

NORTH CAROLINA DIVISION OF HIGHWAYS

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			PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTANCE (IN - VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH (QU) (kN / m ²)
GROUP CLASS.	A-1	A-3	A-2	A-4	A-5	A-6	A-7	A-1-A-2	A-4-A-5	A-7-A-8	VERY LOOSE	VERY SOFT	
SYMBOL											LOOSE	SOFT	
% PASSING	50 MX	32 MX 50 MN 51 MN	10 MX 35 MX 35 MN 35 MN 36 MN 36 MN 36 MN	10 MX 10 MN 11 MN 10 MN 10 MN 11 MN 11 MN	8 MX	12 MX 16 MX 10 MN					MEDIUM DENSE	MEDIUM STIFF	
PASSING #40											DENSE	STIFF	
PI	6 MX										VERY DENSE	HARD	
GROUP INDEX	0	0	0	0	0	0	0	0	0	0			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL & SAND	FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND	CLAYEY SANDS	SILTY SOILS	CLAYEY SOILS	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT			
* PI OF A-7-5 < (LL-30); PI OF A-7-6 > (LL-30)													
TEXTURE OR GRAIN SIZE													
BOULDER	COBBLE	GRAVEL	COARSE SAND	MED. SAND	FINE SAND	SILT	CLAY						
GRAIN (mm)	305	75	2	0.6	0.425	0.2	0.075	0.005					
SIZE (IN)	12	3											
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)			MATERIAL THAT CANNOT BE PENETRATED BY POWER AUGERS, EXCEPT IN THIN LEDGES, AND REQUIRES ROCK CORING TOOLS FOR OBTAINING A SAMPLE										
WEATHERED ROCK (WR)			MATERIAL THAT CAN BE PENETRATED WITH GREAT DIFFICULTY USING POWER AUGERS AND YIELDS SPT REFUSAL										
			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:													
CORE RECOVERY (REC.) - TOTAL LENGTH OF ROCK RECOVERED IN THE CORE BARREL DIVIDED BY THE TOTAL LENGTH OF THE CORE RUN TIMES 100%. ROCK QUALITY DESIGNATION (ROD) - TOTAL LENGTH OF SOUND ROCK SEGMENTS RECOVERED THAT ARE LONGER THAN OR EQUAL TO 10 cm DIVIDED BY THE TOTAL LENGTH OF THE CORE RUN TIMES 100%.													
GROUND WATER													
WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING (I.A.D.) SOON AFTER DRILLING (S.A.D.) STATIC WATER LEVEL (AFTER 24 HRS.) PERCHED WATER (PW), SATURATED ZONE, OR WATER BEARING STRATA SPRING OR SEEPAGE													
MISCELLANEOUS SYMBOLS AND ABBREVIATIONS													
ROADWAY EMBANKMENT WITH SOIL DESCRIPTION				SPT TEST BORING				SAMPLE DESIGNATIONS					
SOIL SYMBOL				AUGER BORING				S-BULK SAMPLE					
ARTIFICIAL FILL OTHER THAN ROADWAY EMBANKMENTS				CORE BORING				SS-SPLIT SPOON SAMPLE					
INFERRED SOIL BOUNDARIES				PIEZOMETER INSTALLATION				ST-SHELBY TUBE SAMPLE					
STRIKE AND DIP				SLOPE INDICATOR INSTALLATION									
APPARENT DIP (NORMAL TO)				SPT N-VALUE									
ROD SOUNDING				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	REF.	REFER TO										
COB.	COBBLE	RES.	RESIDUAL										
CSE.	COARSE	S.	SOFT										
DPT	DYNAMIC PENETRATION TEST	SAT.	SATURATED										
EST.	ESTIMATED	SD.	SAND										
F.	FINE	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: MON. 'CUM 64' 5.0 m RT. OF -L- STA. 26+01 ELEV. = 26.484													
STATE PROJECT NO. 6.43900IT													
T.I.P. NO. R-2562AA (Also used for R-2562AC) F.A. NO.													
COUNTY CUMBERLAND ROUTE NC 87													
SITE DESCRIPTION BRIDGE NO. 21 ON NC 87 OVER ROCKFISH CREEK													
PROJECT GEOLOGIST DNA SUBMITTED BY RRW													
PERSONNEL JWH LWD HMT DATE SUBMITTED 8/97													

CAUTION NOTICE

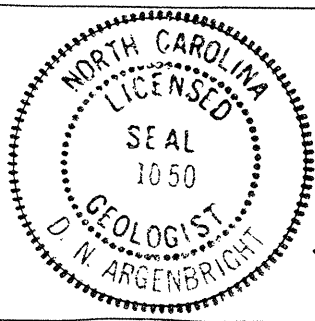
THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WAS MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING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

