

Foundation Materials

Embankment, alluvium, saprolite, weathered rock, and hard rock compose the foundation materials encountered in borings at the site.

Embankment soils are found at both end bent locales, as the new bridge will serve as a connector for two other roads. The embankment has been placed to depths of approximately one to three meters, and consists of silty sand with gravel and boulders.

The alluvium is confined to End Bent Two and Bent Two. Sand and gravel are the constituents of the deposit, with a thickness of less than one meter.

Saprolitic silty sand was encountered only at End Bent One, found beneath the embankment. The horizon is approximately three meters beneath the roadway fill, and is only 0.5 meter thick.

Hard rock is present at all bent locales between Elevations 614 to 617 meters. It is an intrusive rock of the Henderson Gneiss of the Chauga Belt. Locally it was found to be an inequangular quartz monzonite augen gneiss. The rock is generally hard, fresh, and predominantly sound, yielding good to excellent Rock Quality Designation (RQD) values.

Groundwater

Groundwater was not measured in the borings due to the introduction of water during the core drilling process.

Geologic Foundation Recommendations

This investigation was conducted in anticipation of a drilled shaft foundation.

End Bent Slopes

End Bent Slopes of 1.5:1 (H:V) with slope protection are recommended.

Respectfully Submitted,



J. W. Mann, TEG-III

JWM:mw

	STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
	N.C.		1	
	STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
			F.E.	
			CONST.	

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

STRUCTURE
SUBSURFACE INVESTIGATION

STATE PROJECT 8.2843501 I.D. NO. B-3119
 F.A. PROJECT BRZ-2804(I)
 COUNTY BUNCOMBE
 PROJECT DESCRIPTION _____

 SITE DESCRIPTION BRIDGE NO. 653 ON
SR 2804 OVER BROAD RIVER

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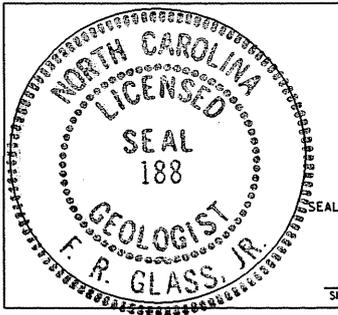
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GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA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

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

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

INVESTIGATED BY J.W. MANN PERSONNEL D.O. CHEEK
 CHECKED BY F.R. GLASS J.T. WILLIAMS
 SUBMITTED BY F.R. GLASS E.A. SMITH
 DATE 10/00 _____



F.R. Glass, Jr.
SIGNATURE

NORTH CAROLINA DIVISION OF HIGHWAYS

20F37

GEOTECHNICAL UNIT

SOIL AND ROCK CLASSIFICATION, LEGEND, AND ABBREVIATIONS

SOIL LEGEND AND AASHTO CLASSIFICATION										CONSISTENCY OR DENSENESS				
GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)					SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS				
GROUP CLASS.	A-1	A-3	A-2			A-4	A-5	A-6	A-7	A-1-A-2	A-4-A-5			
SYMBOL														
% PASSING	50 MX 30 MX 50 MX 15 MX 25 MX		51 MN	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
(PASSING #40) LL PI	6 MX		N.P.	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0		0	0	4 MX	8 MX	12 MX	16 MX	NO MX					
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL & SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND			SILTY SOILS		CLAYEY SOILS					
* PI OF A-7-5 ≤ (LL-30); PI OF A-7-6 > (LL-30)														
TEXTURE OR GRAIN SIZE														
BOULDER	COBBLE	GRAVEL	COARSE SAND	FINE SAND	SILT	CLAY								
GRAIN (mm) SIZE (IN)	305 12	75 3	2	0.25	0.075	0.0075								
SOIL MOISTURE - CORRELATION OF TERMS														
SOIL MOISTURE SCALE (ATTERBERG LIMITS)		FIELD MOISTURE DESCRIPTION		GUIDE FOR FIELD MOISTURE DESCRIPTION										
LL	LIQUID LIMIT		-SATURATED- (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE										
PLASTIC RANGE (PI) PL	PLASTIC LIMIT		-WET- (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE										
OM	OPTIMUM MOISTURE		-MOIST- (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE										
SL	SHRINKAGE LIMIT		-DRY- (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE										
ROCK DESCRIPTION														
IN THE BROADEST MEANING, HARD ROCK IS CONSIDERED TO BE THAT INDURATED EARTH MATERIAL WHICH CANNOT BE SAMPLED BY CONVENTIONAL SOIL SAMPLING TOOLS OR TECHNIQUES. THE BOUNDARY BETWEEN SOIL AND ROCK IS ARBITRARY. TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF "WEATHERED ROCK". FOR THE PURPOSE OF THIS INVESTIGATION, THESE MATERIALS ARE DIVIDED AS FOLLOWS:														
TERM	SYMBOLS			DESCRIPTION										
HARD ROCK (HR)	CORED ROCK		INFERRED ROCK LINE ²	MATERIAL THAT CANNOT BE PENETRATED BY POWER AUGERS, EXCEPT IN THIN LEDGES, AND REQUIRES ROCK CORING TOOLS FOR OBTAINING A SAMPLE										
WEATHERED ROCK (WR)			HARD WEATHERED ROCK (HWR)	MATERIAL THAT CAN BE PENETRATED WITH GREAT DIFFICULTY USING POWER AUGERS AND YIELDS SPT REFUSAL ¹										
			SOFT WEATHERED ROCK (SWR)	MATERIAL THAT CAN BE PENETRATED WITH SOME DIFFICULTY USING POWER AUGERS AND YIELDS SPT VALUES > 100 BLOWS BUT < SPT REFUSAL										
¹ SPT REFUSAL ≤ 2.5 cm OF PENETRATION PER 50 BLOWS IN SPT. ² AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH AUGERS COULD NO LONGER PENETRATE. THE HARD ROCK SYMBOL IS SHOWN WHEN ROCK IS CORED AND ONLY TO THAT DEPTH CORED. A DESCRIPTION OF ROCK IS GIVEN, INCLUDING: <u>CORE RECOVERY (REC.)</u> - TOTAL LENGTH OF ROCK RECOVERED IN THE CORE BARREL DIVIDED BY THE TOTAL LENGTH OF THE CORE RUN TIMES 100%. <u>ROCK QUALITY DESIGNATION (ROD)</u> - TOTAL LENGTH OF SOUND ROCK SEGMENTS RECOVERED THAT ARE LONGER THAN OR EQUAL TO 0.1 m DIVIDED BY THE TOTAL LENGTH OF THE CORE RUN TIMES 100%.														
SEAL														
Signature _____														
GROUND WATER														
WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING (I.A.D.) SOON AFTER DRILLING (____ HRS.) STATIC WATER LEVEL (AFTER _____ HRS.) PERCHED WATER (PW), SATURATED ZONE, OR WATER BEARING STRATA SPRING OR SEEPAGE														
MISCELLANEOUS SYMBOLS AND ABBREVIATIONS														
ROADWAY EMBANKMENT WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL OTHER THAN ROADWAY EMBANKMENTS INFERRED SOIL BOUNDARIES STRIKE AND DIP APPARENT DIP (NORMAL TO _____) ROD SOUNDING		SPT TEST BORING SAMPLE DESIGNATIONS AUGER BORING S-BULK SAMPLE CORE BORING SS-SPLIT SPOON SAMPLE PIEZOMETER INSTALLATION ST-SHELBY TUBE SAMPLE SLOPE INDICATOR INSTALLATION RS-ROCK SAMPLE SPT N-VALUE MONITORING WELL												
ABBREVIATIONS														
ALLUV.	ALLUVIUM	MIC.	MICACEOUS											
AR	AUGER REFUSAL	MOT.	MOTTLED											
BLDR.	BOULDER	N	BLOWS / 30 CM											
CALC.	CALCAREOUS	NS	NO SAMPLE TAKEN											
CL.	CLAY	ORG.	ORGANIC											
CLY.	CLAYEY	P.P.	POCKET PENETROMETER											
COB.	COBBLE	REF.	REFER TO											
CSE.	COARSE	RES.	RESIDUAL											
DPT	DYNAMIC PENETRATION TEST	S.	SOFT											
EST.	ESTIMATED	SAT.	SATURATED											
F.	FINE	SD.	SAND											
FIAD	FILLED IMMED. AFTER DRILLING	SDY.	SANDY											
FOSS.	FOSSILIFEROUS	SED(S).	SEDIMENT(S)											
FRAC.	FRACTURED	SL.	SILT, SILTY											
FRAG(S).	FRAGMENT(S)	SLI.	SLIGHTLY											
GR.	GRAVEL	SPT	STANDARD PENETRATION TEST											
GS	SPECIFIC GRAVITY	TS.	TOPSOIL											
GW	GROUND WATER	VST	VANE SHEAR TEST											
MED.	MEDIUM	V.	VERY											
		W/	WITH											
BENCH MARK: TBM-4: RAILROAD SPIKE IN POWER POLE AT NORTH END OF BRIDGE (-L- STA. 10+43.006 16.679m LT.)														
STATE PROJECT NO. 8.2843501														
T.J.P. NO. B-3119 F.A. NO. BRZ-2804(L)														
COUNTY BUNCOMBE ROUTE SR 2804														
SITE DESCRIPTION BRIDGE NO. 653 ON SR 2804 OVER BROAD RIVER														
PROJECT GEOLOGIST J.W. MANN SUBMITTED BY F.R. GLASS														
PERSONNEL D. O. CHEEK														
J.T. WILLIAMS														
E.A. SMITH DATE SUBMITTED 10/00														
REV. 8/11/98														

LEGEND SUPPLEMENT

In addition to the terms and abbreviations listed on the Legend Sheet, the following will be used to further describe rock quality on this project. Because of limited space on the logs, abbreviations are in parenthesis.

