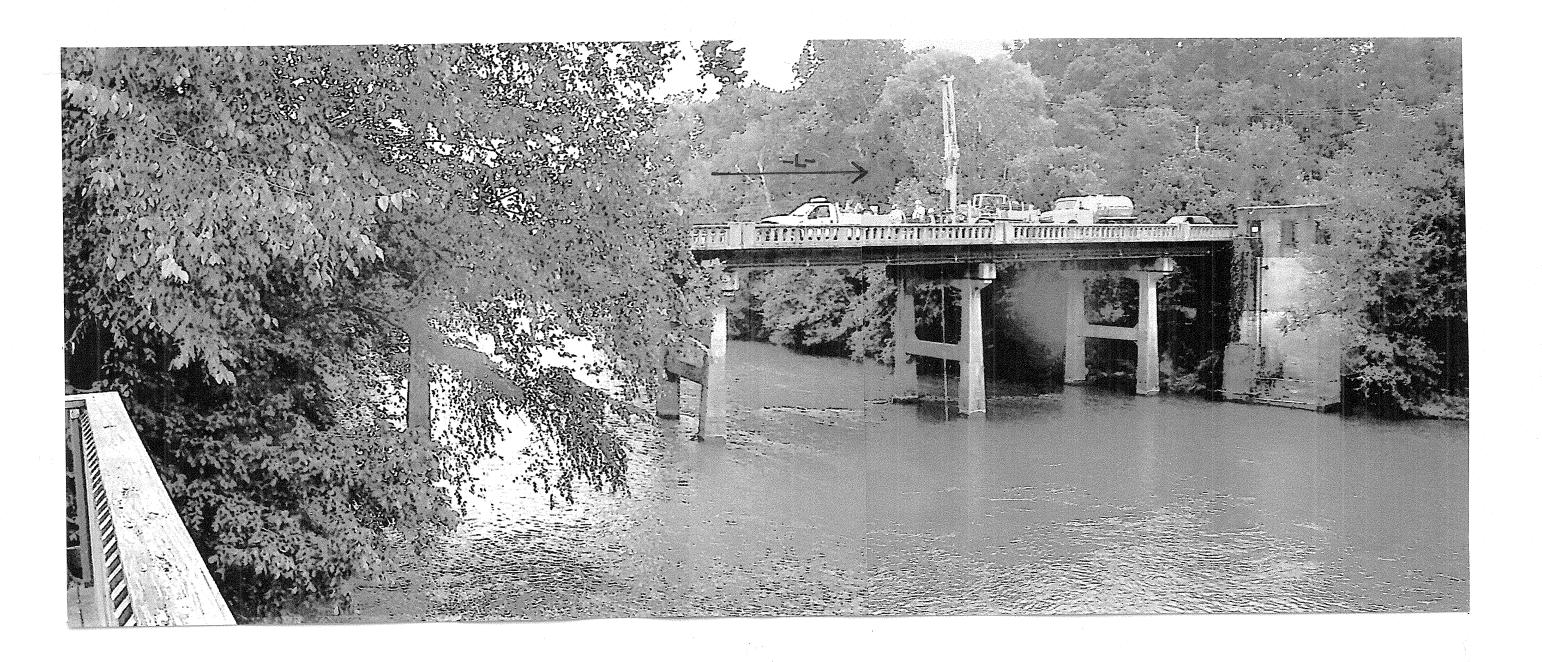
BOXES 1,2 & 3: 15.3 - 40.2 FEET





SITE PHOTOGRAPH

(BRIDGE NO. 75 ON SR 3003 OVER SMITH RIVER)



View looking North and upstream on Smith River