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

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

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

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



SEAL

Signature: *Dean N. Argenbriecht*
 Signature

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 6.43900IT	ID. R-2562AA	COUNTY CUMBERLAND	GEOLOGIST J. W. HOLLOMAN
SITE DESCRIPTION BRIDGE NO. 21 ON NC 87 (-L-REV.) OVER ROCKFISH CREEK			GROUND WATER
BORING NO. EBI-A (NBL)	BORING LOCATION 24+95.5	OFFSET 12.6 m LT.	ALIGNMENT -L-REV.
COLLAR ELEV. 23.87 m	NORTHING 0.00	EASTING 0.00	0 HR. N.M.
TOTAL DEPTH 20.26 m	DRILL MACHINE CME-45B	DRILL METHOD ROTARY W/MUD	HAMMER TYPE AUTOMATIC
START DATE 2/20/97	COMPLETION DATE 2/20/97	SURFACE WATER DEPTH	

ELEV.	DEPTH	BLOW COUNT			PEN. (m)	BLOWS PER 30cm				SAMPLE NUMBER	LOG	SOIL AND ROCK DESCRIPTION
		15cm	15cm	15cm		0	25	50	75			
3.00												BORING TERMINATED AT ELEV. 3.61m IN VERY DENSE SAND
1.00												
-1.00												
-3.00												
-5.00												
-7.00												
-9.00												
-11.00												
-13.00												
-15.00												
-17.00												

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 6.43900IT	ID. R-2562AA	COUNTY CUMBERLAND	GEOLOGIST J. W. HOLLOMAN
SITE DESCRIPTION BRIDGE NO. 21 ON NC 87 (-L-REV.) OVER ROCKFISH CREEK			GROUND WATER
BORING NO. BI-A (NBL)	BORING LOCATION 25+07	OFFSET 12.6 m LT.	ALIGNMENT -L-REV.
COLLAR ELEV. 19.50 m	NORTHING 0.00	EASTING 0.00	0 HR. N.M.
TOTAL DEPTH 17.43 m	DRILL MACHINE CME-45B	DRILL METHOD ROTARY W/MUD	HAMMER TYPE AUTOMATIC
START DATE 2/25/97	COMPLETION DATE 2/25/97	SURFACE WATER DEPTH	

ELEV.	DEPTH	BLOW COUNT			PEN. (m)	BLOWS PER 30cm				SAMPLE NUMBER	LOG	SOIL AND ROCK DESCRIPTION
		15cm	15cm	15cm		0	25	50	75			
19.50	0.00	1	1	1	0.3					SS-10	TAN SLIGHTLY CLAYEY FINE SANDY SILT, DRY (FILL)	
18.00	1.74	10	20	27	0.3					SS-11		
16.00	3.26	13	16	18	0.3					SS-12	GRAY SILTY SANDY CLAY, WET	
14.00	4.79	10	16	19	0.3					SS-13	GRAY MICACEOUS FINE TO COARSE SAND, SAT.	
12.00	6.31	4	4	13	0.3					SS-14	GRAY FINE TO COARSE SAND, SAT.	
10.00	7.83	12	15	19	0.3					SS-15		
8.00	9.36	6	8	9	0.3					SS-16	GRAY RED MOTTLED SILTY SANDY CLAY, WET	
6.00	10.88	14	20	23	0.3							
4.00	12.41	12	17	22	0.3							
2.00	13.93	12	13	16	0.3							
0.00	15.45	21	33	38	0.3					SS-17		
	16.98	19	31	37	0.3							
												BORING TERMINATED AT ELEV. 2.07m IN HARD SANDY CLAY

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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

SHEET 1 OF 1

PROJECT NO. 6.43900IT		ID. R-2562AA		COUNTY CUMBERLAND		GEOLOGIST J. W. HOLLOMAN						
SITE DESCRIPTION BRIDGE NO. 21 ON NC 87 (-L-REV.) OVER ROCKFISH CREEK							GROUND WATER					
BORING NO. B3-B (NBL)		BORING LOCATION 25+52.5		OFFSET 8.6 m LT.		ALIGNMENT -L-REV.						
COLLAR ELEV. 11.13 m		NORTHING 0.00		EASTING 0.00		0 HR. N.M.						
TOTAL DEPTH 17.49 m		DRILL MACHINE CME-45B		DRILL METHOD ROTARY W/MUD		HAMMER TYPE AUTOMATIC						
START DATE 3/25/97		COMPLETION DATE 3/25/97		SURFACE WATER DEPTH 0.70 m								
ELEV.	DEPTH	BLOW COUNT			PEN. (m)	BLOWS PER 30cm				SAMPLE NUMBER	LOG	SOIL AND ROCK DESCRIPTION
		15cm	15cm	15cm		0	25	50	75			
11.13												
10.00	1.15	WOR	WOR	WOR	0.3	X 0						GRAY SILTY SANDY CLAY, WET
	2.07	3	3	10	0.3	X 13						
8.00	3.32	3	WOH	WOH	0.3	X 0						GRAY MICACEOUS FINE TO COARSE SAND WITH WOOD, SAT.
	4.85	2	6	11	0.3	X 17				SS-66		
6.00	6.37	15	20	30	0.3	X 50				SS-67		GRAY BROWN MOTTLED SLI. CLAYEY SANDY SILT, WET
	7.89	10	11	18	0.3	X 29				SS-68		GRAY FINE TO COARSE SAND, SAT.
4.00	9.42	11	19	24	0.3	X 43				SS-69		GRAY SANDY SILTY CLAY, WET
2.00	10.94	23	56	44	0.24	100+	X			SS-70		TAN BROWN FINE SANDY SILT, WET
	12.47	12	15	19	0.3	X 34						
-2.00	13.99	13	19	19	0.3	X 38				SS-71		GRAY GREEN MICACEOUS FINE TO COARSE SAND, SAT.
-4.00	15.51	34	64	36	0.21	100+	X			SS-72		GRAY RED MOTTLED SILTY SANDY CLAY, WET
-6.00	17.04	18	27	46	0.3	X 73						
						BORING TERMINATED AT ELEV. -6.36 m IN HARD SANDY CLAY						
-8.00												