WEATHERING

Fresh	Rock fresh, crystals bright, few joints may show slight staining. Rock rings under hammer in crystalline.
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 0.025 m (1 in.). Open joints may contain clay. In granitoid rocks some occasional feldspar crystals are dull and discolored.
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 show 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 & can be excavated with geologist's pick. Rock gives "clunk" sound when struck. <u>Comparable to hard weathered rock.</u>
Severe (SEV.)	All rocks 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. <u>Comparable to soft weathered rock.</u>
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. <u>Comparable to soil.</u>
Complete	Rock reduced to soil. Rock fabric not discernible only in small and scattered concentrations. Quartz may be present as dikes or stringers. Saprolite is also an example. <u>Comparable to soil.</u>

ROCK CONTINUITY

Sound	Core pieces larger than 0.20 m.
Slightly Fractured (SLI. FRAC.)-	Core pieces between 0.10 m and 0.20m.
Moderately Fractured (MOD. FRAC.)-	Core pieces between 0.025 m and 0.10 m.
Extremely Fractured (EXT. FRAC.)-	Core pieces less than 0.025 m.

JOINT SPACING

Average Discontinuity Spacing (ADS)

The average measured distance (in meters) between joints in the same set. Will not apply to individual joints.

JOINT THICKNESS

Average Discontinuity Thickness (ADT)

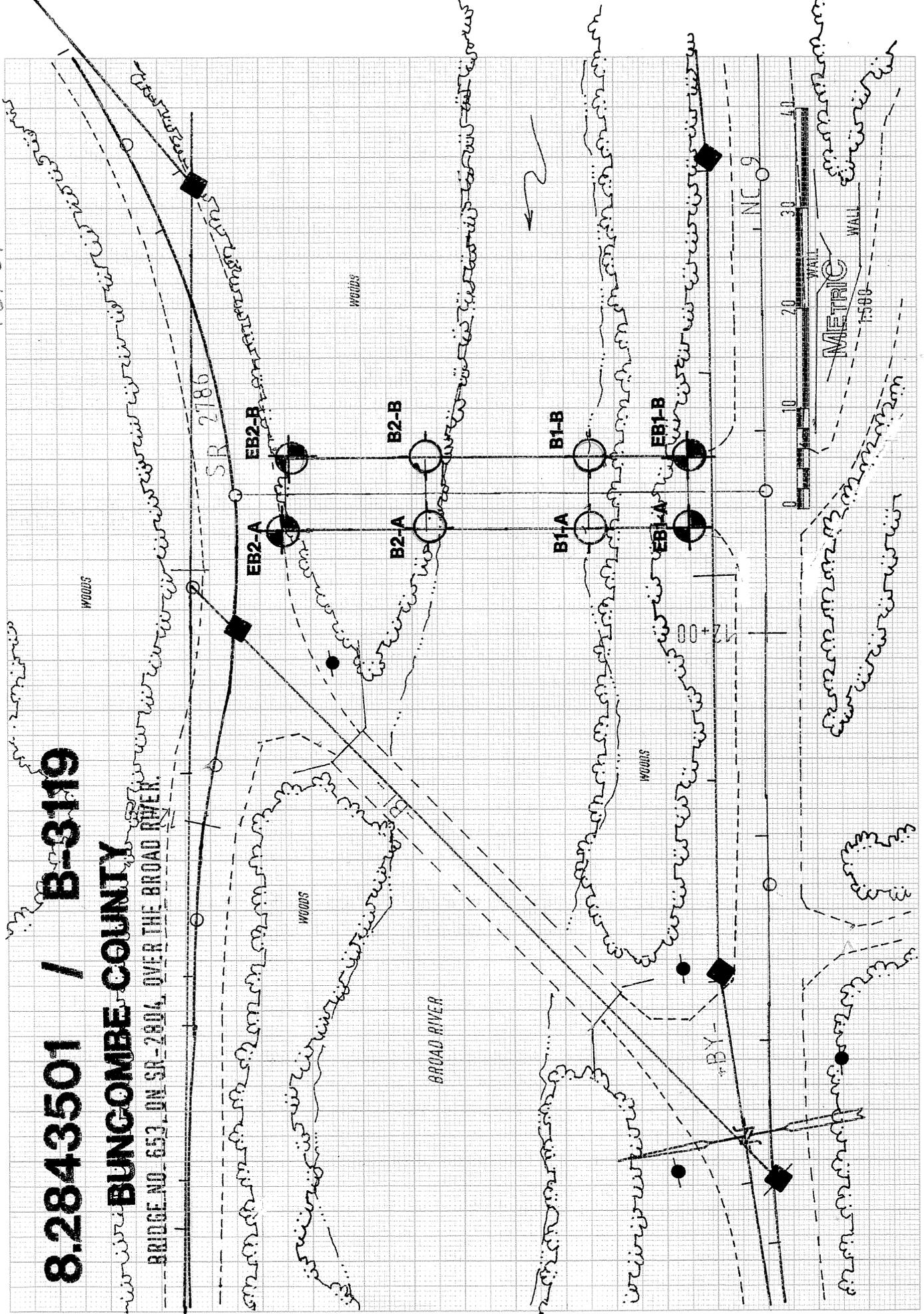
The average thickness or width of gap in the joint (in meters).

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8.2843501 / B-3119

BUNCOMBE COUNTY

BRIDGE NO. 653 ON SR-2804 OVER THE BROAD RIVER.



10+40

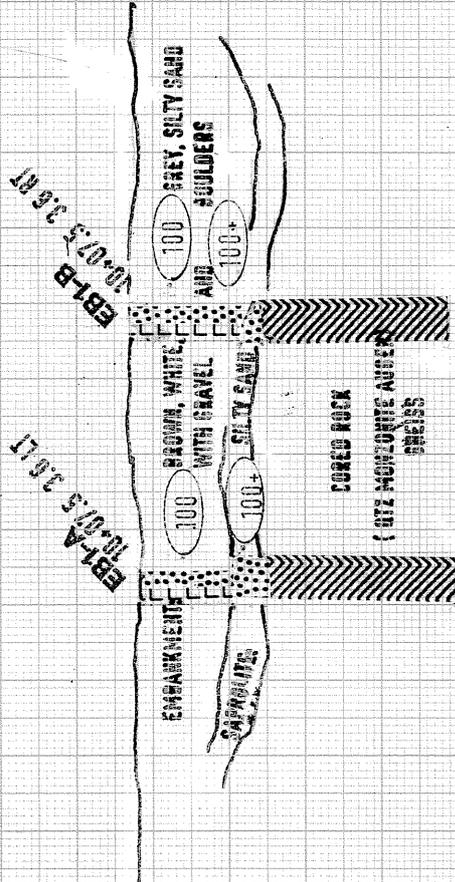
10+20

10+00

60F37

X-SECTION

EB1



620
618
616
614
612
610

620
618
616
614
612

8.2843501 / B-3119
BUNCOMBE COUNTY

BRIDGE NO 653, ON SR - 2804, OVER THE BROAD RIVER



SCALE 1:200

METRIC

70F37

X-SECTION

B1

620
618
616
614
612

620
618
616
614
612
610

B1-A
10-1715.2611

B1-B
10-1715.2611

CORED ROCK
(GTS MORZONITE AUGEN)
SWISS



SCALE 1:200

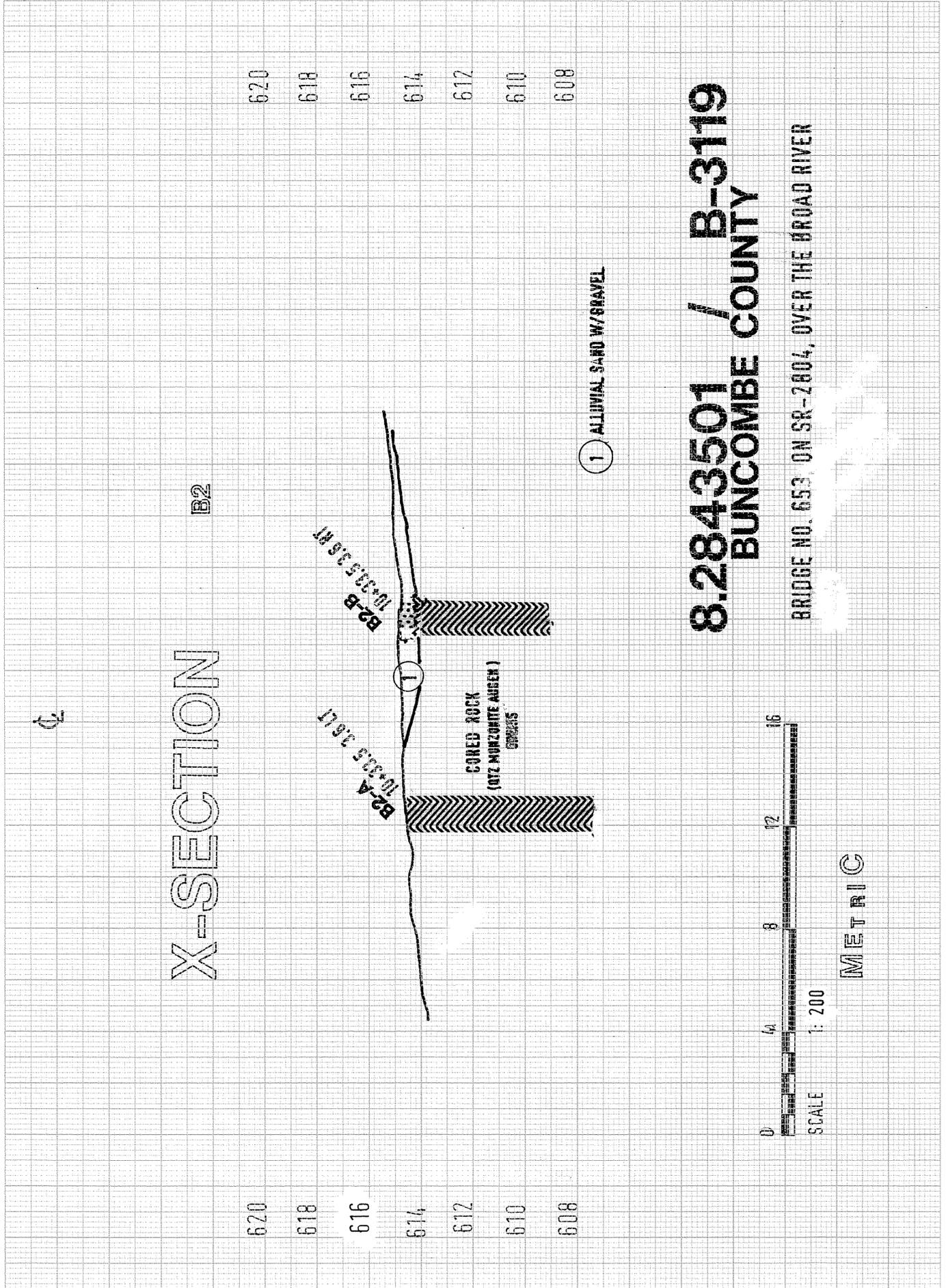
METRIC

8.2843501 / B-3119

BUNCOMBE COUNTY

BRIDGE NO. 653, ON SR-2804, OVER THE BROAD RIVER.