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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

SHEET 1 OF 2

PROJECT NO. 6.43900IT		ID. R-2562AA		COUNTY CUMBERLAND		GEOLOGIST J. W. HOLLOMAN						
SITE DESCRIPTION BRIDGE NO. 21 ON NC 87 (-L-REV.) OVER ROCKFISH CREEK							GROUND WATER					
BORING NO. B4-A (NBL)		BORING LOCATION 25+78		OFFSET 12.6 m LT.		ALIGNMENT -L-REV.						
COLLAR ELEV. 18.36 m		NORTHING 0.00		EASTING 0.00		0 HR. N.M.						
TOTAL DEPTH 19.30 m		DRILL MACHINE CME-45B		DRILL METHOD ROTARY W/MUD		HAMMER TYPE AUTOMATIC						
START DATE 3/11/97		COMPLETION DATE 3/12/97		SURFACE WATER DEPTH								
ELEV.	DEPTH	BLOW COUNT			PEN. (m)	BLOWS PER 30cm				SAMPLE NUMBER	LOG	SOIL AND ROCK DESCRIPTION
		15cm	15cm	15cm		0	25	50	75			
18.36	0.00	WOR	WOR	WOR	2	X 2						
18.00												
	1.28	2	1	1	0.3	X 2				SS-36		TAN GRAY SILTY SANDY CLAY, WET
16.00	2.78	4	6	6	0.3	X 12						
	3.62	7	8	12	0.3	X 20				SS-37		TAN GRAY CLAYEY SAND, SAT.
14.00	5.15	7	8	9	0.3	X 17						
12.00	6.68	8	17	22	0.3	X 39				SS-38		RED GRAY MOTTLED MICACEOUS SANDY SILTY CLAY, WET
10.00	8.20	11	18	25	0.3	X 43						
	9.72	12	24	31	0.3	X 55				SS-39		
8.00	11.24	17	28	38	0.3	X 66						
6.00	12.76	11	15	24	0.3	X 39				SS-40		GRAY SLIGHTLY CLAYEY FINE TO COARSE SAND, SAT.
4.00	14.28	19	24	33	0.3	X 57				SS-41		RED GRAY MOTTLED MICACEOUS SLIGHTLY CLAYEY SANDY SILT, WET
2.00	15.81	10	12	20	0.3	X 32						
	17.33	14	24	44	0.3	X 68				SS-42		RED GRAY MOTTLED MICACEOUS FINE SILTY SANDY CLAY, WET
0.00	18.85	14	18	20	0.3	X 38				SS-43		GRAY COARSE SAND, SAT.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

SHEET 2 OF 2

PROJECT NO. 6.43900IT	ID. R-2562AA	COUNTY CUMBERLAND	GEOLOGIST J. W. HOLLOMAN
SITE DESCRIPTION BRIDGE NO. 21 ON NC 87 (-L-REV.) OVER ROCKFISH CREEK			GROUND WATER
BORING NO. B4-A (NBL)	BORING LOCATION 25+78	OFFSET 12.6 m LT.	ALIGNMENT -L-REV.
COLLAR ELEV. 18.36 m	NORTHING 0.00	EASTING 0.00	0 HR. N.M. 24 HR. 3.10 m
TOTAL DEPTH 19.30 m	DRILL MACHINE CME-45B	DRILL METHOD ROTARY W/MUD	HAMMER TYPE AUTOMATIC
START DATE 3/11/97	COMPLETION DATE 3/12/97	SURFACE WATER DEPTH	

ELEV.	DEPTH	BLOW COUNT			PEN. (m)	BLOWS PER 30cm				SAMPLE NUMBER	LOG MOI.	LOG	SOIL AND ROCK DESCRIPTION
		15cm	15cm	15cm		0	25	50	75				
													BORING TERMINATED AT ELEV. = 0.94 m IN DENSE SAND.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

SHEET 1 OF 1

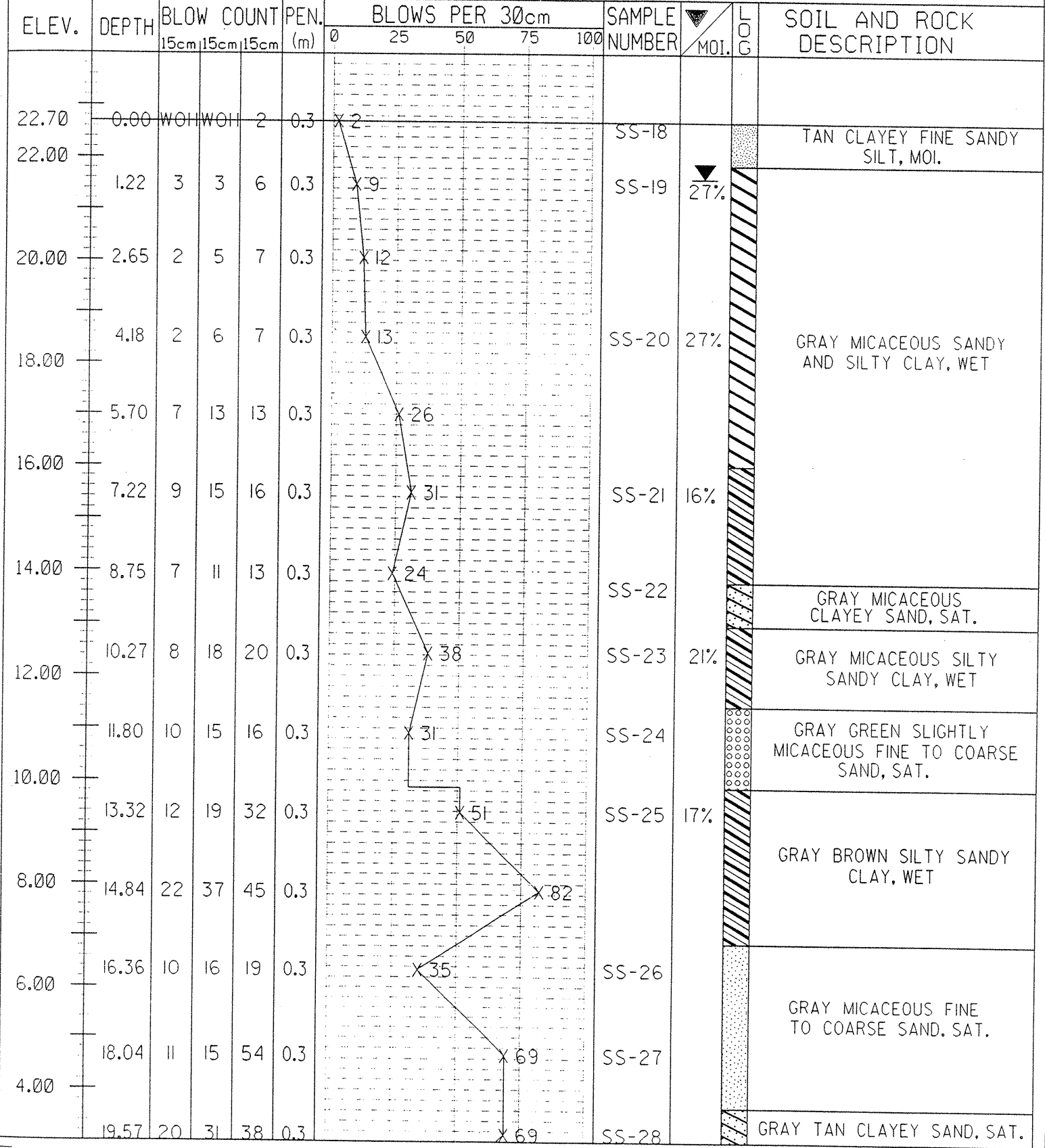
PROJECT NO. 6.43900IT	ID. R-2562AA	COUNTY CUMBERLAND	GEOLOGIST J. W. HOLLOMAN
SITE DESCRIPTION BRIDGE NO. 21 ON NC 87 (-L-REV.) OVER ROCKFISH CREEK			GROUND WATER
BORING NO. EB2-A (NBL)	BORING LOCATION 25+97.5	OFFSET 12.6 m LT.	ALIGNMENT -L-REV.
COLLAR ELEV. 26.57 m	NORTHING 0.00	EASTING 0.00	0 HR. N.M. 24 HR. 2.20 m
TOTAL DEPTH 18.34 m	DRILL MACHINE CME-45B	DRILL METHOD ROTARY W/MUD	HAMMER TYPE AUTOMATIC
START DATE 3/19/97	COMPLETION DATE 3/20/97	SURFACE WATER DEPTH	