80F37



X-SECTION

B2

B2-B 10+32.5 3.6 RT

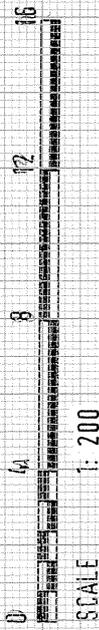
B2-A 10+32.5 3.6 LT

CORED ROCK
(OTZ MONZONITE AUGER)
CONCRETE

1 ALLUVIAL SAND W/ GRAVEL

8.2843501 / B-3119 BUNCOMBE COUNTY

BRIDGE NO. 653, ON SR-2804, OVER THE BROAD RIVER

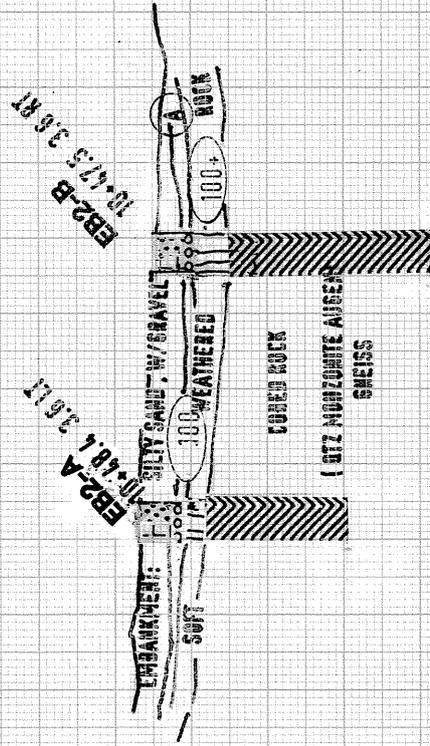


METRIC

90F37

X-SECTION

EB2



620
618
616
614
612
610

(A) ALLUVIAL SAND AND GRAVEL



SCALE 1:200

METRIC

8.2843501 / B-3119
BUNCOMBE COUNTY

BRIDGE NO 653, ON SR - 2804, OVER THE BROAD RIVER

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

10 of 37

PROJECT NO 8.2843501		ID B-3119		COUNTY BUNCOMBE		GEOLOGIST D.O. CHEEK (LOGGER)								
SITE DESCRIPTION BRIDGE NO. 653 ON SR 2804 OVER BROAD RIVER							GND WATER							
BORING NO EB1-A		NORTHING 0.00		EASTING 0.00		0 HR N/A								
ALIGNMENT -L-		BORING LOCATION 10+07.500		OFFSET 3.60m LT		24 HR N/A								
COLLAR ELEV 620.49m		TOTAL DEPTH 8.46m		START DATE 10/02/00		COMPLETION DATE 10/02/00								
DRILL MACHINE CME-550			DRILL METHOD SPT CORE BORING			HAMMER TYPE AUTOMATIC								
SURFACE WATER DEPTH			DEPTH TO ROCK 3.25m			Log EB1-A, Page 1 of 1								
ELEV	DEPTH	BLOW CT			PEN (m)	BLOWS PER 30cm					SAMPLE NO	LOG	SOIL AND ROCK DESCRIPTION	
		15cm	15cm	15cm		0	25	50	75	100				
620.49														
620.00	1.05				0.09									EMBANKMENT: BROWN-WHITE-GRAY SILTY SAND W/ GRAVEL & BOULDERS
618.00	2.57				0.05									SAPROLITE: SILTY SAND
616.00											CORE 1			QUARTZ MONZONITE AUGEN GNEISS: REC=92% RQD=59%
614.00											CORE 2			QUARTZ MONZONITE AUGEN GNEISS: REC=94% RQD=94%
612.03											CORE 3			QUARTZ MONZONITE AUGEN GNEISS: REC=100% RQD=89%
											CORE 4			QUARTZ MONZONITE AUGEN GNEISS: REC=100% RQD=95%
						BORING TERMINATED @ ELEV. 612.03 METERS IN HARD ROCK (AUGEN GNEISS)								

110P37

DATE 10/26/00

CORE BORING REPORT

PROJECT: 8.2843501 I. D. NO: B-3119 BORING NO: EB1-A GEOLOGIST: J.W. MANN

DESCRIPTION: BRIDGE NO. 653 ON SR 2786 OVER BROAD RIVER

COUNTY: BUNCOMBE COLLAR ELEVATION: 620.49 m TOTAL DEPTH: 8.46 m

ELEV. (m)	DEPTH (m)	DRILL RATE MIN./3 m	RUN (m)	REC. METERS %	RQD. METERS %	SAMP. #	FIELD CLASSIFICATION AND REMARKS
617.24	3.25		0.75	0.69	0.44		BROWN-GRAY, HARD, VERY SLIGHTLY WEATHERED, MODERATE TO SLIGHTLY FRACTURED, QUARTZ MONZONITE AUGEN GNEISS. 8 JNT @ 0-20° ADS=0.07m ADT=7mm
				92	59		
616.49	4.00						
616.49	4.00		1.49	1.40	1.40		PINK-WHITE-GRAY, HARD, FRESH, SLIGHTLY FRACTURED TO SOUND QUARTZ MONZONITE AUGEN GNEISS. 2 JNT @ 10-15° ADS=0.53m ADT=7mm
				94	94		
615.00	5.49						
615.00	5.49		1.47	1.47	1.31		PINK-WHITE-GRAY, HARD, FRESH, MODERATELY FRACTURED TO SOUND QUARTZ MONZONITE AUGEN GNEISS. 3 JNT @ 10-25° ADS=0.38m ADT=3mm
				100	89		
613.53	6.96						
613.53	6.96		1.50	1.50	1.43		PINK-WHITE-GRAY, HARD, FRESH, GENERALLY SOUND, QUARTZ MONZONITE AUGEN GNEISS. 2 JNT @ 10° ADS=0.17m ADT=2mm 1 JNT @ 60°
				100	95		
612.03	8.46						

CORING TERMINATED AT
ELEVATION 612.03 m

DRILLER: J.T. WILLIAMS CORE SIZE: NXWL EQUIPMENT: CME-550

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

12 OF 37

PROJECT NO 8.2843501	ID B-3119	COUNTY BUNCOMBE	GEOLOGIST D.O. CHEEK (LOGGER)
SITE DESCRIPTION BRIDGE NO. 653 ON SR 2804 OVER BROAD RIVER			GND WATER
BORING NO EB1-B	NORTHING 0.00	EASTING 0.00	0 HR 4.32m
ALIGNMENT -L-	BORING LOCATION 10+07.500	OFFSET 3.60m RT	24 HR N/A
COLLAR ELEV 620.60m	TOTAL DEPTH 8.30m	START DATE 9/27/00	COMPLETION DATE 10/02/00
DRILL MACHINE CME-550	DRILL METHOD SPT CORE BORING	HAMMER TYPE AUTOMATIC	
SURFACE WATER DEPTH		DEPTH TO ROCK 3.49m	Log EB1-B, Page 1 of 1

ELEV	DEPTH	BLOW CT			PEN (m)	BLOWS PER 30cm					SAMPLE NO	LOG	SOIL AND ROCK DESCRIPTION	
		15cm	15cm	15cm		0	25	50	75	100				
620.60														
620.00	0.95	30	51	50	0.18						SS-1		BLACK-WHITE-GRAY SILTY SAND W/ GRAVEL & BOULDERS	
618.00	2.47	50			0.02								SAPROLITE: SILTY SAND	
616.00											CORE 1 CORE 2		QUARTZ MONZONITE AUGEN GNEISS: REC=95% RQD=71%	
614.00											CORE 3		QUARTZ MONZONITE AUGEN GNEISS: REC=99% RQD=99%	
612.30											CORE 4		QUARTZ MONZONITE AUGEN GNEISS: REC=96% RQD=96%	
BORING TERMINATED @ ELEV. 612.30 METERS IN HARD ROCK (AUGEN GNEISS)														

130F37

DATE 10/26/00

CORE BORING REPORT

PROJECT: 8.2843501 I. D. NO: B-3119 BORING NO: EB1-B GEOLOGIST: J.W. MANN

DESCRIPTION: BRIDGE NO. 653 ON SR 2804 OVER BROAD RIVER

COUNTY: BUNCOMBE COLLAR ELEVATION: 620.60 m TOTAL DEPTH: 8.30 m

ELEV. (m)	DEPTH (m)	DRILL RATE MIN./3 m	RUN (m)	REC. METERS %	RQD. METERS %	SAMP. #	FIELD CLASSIFICATION AND REMARKS
617.11	3.49		0.38	0.36	0.27		PINK-WHITE-GRAY, HARD, FRESH, PREDOMINANTLY SOUND, QUARTZ MONZONITE AUGEN GNEISS. SOME APATITE DIKES PRESENT. 4 JNT @ 15-25° ADS=0.20m ADT=2mm JOINTS OCCUR WITHIN 1st & 2nd CORE RUNS. ALL OTHER FRACTURES MECHANICAL.
				95	71		
616.73	3.87		1.45	1.45	1.42		
616.73	3.87			100	98		
615.28	5.32		1.49	1.48	1.48		
615.28	5.32			99	99		
613.79	6.81		1.49	1.43	1.43		
613.79	6.81			96	96		
612.30	8.30						