ELEV.	DEPTH	BLOW COUNT			PEN. (m)	BLOWS PER 30cm				SAMPLE NUMBER	LOG MOI.	LOG	SOIL AND ROCK DESCRIPTION
		15cm	15cm	15cm		0	25	50	75				
26.57													
26.00	0.45	6	10	8	0.3					X 18			
	1.22	4	2	1	0.3					X 3			
24.00	2.65	4	7	9	0.3					X 16			TAN GRAY FINE TO COARSE SAND, MOI. TO SAT. (FILL)
22.00	4.18	6	7	7	0.3					X 14			TAN FINE TO COARSE SAND, SAT.
	5.70	4	4	6	0.3					X 10		26%	
20.00	7.22	5	6	9	0.3					X 15			GRAY SANDY AND SILTY CLAY, WET
18.00	8.75	9	17	30	0.3					X 17		23%	
16.00	10.27	7	11	16	0.3					X 27		19%	
14.00	11.80	11	17	19	0.3					X 36			GRAY GREEN MICACEOUS FINE TO COARSE SAND, SAT.
	13.32	7	9	12	0.3					X 21			
12.00	14.84	17	26	34	0.3					X 60		17%	
10.00	16.37	29	50	50	0.23					X 60+			GRAY SILTY SANDY CLAY, WET
	17.89	25	39	38	0.3					X 77			GRAY SLIGHTLY CLAYEY FINE TO COARSE SAND, SAT.
8.00													BORING TERMINATED AT ELEV. 8.23 m IN VERY DENSE SAND.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

SHEET 1 OF 2

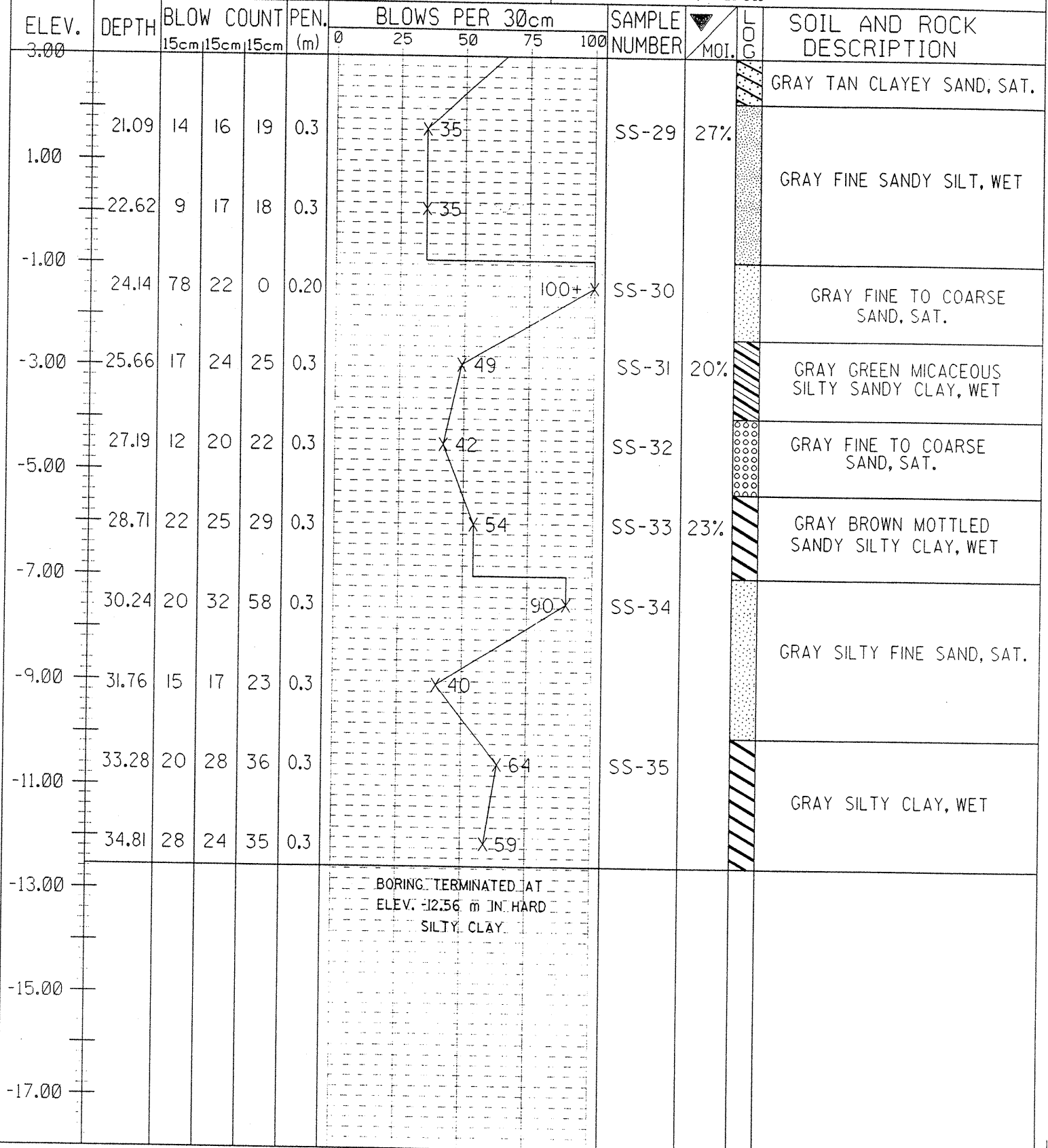
PROJECT NO. 6.43900IT	ID. R-2562AA	COUNTY CUMBERLAND	GEOLOGIST J. W. HOLLOMAN
SITE DESCRIPTION BRIDGE NO. 21 ON NC 87 (-L-REV.) OVER ROCKFISH CREEK			GROUND WATER
BORING NO. EB2-B (SBL)	BORING LOCATION 25+69.5	OFFSET 23.0 m RT.	ALIGNMENT -L-REV.
COLLAR ELEV. 22.70 m	NORTHING 0.00	EASTING 0.00	0 HR. N.M. 24 HR. 1.10 m
TOTAL DEPTH 35.26 m	DRILL MACHINE CME-45B	DRILL METHOD ROTARY W/MUD	HAMMER TYPE AUTOMATIC
START DATE 3/5/97	COMPLETION DATE 3/11/97	SURFACE WATER DEPTH	



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

SHEET 2 OF 2

PROJECT NO. 6.43900IT	ID. R-2562AA	COUNTY CUMBERLAND	GEOLOGIST J. W. HOLLOMAN
SITE DESCRIPTION BRIDGE NO. 21 ON NC 87 (-L-REV.) OVER ROCKFISH CREEK			GROUND WATER
BORING NO. EB2-B (SBL)	BORING LOCATION 25+69.5	OFFSET 23.0 m RT.	ALIGNMENT -L-REV.
COLLAR ELEV. 22.70 m	NORTHING 0.00	EASTING 0.00	0 HR. N.M. 24 HR. 1.10 m
TOTAL DEPTH 35.26 m	DRILL MACHINE CME-45B	DRILL METHOD ROTARY W/MUD	HAMMER TYPE AUTOMATIC
START DATE 3/5/97	COMPLETION DATE 3/11/97	SURFACE WATER DEPTH	



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R-2562AA

HOLE #	SAMPLE #	PASS 2.0mm	PASS 425µm	PASS 75µm	CS SAND	FINE SAND	SI	CL	LL	PI	CLASS	DEPTH	MOIST. ORG.
EB1-A	SS-1	100	94	47	15.6	44.4	17.8	22.2	24	8	A4(1)	0.30-0.45	
(NBL)	SS-2	82	72	47	19.8	28.1	23.8	28.3	34	15	A6(4)	1.52-1.97	
	SS-3	95	84	59	17.2	26.7	29.9	26.3	41	18	A76(8)	3.05-3.50	25.4
	SS-4	100	90	50	19.0	39.8	33.1	8.1	31	8	A4(2)	4.57-5.02	20.2
	SS-5	100	81	27	39.6	38.0	20.4	2.0	34	NP	A24(0)	7.62-8.07	
	SS-6	97	56	26	54.5	22.6	18.8	4.0	38	14	A26(0)	9.14-9.59	
	SS-7	95	66	19	50.3	33.5	14.1	2.0	30	3	A24(0)	12.19-12.64	
	SS-8	100	88	60	19.8	27.5	38.6	14.1	37	15	A6(7)	15.24-15.69	23.3
	SS-9	95	56	14	64.6	23.0	10.3	2.0	36	10	A24(0)	18.29-18.74	
B1-A	SS-10	93	85	44	17.4	42.6	21.8	18.2	21	5	A4(0)	0.30-0.45	
(NBL)	SS-11	100	88	46	23.8	37.8	32.3	6.1	40	13	A6(3)	1.74-2.19	
	SS-12	100	82	38	31.5	37.2	25.3	6.1	33	13	A6(1)	4.79-5.24	
	SS-13	100	83	9	57.4	35.2	5.5	2.0	23	NP	A3(0)	6.31-6.71	
	SS-14	90	46	12	66.1	23.0	10.9	0.0	33	NP	A1B(0)	7.83-8.28	
	SS-15	98	48	10	71.9	20.2	7.9	0.0	37	NP	A1B(0)	9.36-9.81	
	SS-16	100	75	40	36.8	29.9	27.3	6.1	35	16	A6(2)	10.88-11.33	
	SS-17	100	93	63	13.7	33.7	40.4	12.1	37	12	A6(6)	15.45-15.90	
EB2-B	SS-18	100	95	57	10.7	39.6	23.4	26.3	29	10	A4(3)	0.30-0.45	
(SBL)	SS-19	100	93	79	10.1	14.1	15.2	60.6	68	42	A76(35)	1.22-1.67	26.7