CORING TERMINATED AT
ELEVATION 612.30 m

DRILLER: J.T. WILLIAMS

CORE SIZE: NXWL

EQUIPMENT: CME-550

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

140F37

PROJECT NO 8.2843501		ID B-3119		COUNTY BUNCOMBE		GEOLOGIST D.O. CHEEK (LOGGER)										
SITE DESCRIPTION BRIDGE NO. 653 ON SR 2804 OVER BROAD RIVER									GND WATER							
BORING NO B1-A		NORTHING 0.00			EASTING 0.00				0 HR N/A							
ALIGNMENT -L-		BORING LOCATION 10+17.500			OFFSET 3.60m LT				24 HR N/A							
COLLAR ELEV 614.83m		TOTAL DEPTH 4.30m		START DATE 9/26/00		COMPLETION DATE 09/26/00										
DRILL MACHINE CME-550			DRILL METHOD CORE BORING			HAMMER TYPE AUTOMATIC										
SURFACE WATER DEPTH			DEPTH TO ROCK 0.00m			Log B1-A, Page 1 of 1										
ELEV	DEPTH	BLOW CT			PEN (m)	BLOWS PER 30cm					SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION		
		15cm	15cm	15cm		0	25	50	75	100						
614.83																
614.00															Ground Surface	
															CORE 1	QUARTZ MONZONITE AUGEN GNEISS: REC=95% RQD=95%
															CORE 2	QUARTZ MONZONITE AUGEN GNEISS: REC=100% RQD=100%
															CORE 3	QUARTZ MONZONITE AUGEN GNEISS: REC=99% RQD=99%
610.53																BORING TERMINATED @ ELEV 610.53 METERS IN HARD ROCK (AUGEN GNEISS)

150F37

DATE 10/26/00

CORE BORING REPORT

PROJECT: 8.2843501 I. D. NO: B-3119 BORING NO: B1-A GEOLOGIST: J.W. MANN

DESCRIPTION: BRIDGE NO. 653 ON SR 2804 OVER BROAD RIVER

COUNTY: BUNCOMBE COLLAR ELEVATION: 614.83 m TOTAL DEPTH: 4.30 m

ELEV. (m)	DEPTH (m)	DRILL RATE MIN./3 m	RUN (m)	REC. METERS %	RQD. METERS %	SAMP. #	FIELD CLASSIFICATION AND REMARKS
614.83	0.00		1.33	1.27	1.27		WHITE-GRAY, HARD, FRESH, SOUND, QUARTZ MONZONITE AUGEN GNEISS. SOME LARGE FELDSPAR PORPHYRPBLASTS PRESENT. ALL FRACTURES MECHANICAL.
				95	95		
613.50	1.33		1.49	1.49	1.49		
613.50	1.33			100	100		
612.01	2.82		1.48	1.46	1.46	RS-2	
612.01	2.82			99	99		
610.53	4.30						

CORING TERMINATED AT
ELEVATION 610.53 m

DRILLER: J.T. WILLIAMS

CORE SIZE: NXWL

EQUIPMENT: CME-550

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

160F37

PROJECT NO 8.2843501		ID B-3119		COUNTY BUNCOMBE		GEOLOGIST D.O. CHEEK (LOGGER)									
SITE DESCRIPTION BRIDGE NO. 653 ON SR 2804 OVER BROAD RIVER									GND WATER						
BORING NO B1-B		NORTHING 0.00			EASTING 0.00				0 HR N/A						
ALIGNMENT -L-		BORING LOCATION 10+17.500			OFFSET 3.60m RT				24 HR N/A						
COLLAR ELEV 614.62m		TOTAL DEPTH 4.14m		START DATE 9/27/00		COMPLETION DATE 09/27/00									
DRILL MACHINE CME-550			DRILL METHOD CORE BORING			HAMMER TYPE AUTOMATIC									
SURFACE WATER DEPTH			DEPTH TO ROCK 0.00m			Log B1-B, Page 1 of 1									
ELEV	DEPTH	BLOW CT			PEN (m)	BLOWS PER 30cm					SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION	
		15cm	15cm	15cm		0	25	50	75	100					
614.62															
614.00															Ground Surface
											CORE 1				QUARTZ MONZONITE AUGEN GNEISS: REC=99% RQD=86%
											CORE 2				QUARTZ MONZONITE AUGEN GNEISS: REC=99% RQD=99%
612.00											CORE 3				QUARTZ MONZONITE AUGEN GNEISS: REC=100% RQD=100%
610.48															
						BORING TERMINATED @ ELEV. 610.48 METERS IN HARD ROCK (AUGEN GNEISS)									

170237

SHEET 1 OF 1

DATE 10/26/00

CORE BORING REPORT

PROJECT: 8.2843501 I. D. NO: B-3119 BORING NO: B1-B GEOLOGIST: J.W. MANN

DESCRIPTION: BRIDGE NO. 653 ON SR 2804 OVER BROAD RIVER

COUNTY: BUNCOMBE COLLAR ELEVATION: 614.62 m TOTAL DEPTH: 4.14 m

ELEV. (m)	DEPTH (m)	DRILL RATE MIN./3 m	RUN (m)	REC. METERS %	RQD. METERS %	SAMP. #	FIELD CLASSIFICATION AND REMARKS
614.62	0.00		1.15	1.14	0.99		WHITE-GRAY, HARD, FRESH, EXTREMELY FRACTURED - PREDOMINANTLY SOUND, QUARTZ MONZONITE AUGEN GNEISS. 5 JNT @ 0-10° ADS=0.12m ADT=3mm 1 JNT @ 25° ADT=2mm OTHER FRACTURES MECHANICAL.
				99	86		
613.47	1.15		1.49	1.48	1.48	RS-1	
613.47	1.15			99	99		
611.98	2.64		1.50	1.50	1.50		WHITE-GRAY, HARD, FRESH, SOUND, QUARTZ MONZONITE AUGEN GNEISS. FRACTURES ARE MECHANICAL
611.98	2.64			100	100		
610.48	4.14						

CORING TERMINATED AT
ELEVATION 610.48 m

DRILLER: J.T. WILLIAMS CORE SIZE: NXWL EQUIPMENT: CME-550

190737

SHEET 1 OF 1

DATE 10/26/00

CORE BORING REPORT

PROJECT: 8.2843501 I. D. NO: B-3119 BORING NO: B2-A GEOLOGIST: J.W. MANN

DESCRIPTION: BRIDGE NO. 653 ON SR 2804 OVER BROAD RIVER

COUNTY: BUNCOMBE COLLAR ELEVATION: 614.32 m TOTAL DEPTH: 7.09 m

ELEV. (m)	DEPTH (m)	DRILL RATE MIN./3 m	RUN (m)	REC. METERS %	RQD. METERS %	SAMP. #	FIELD CLASSIFICATION AND REMARKS
614.32	0.00		1.16	1.14	1.10		WHITE-GRAY, HARD, FRESH, GENERALLY SOUND, QUARTZ MONZONITE AUGEN GNEISS. 3 JNT @ 5-10° ADS=0.30m ADT=5mm
				98	95		
613.16	1.16		1.47	1.47	1.47		PINK-WHITE-GRAY, HARD, FRESH, SOUND, QUARTZ MONZONITE AUGEN GNEISS. ALL FRACTURES MECHANICAL BREAKS
613.16	1.16			100	100		
611.69	2.63		1.52	1.52	1.52		
611.69	2.63			100	100		
610.17	4.15		1.47	1.45	1.45		
610.17	4.15			99	99		
608.70	5.62		1.47	1.47	1.47	RS-3	
608.70	5.62			100	100		
607.23	7.09						

CORING TERMINATED AT
ELEVATION 607.23 m

DRILLER: J.T. WILLIAMS

CORE SIZE: NXWL

EQUIPMENT: CME-550

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

200737

PROJECT NO 8.2843501		ID B-3119		COUNTY BUNCOMBE		GEOLOGIST D.O. CHEEK (LOGGER)									
SITE DESCRIPTION BRIDGE NO. 653 ON SR 2804 OVER BROAD RIVER							GND WATER								
BORING NO B2-B		NORTHING 0.00		EASTING 0.00		0 HR N/A									
ALIGNMENT -L-		BORING LOCATION 10+33.500		OFFSET 3.60m RT		24 HR N/A									
COLLAR ELEV 614.88m		TOTAL DEPTH 5.78m		START DATE 9/06/00		COMPLETION DATE 09/06/00									
DRILL MACHINE CME-550			DRILL METHOD CORE BORING			HAMMER TYPE AUTOMATIC									
SURFACE WATER DEPTH			DEPTH TO ROCK 0.57m			Log B2-B, Page 1 of 1									
ELEV	DEPTH	BLOW CT			PEN (m)	BLOWS PER 30cm					SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION	
		15cm	15cm	15cm		0	25	50	75	100					
614.88															
															Ground Surface
614.00															ALLUVIAL SD. W/ GR.
															QUARTZ MONZONITE AUGEN GNEISS: REC=99% RQD=66%
															QUARTZ MONZONITE AUGEN GNEISS: REC=100% RQD=83%
612.00															QUARTZ MONZONITE AUGEN GNEISS: REC=100% RQD=98%
															QUARTZ MONZONITE AUGEN GNEISS: REC=99% RQD=99%
610.00															
609.10															
															BORING TERMINATED @ ELEV. 609.10 METERS IN HARD ROCK (AUGEN GNEISS)

210P37

SHEET 1 OF 1

DATE 10/26/00

CORE BORING REPORT

PROJECT: 8.2843501 I. D. NO: B-3119 BORING NO: B2-B GEOLOGIST: J.W. MANN

DESCRIPTION: BRIDGE NO. 653 ON SR 2804 OVER BROAD RIVER

COUNTY: BUNCOMBE COLLAR ELEVATION: 614.88 m TOTAL DEPTH: 5.78 m

ELEV. (m)	DEPTH (m)	DRILL RATE MIN./3 m	RUN (m)	REC. METERS %	RQD. METERS %	SAMP. #	FIELD CLASSIFICATION AND REMARKS
614.31	0.57		0.77	0.76	0.51		WHITE-GRAY, HARD, FRESH, EXTREMELY FRACTURED TO SOUND, QUARTZ MONZONITE AUGEN GNEISS. 6 JNT @ 0-10° ADS=0.04m ADT=2mm
				99	66		
613.54	1.34					RS-4	
613.54	1.34		1.46	1.46	1.21		PINK-WHITE-GRAY, HARD, FRESH, MODERATELY FRACTURED TO SOUND, QUARTZ MONZONITE AUGEN GNEISS. 6 JNT @ 0-10° ADS=0.07m ADT=4mm
				100	83		
612.08	2.80						
612.08	2.80		1.49	1.49	1.46		PINK-WHITE-GRAY, HARD, FRESH, SOUND, QUARTZ MONZONITE AUGEN GNEISS.
				100	98		
610.59	4.29						1 JNT @ 30°
610.59	4.29		1.49	1.47	1.47		OTHER FRACTURES MECHANICAL.
				99	99		
609.10	5.78						