	SS-20	100	96	83	6.9	15.2	57.8	20.2	53	22	A75(21)	4.18-4.63	27.2
	SS-21	100	77	36	44.0	23.8	26.1	6.1	34	14	A6(1)	7.22-7.67	15.6
	SS-22	100	63	24	59.8	17.4	8.7	14.1	33	13	A26(0)	8.90-9.20	
	SS-23	100	79	45	33.3	27.5	33.1	6.1	37	15	A6(3)	10.27-10.72	21.1
	SS-24	96	48	16	65.9	20.6	13.5	0.0	34	NP	A1B(0)	11.80-12.25	
	SS-25	100	83	48	28.7	29.3	33.9	8.1	36	14	A6(4)	13.32-13.77	17.4
	SS-26	100	83	22	47.5	34.3	16.2	2.0	36	NP	A24(0)	16.36-16.81	
	SS-27	97	62	17	58.8	26.5	12.7	2.0	34	NP	A24(0)	18.04-18.49	
	SS-28	97	73	32	45.5	25.5	25.1	4.0	29	12	A26(0)	19.57-20.02	
	SS-29	100	97	44	5.9	62.2	27.9	4.0	36	7	A4(1)	21.09-21.54	27.1
	SS-30	100	77	27	39.4	40.2	18.4	2.0	18	NP	A24(0)	24.14-24.59	
	SS-31	100	89	37	24.6	42.4	24.8	8.1	33	13	A6(1)	25.66-26.11	19.6
	SS-32	96	47	11	69.1	21.2	7.7	2.0	34	NP	A1B(0)	27.19-27.64	
	SS-33	100	97	81	5.9	17.6	52.3	24.2	48	18	A75(16)	28.71-29.16	22.6
	SS-34	100	100	34	1.2	69.7	21.0	8.1	25	5	A24(0)	30.24-30.69	
	SS-35	100	98	94	2.4	5.1	29.9	62.6	66	37	A76(41)	33.28-33.73	
B4-A	SS-36	93	80	63	20.8	14.3	18.4	46.5	48	22	A76(12)	1.28-1.73	
(NBL)	SS-37	100	71	28	57.2	16.2	6.5	20.2	41	18	A27(1)	3.62-4.07	
	SS-38	97	69	38	43.0	22.8	26.1	8.1	33	12	A6(1)	6.68-7.13	
	SS-39	100	74	49	34.3	24.0	33.5	8.1	42	14	A76(4)	9.72-10.17	
	SS-40	100	75	26	42.8	36.8	16.4	4.0	39	9	A24(0)	12.76-13.21	
	SS-41	100	87	41	23.6	42.8	25.5	8.1	35	10	A4(1)	14.28-14.73	
	SS-42	100	92	64	13.7	31.3	42.8	12.1	36	12	A6(6)	17.33-17.78	
	SS-43	100	37	7	78.3	16.9	3.8	1.0	29	NP	A1B(0)	18.85-19.30	
B3-A	SS-44	97	78	53	24.4	24.4	20.8	30.3	39	17	A6(6)	2.07-2.52	
(NBL)	SS-45	96	72	31	45.3	24.6	9.9	20.2	33	13	A26(0)	3.51-3.96	
B2-A	SS-46	100	79	39	35.2	31.7	14.9	18.2	24	7	A4(0)	0.30-0.45	
(NBL)	SS-47	100	77	42	34.9	27.7	25.3	12.1	44	13	A75(2)	1.43-1.88	
	SS-48	94	52	16	64.4	21.5	11.0	3.0	33	1	A24(0)	4.02-4.47	
	SS-49	100	81	38	33.9	34.7	27.3	4.0	39	9	A4(0)	5.55-6.00	
	SS-50	85	55	17	58.6	24.3	12.0	5.1	34	12	A26(0)	7.07-7.52	