CORING TERMINATED AT
ELEVATION 609.10 m

DRILLER: J.T. WILLIAMS

CORE SIZE: NXWL

EQUIPMENT: CME-550

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

22 of 37

PROJECT NO 8.2843501		ID B-3119		COUNTY BUNCOMBE		GEOLOGIST D.O. CHEEK (LOGGER)								
SITE DESCRIPTION BRIDGE NO. 653 ON SR 2804 OVER BROAD RIVER							GND WATER							
BORING NO EB2-A		NORTHING 0.00		EASTING 0.00		0 HR N/A								
ALIGNMENT -L-		BORING LOCATION 10+48.400		OFFSET 3.60m LT		24 HR N/A								
COLLAR ELEV 619.49m		TOTAL DEPTH 5.50m		START DATE 10/10/00		COMPLETION DATE 10/10/00								
DRILL MACHINE CME-550			DRILL METHOD SPT CORE BORING			HAMMER TYPE AUTOMATIC								
SURFACE WATER DEPTH			DEPTH TO ROCK 1.63m			Log EB2-A, Page 1 of 1								
ELEV	DEPTH	BLOW CT			PEN (m)	BLOWS PER 30cm					SAMPLE NO	LOG	SOIL AND ROCK DESCRIPTION	
		15cm	15cm	15cm		0	25	50	75	100				
619.49														
619.00	1.12	100			0.06					100			EMBANKMENT: SILTY SAND W/ GRAVEL	
617.00													ALLUVIAL GRAVEL & SAND	
													SOFT WEATHERED ROCK	
													QUARTZ MONZONITE AUGEN GNEISS: REC=98% RQD=98%	
													QUARTZ MONZONITE AUGEN GNEISS: REC=99% RQD=93%	
615.00													QUARTZ MONZONITE AUGEN GNEISS: REC=96% RQD=92%	
613.99														
BORING TERMINATE @ ELEV. 613.99 METERS IN HARD ROCK (AUGEN GNEISS)														

DATE 10/26/00

CORE BORING REPORT

PROJECT: 8.2843501 I. D. NO: B-3119 BORING NO: EB2-A GEOLOGIST: J.W. MANN

DESCRIPTION: BRIDGE NO. 653 ON SR 2804 OVER BROAD RIVER

COUNTY: BUNCOMBE COLLAR ELEVATION: 619.49 m TOTAL DEPTH: 5.50 m

ELEV. (m)	DEPTH (m)	DRILL RATE MIN./3 m	RUN (m)	REC. METERS %	RQD. METERS %	SAMP. #	FIELD CLASSIFICATION AND REMARKS
617.86	1.63		0.90	0.88	0.88		WHITE-GRAY, HARD, FRESH, PREDOMINANTLY SOUND, QUARTZ MONZONITE AUGEN GNEISS. 3 JNT @ 0-10° ADS=0.03m ADT=5mm 1 JNT @ 35° ADT=1mm JOINTS OCCUR IN LAST CORE RUN. OTHER FRACTURES MECHANICAL.
				98	98		
616.96	2.53		1.48	1.46	1.38		
616.96	2.53			99	93		
615.48	4.01		1.49	1.43	1.37		
615.48	4.01			96	92		
613.99	5.50						

CORING TERMINATED AT
ELEVATION 613.99 m

DRILLER: J.T. WILLIAMS CORE SIZE: NXWL EQUIPMENT: CME-550

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

240F37

PROJECT NO 8.2843501		ID B-3119		COUNTY BUNCOMBE		GEOLOGIST D.O. CHEEK (LOGGER)								
SITE DESCRIPTION BRIDGE NO. 653 ON SR 2804 OVER BROAD RIVER							GND WATER							
BORING NO EB2-B		NORTHING 0.00		EASTING 0.00		0 HR N/A								
ALIGNMENT -L-		BORING LOCATION 10+47.500		OFFSET 3.60m RT		24 HR N/A								
COLLAR ELEV 618.88m		TOTAL DEPTH 7.32m		START DATE 10/04/00		COMPLETION DATE 10/04/00								
DRILL MACHINE CME-550			DRILL METHOD SPT CORE BORING			HAMMER TYPE AUTOMATIC								
SURFACE WATER DEPTH			DEPTH TO ROCK 1.87m			Log EB2-B, Page 1 of 1								
ELEV	DEPTH	BLOW CT			PEN (m)	BLOWS PER 30cm					SAMPLE NO	LOG	SOIL AND ROCK DESCRIPTION	
		15cm	15cm	15cm		0	25	50	75	100				
618.88														
618.00	1.40	50			0.02					50			EMBANKMENT: SILTY SAND W/ GRAVEL	
													ALLUVIAL GRAVEL W/ SAND	
													HARD WEATHERED ROCK	
616.00											CORE 1		QUARTZ MONZONITE AUGEN GNEISS: REC=98% RQD=86%	
											CORE 2		QUARTZ MONZONITE AUGEN GNEISS: REC=94% RQD=94%	
614.00											CORE 3		QUARTZ MONZONITE AUGEN GNEISS: REC=100% RQD=100%	
											CORE 4		QUARTZ MONZONITE AUGEN GNEISS: REC=99% RQD=99%	
612.00														
611.56														
						BORING TERMINATED @ ELEV. 611.56 METERS IN HARD ROCK (AUGEN GNEISS)								

DATE 10/26/00

CORE BORING REPORT

PROJECT: 8.2843501 I. D. NO: B-3119 BORING NO: EB2-B GEOLOGIST: J.W. MANN

DESCRIPTION: BRIDGE NO. 653 ON SR 2804 OVER BROAD RIVER

COUNTY: BUNCOMBE COLLAR ELEVATION: 618.88 m TOTAL DEPTH: 7.32 m

ELEV. (m)	DEPTH (m)	DRILL RATE MIN./3 m	RUN (m)	REC. METERS %	RQD. METERS %	SAMP. #	FIELD CLASSIFICATION AND REMARKS
617.01	1.87		0.95	0.93	0.95		PINK-WHITE-GRAY, HARD, FRESH, MODERATELY FRACTURED TO SOUND, QUARTZ MONZONITE AUGEN GNEISS. 5 JNT @ 5-20° ADS=0.15m ADT=3mm
				98	100		
616.06	2.82						
616.06	2.82		1.49	1.40	1.40		PINK WHITE-GRAY, HARD, FRESH, SOUND, QUARTZ MONZONITE AUGEN GNEISS. FRACTURES ARE MECHANICAL.
				94	94		
614.57	4.31						
614.57	4.31		1.52	1.52	1.52		
				100	100		
613.05	5.83						
613.05	5.83		1.49	1.47	1.47		
				99	99		
611.56	7.32						

CORING TERMINATED AT
ELEVATION 611.56 m

DRILLER: J.T. WILLIAMS CORE SIZE: NXWL EQUIPMENT: CME-550

GEOTECHNICAL UNIT FIELD SCOUR REPORT

PROJECT: 8.2843501 ID: B-3119 COUNTY: Buncombe

DESCRIPTION(1): Bridge No. 653 on SR-2804 Over Broad River.

INFORMATION ON EXISTING BRIDGES Information obtained from: x field inspection
microfilm(Reel: Pos:)
other

COUNTY BRIDGE NO. 653 BRIDGE LENGTH 35.6m NO. BENTS IN: CHANNEL 0 FLOOD PLAIN 0

FOUNDATION TYPE: Concrete abutments.

EVIDENCE OF SCOUR(2):

ABUTMENTS OR END BENT SLOPES: None noted.

INTERIOR BENTS: N/A

CHANNEL BED: None.

CHANNEL BANKS: None.

EXISTING SCOUR PROTECTION:

TYPE(3): Only existing concrete abutments.

EXTENT(4) N/A

EFFECTIVENESS(5): N/A

OBSTRUCTIONS(6) (DAMS, DEBRIS, ETC.): Minor: a few logs.

DESIGN INFORMATION

CHANNEL BED MATERIAL(7) (SAMPLE RESULTS ATTACHED): Rock with some gravel and sand.

CHANNEL BANK MATERIAL(8) (SAMPLE RESULTS ATTACHED): Sand, gravel, boulders.

FOUNDATION BEARING MATERIAL(9): Rock.

CHANNEL BANK COVER(10) Trees and bushes.

FLOOD PLAIN WIDTH(11): EB1 = 4 meters EB2 = 8 meters (river mainly incised).

FLOOD PLAIN COVER(12): Trees and bushes.

DESIGN INFORMATION CONT.

PAGE 2

STREAM IS x DEGRADING AGGRADING (13)

OTHER OBSERVATIONS AND COMMENTS: _____

CHANNEL MIGRATION TENDENCY (14): Toward End Bent One.

CRITICAL SCOUR ELEVATION (15): _____

Bent One: 614.5

Bent Two: 614.5

REPORTED BY: J. W. Mann, TEG-III DATE: 10/26/00 INSTRUCTIONS

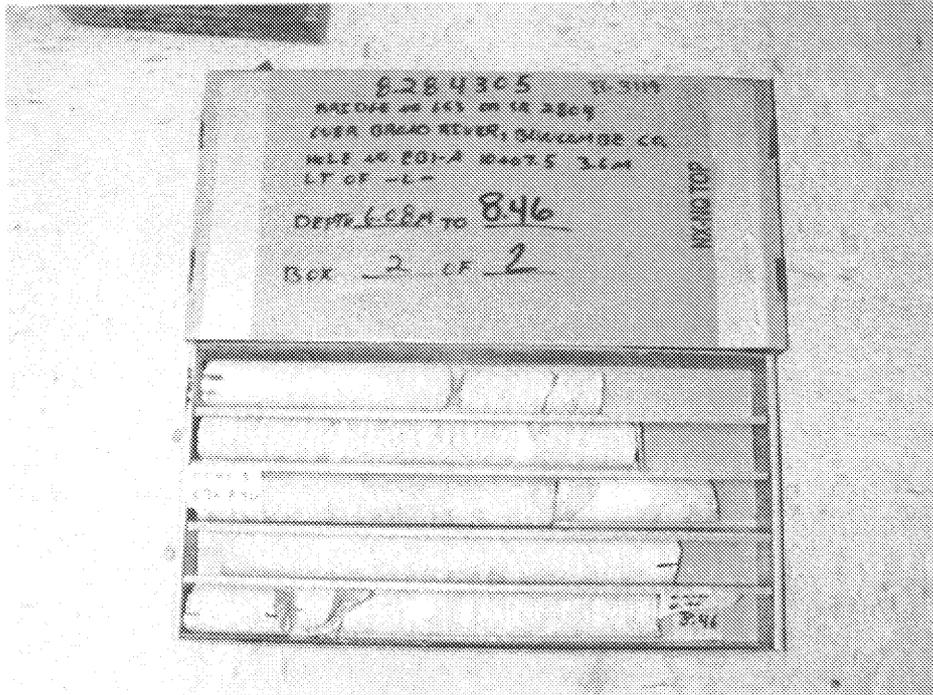
- (1) GIVE THE DESCRIPTION OF THE SPECIFIC SITE GIVING ROUTE NUMBER AND BODY OF WATER CROSSED.
- (2) NOTE ANY EVIDENCE OF SCOUR AT THE EXISTING END BENTS OR ABUTMENTS (UNDERMINING, SLOUGHING, SCOUR LOCATIONS, DEGRADATIONS, ETC.)
- (3) NOTE ANY EXISTING SCOUR PROTECTION (RIP RAP, ETC.)
- (4) DESCRIBE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

290F37

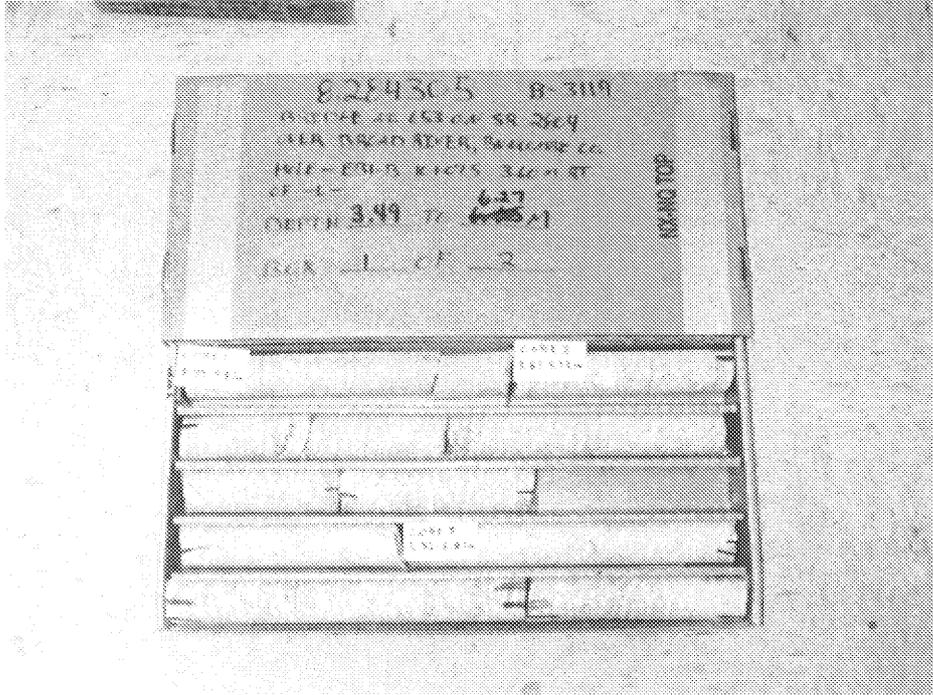


8.2843501 (B-3119)
BRIDGE NO. 653 ON
SR-2804 OVER
BROAD RIVER
(BUNCOMBE CO.)

EBI-A
BOX 1 OF 2

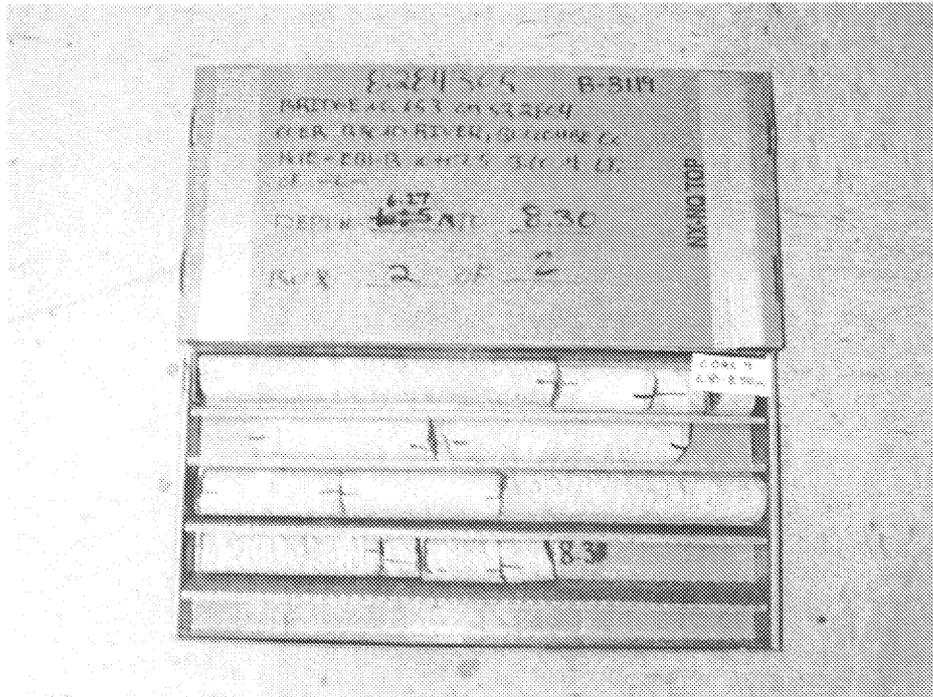


EBI-A
BOX 2 OF 2

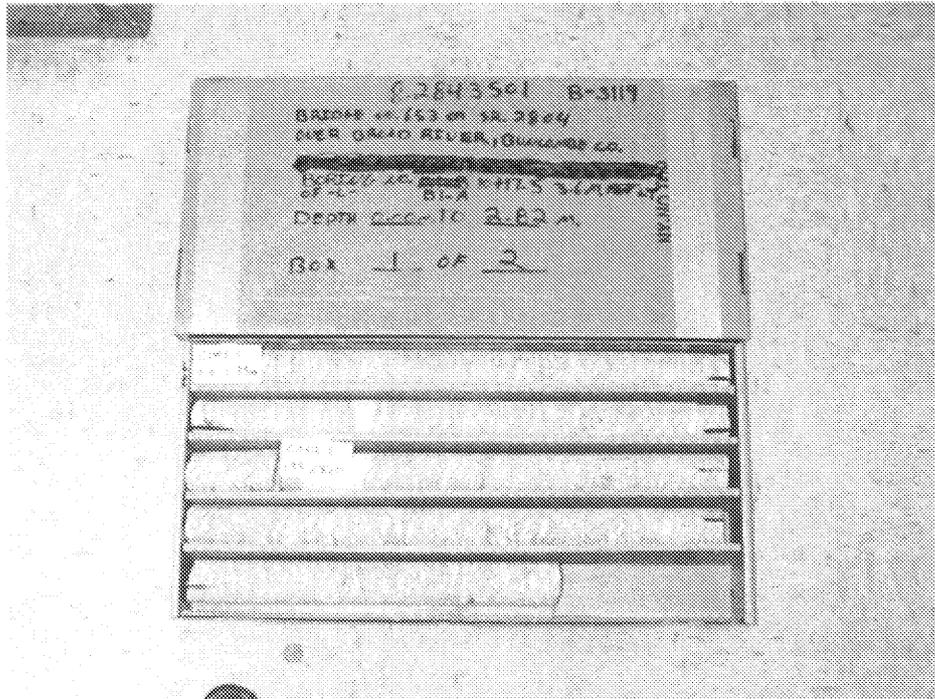


8.2843501 (B-3119)
BRIDGE NO. 653 ON
SR-2804 OVER
BROAD RIVER
(BUNCOMBE CO.)

EB1-B
BOX 1 OF 2

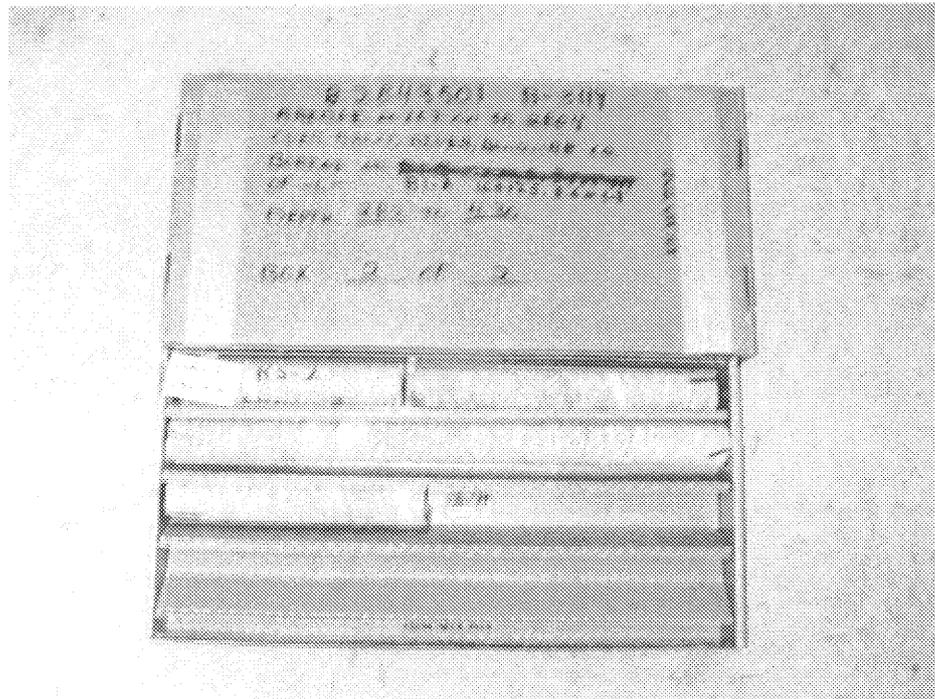


EB1-B
BOX 2 OF 2

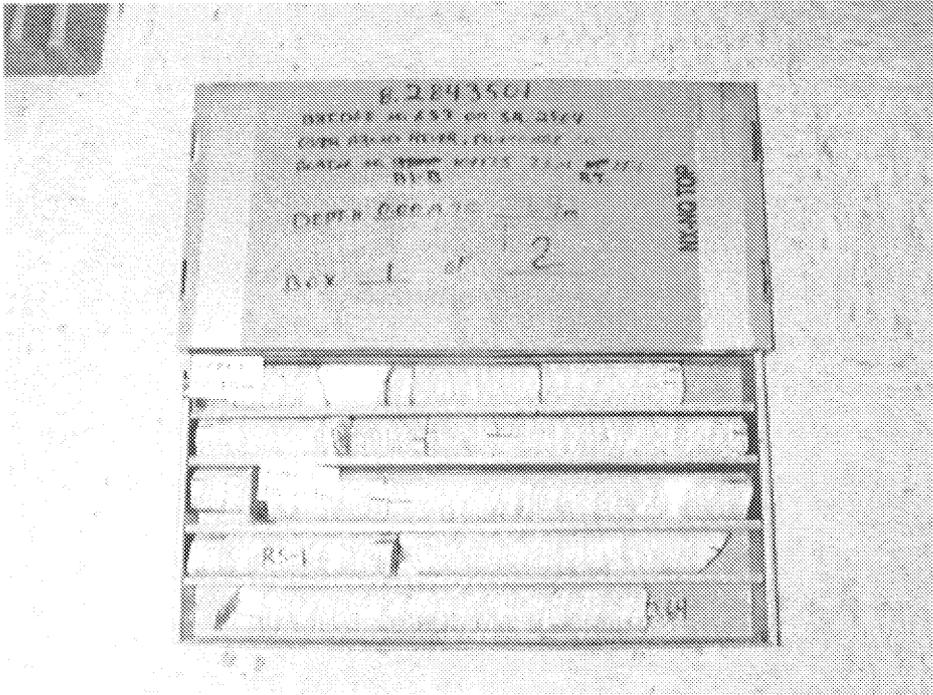


8.2843501 (B-3119)
 BRIDGE NO. 653 ON
 SR-2804 OVER
 BROAD RIVER
 (BUNCOMBE CO.)

B1-A
 BOX 1 OF 2

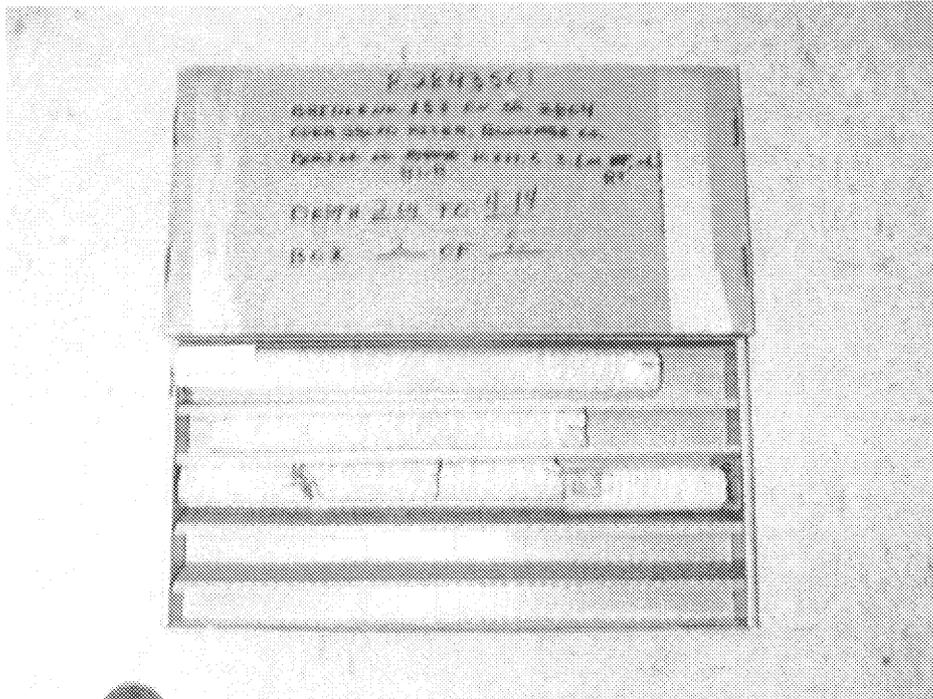


B1-A
 BOX 2 OF 2

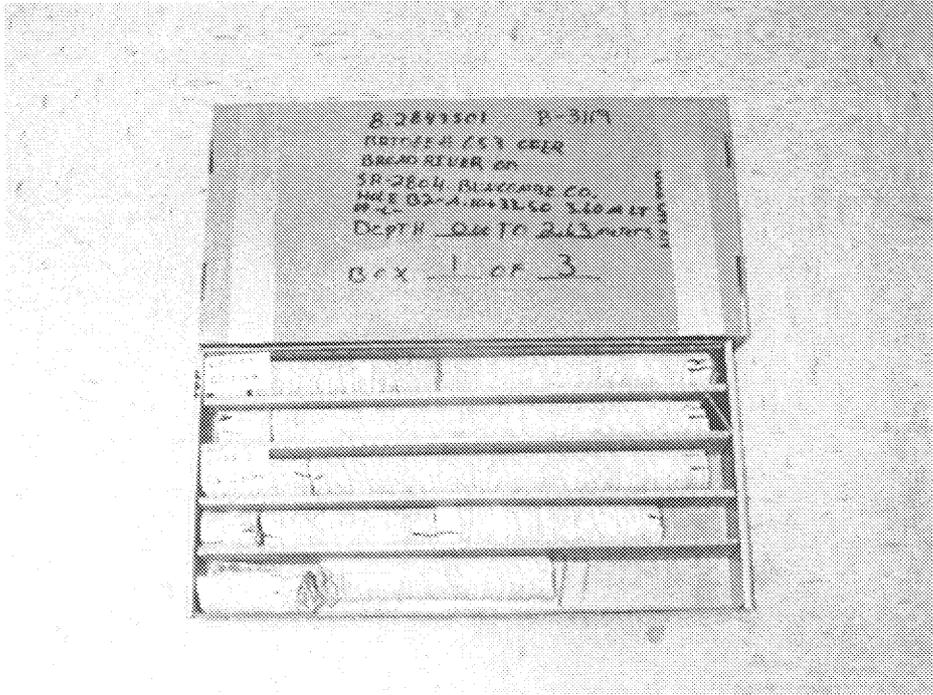


8.2843501 (B-3119)
BRIDGE NO. 653 ON
SR-2804 OVER
BROAD RIVER
(BUNCOMBE CO.)

B1-B
BOX 1 OF 2

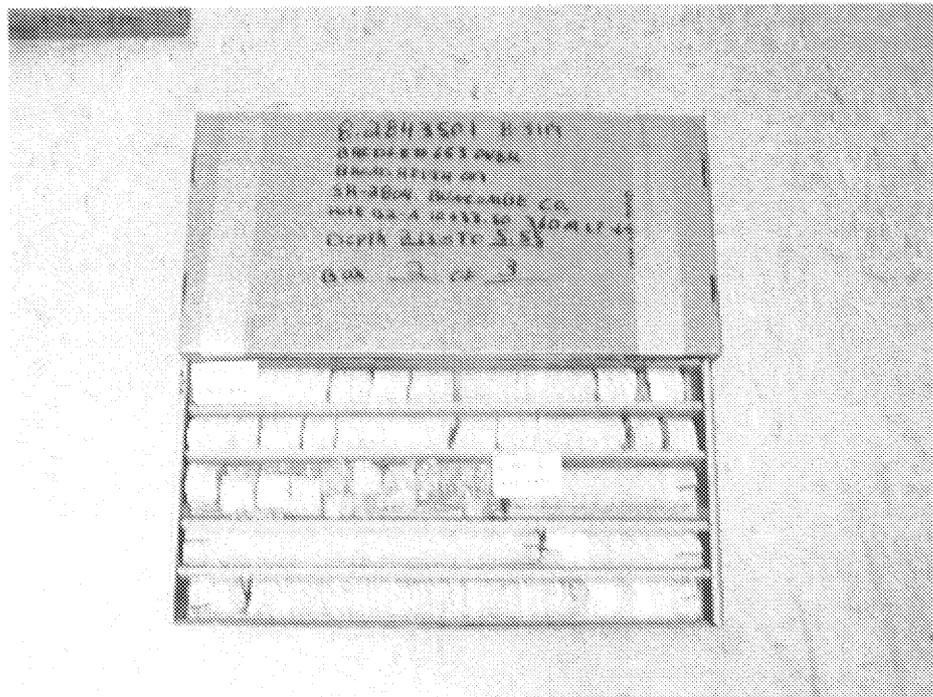


B1-B
BOX 2 OF 2

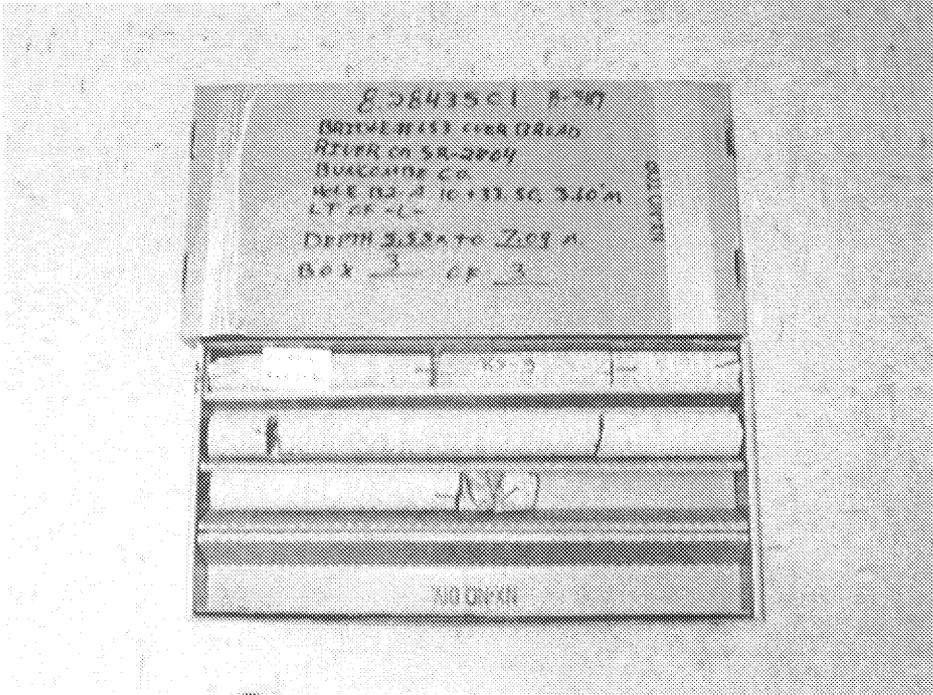


8.2843501 (B-3119)
BRIDGE NO. 653 ON
SR-2804 OVER
BROAD RIVER
(BUNCOMBE CO.)

B2-A
BOX 1 OF 3

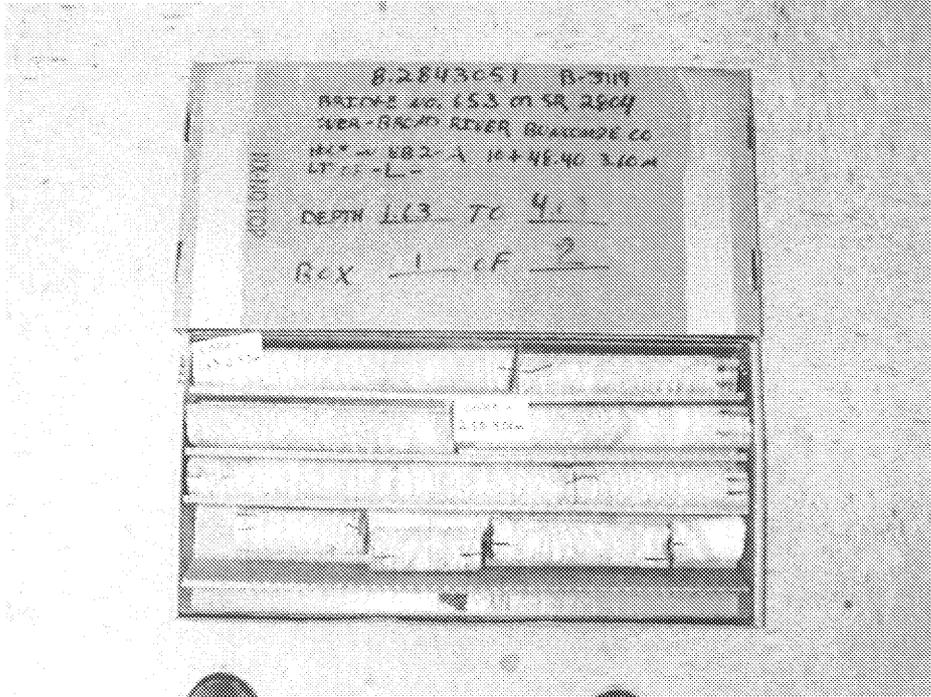


B2-A
BOX 2 OF 3



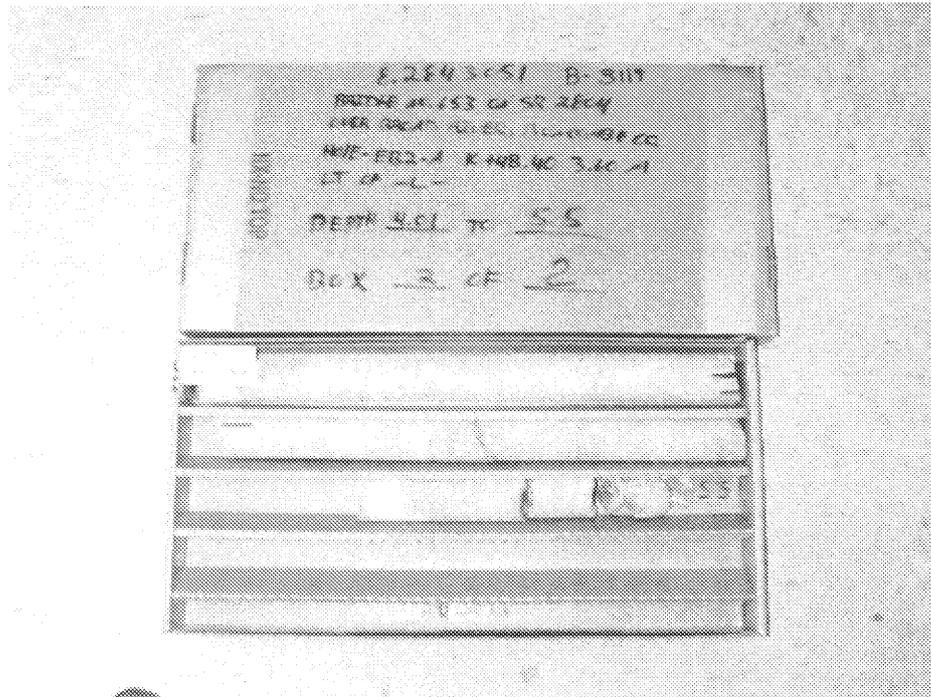
8 2843501 (B-3119)
BRIDGE NO.653 ON
SR-2804 OVER
BROAD RIVER
(BUNCOMBE CO.)

B2-A
BOX 3 OF 3

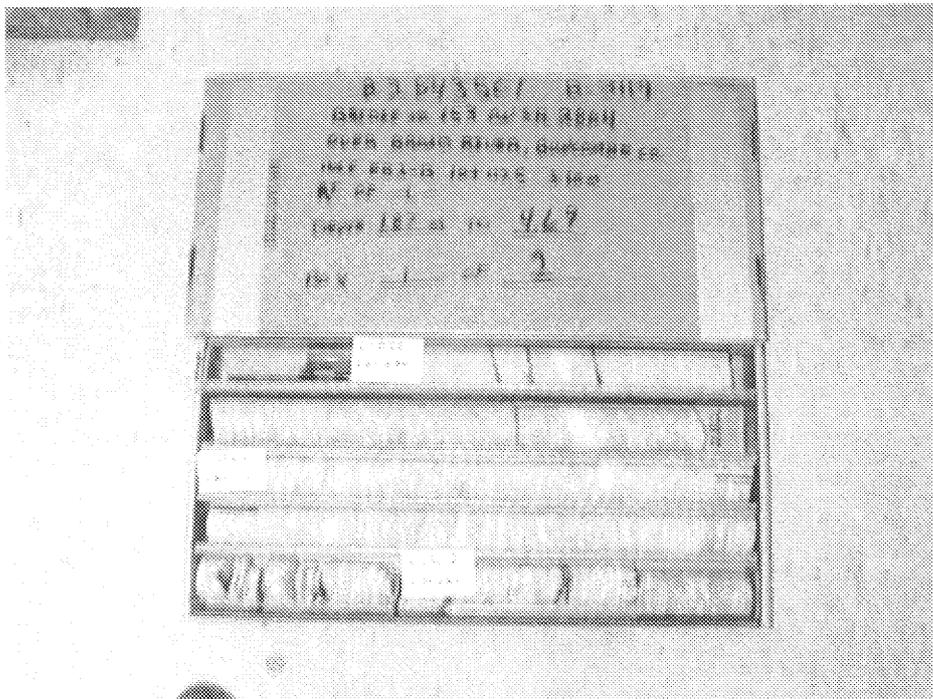


8.2843501 (B-3119)
BRIDGE NO. 653 ON
SR-2804 OVER
BROAD RIVER
(BUNCOMBE CO.)

EB2-A
BOX 1 OF 2

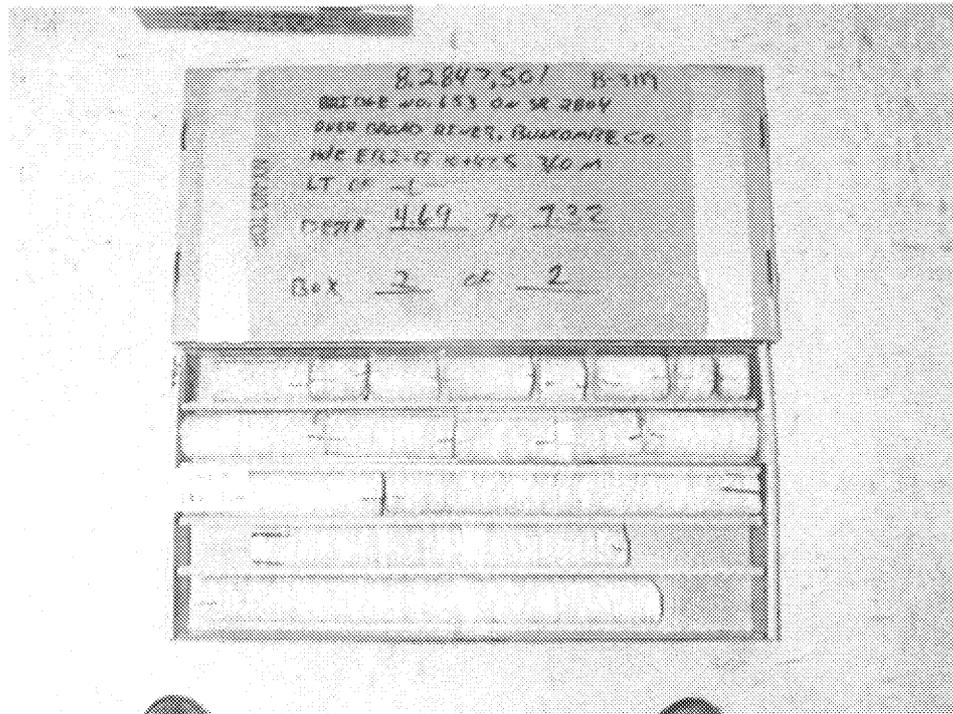


EB2-A
BOX 2 OF 2



8.2843501 (B-3119)
BRIDGE NO. 653 ON
SR-2804 OVER
BROAD RIVER
(BUNCOMBE CO.)

EB2-B
BOX 1 OF 2



EB2-B
BOX 2 OF 2