A-17
R-2562AA

HOLE #	SAMPLE #	PASS 2.0mm	PASS 425µm	PASS 75µm	CS SAND	FINE SAND	SI	CL	LL	PI	CLASS	DEPTH	MOIST. ORG.
B2-A	SS-51	100	89	52	18.8	38.4	34.7	8.1	30	10	A4(3)	8.59-9.04	
(NBL)	SS-52	100	86	23	30.5	53.1	12.3	4.0	21	NP	A24(0)	10.12-10.57	
	SS-53	100	65	17	60.8	25.7	11.5	2.0	23	NP	A24(0)	11.64-12.09	
	SS-54	93	68	39	38.6	22.8	24.4	14.1	37	14	A6(2)	14.69-14.96	
	SS-55	98	75	23	41.8	37.6	12.5	8.1	31	9	A24(0)	17.74-18.19	
EB2-A	SS-56	77	39	10	71.5	17.0	3.4	8.1	16	NP	A1B(0)	0.45-0.90	
(NBL)	SS-57	88	60	23	50.3	26.1	11.5	12.1	22	4	A24(0)	1.22-1.67	
	SS-58	57	35	6	54.9	36.4	4.6	4.0	15	NP	A1B(0)	4.18-4.63	
	SS-59	100	95	82	7.3	13.7	20.4	58.6	53	27	A76(24)	5.70-6.15	25.6
	SS-60	100	94	72	13.3	19.2	41.2	26.3	39	18	A6(12)	8.75-9.20	23.1
	SS-61	100	94	23	33.7	48.1	16.2	2.0	34	NP	A24(0)	10.27-10.72	18.9
	SS-62	100	65	13	67.7	21.4	8.9	2.0	29	NP	A24(0)	13.32-13.77	
	SS-63	100	79	44	31.9	31.3	28.7	8.1	32	11	A6(2)	14.84-15.29	16.7
	SS-64	89	56	24	54.3	23.2	18.4	4.0	33	10	A24(0)	16.37-16.82	
B3-A	SS-65	92	61	21	59.6	20.6	13.7	6.1	27	NP	A24(0)	5.75-5.80	
(NBL)	SS-66	97	55	15	66.7	20.8	8.5	4.0	37	NP	A24(0)	4.85-5.30	
B3-B	SS-67	99	84	37	30.7	38.4	24.8	6.1	30	10	A4(0)	6.37-6.82	
(NBL)	SS-68	95	56	19	56.8	26.9	12.3	4.0	34	8	A24(0)	7.89-8.34	
	SS-69	100	95	73	8.9	26.5	44.4	20.2	43	17	A76(12)	9.42-9.87	
	SS-70	100	96	50	8.7	53.5	19.6	18.2	19	2	A4(0)	10.94-11.33	
	SS-71	98	79	19	38.6	45.7	11.7	4.0	23	NP	A24(0)	13.99-14.44	
	SS-72	100	94	73	11.9	19.4	32.3	36.4	38	19	A6(12)	15.51-15.87	
EB1-A	SS-73	82	64	24	34.6	38.8	10.4	16.3	30	14	A26(0)	1.09-1.54	30.3
(SBL)	SS-74	97	92	71	8.9	25.4	47.4	18.3	39	13	A6(9)	2.52-2.97	
	SS-75	99	82	41	33.1	31.1	31.7	4.1	42	9	A5(1)	7.10-7.55	20.9
	SS-76	97	59	22	58.1	22.4	16.5	3.0	39	NP	A24(0)	8.62-9.07	
	SS-77	96	67	12	62.8	27.2	8.9	1.0	30	NP	A24(0)	10.15-10.60	
	SS-78	96	70	27	46.0	29.5	20.4	4.1	31	5	A24(0)	11.67-12.12	
	SS-79	100	89	50	22.4	33.7	37.8	6.1	32	9	A4(2)	14.72-15.17	18.3
	SS-80	100	93	62	13.8	31.5	42.5	12.2	38	7	A4(4)	16.25-16.70	
	SS-100	100	97	63	6.5	42.2	41.2	10.1	51	15	A75(10)	19.42-19.87	34.5
	SS-101	100	92	56	15.6	38.4	36.0	10.1	25	7	A4(1)	22.46-22.70	
	SS-102	100	98	64	5.4	36.8	41.8	16.0	13	NP	A4(0)	23.98-24.43	
	SS-103	98	81	41	37.6	23.8	24.4	14.1	40	18	A6(3)	25.51-25.96	
	SS-104	100	95	84	6.7	12.1	40.8	40.4	53	28	A76(25)	28.56-29.01	
	SS-105	100	98	56	5.1	46.7	34.1	14.1	33	10	A4(3)	31.61-32.06	
	SS-106	100	99	54	2.4	54.9	30.5	12.1	32	12	A6(4)	34.66-35.11	

GEOTECHNICAL UNIT FIELD SCOUR REPORT

PROJECT: 6.439001T ID: R-2562AA COUNTY: Cumberland

DESCRIPTION (1): Bridge No. 21 on NC 87 over Rockfish Creek

INFORMATION ON EXISTING BRIDGES Information obtained from [X] field inspection [] microfilm (Reel: [] Position: []) [] other

COUNTY BRIDGE NO. 21 BRIDGE LENGTH 106 m NO. BENTS 6 NO. BENTS IN CHANNEL 2 FLOOD PLAIN 0

FOUNDATION TYPE: unknown

EVIDENCE OF SCOUR (2):

ABUTMENTS OR END BENT SLOPES: 0.15 meter trenches from surface runoff

INTERIOR BENTS: Concrete encountered between existing Bent 4 and creek bank 5.8± meters below ground to fill scour pocket.

CHANNEL BED: None

CHANNEL BANKS: 1) circular arc failure (5 m wide) on bank east of Bent 1; 2) trees leaning into water on north bank of creek

EXISTING SCOUR PROTECTION:

TYPE (3): Concrete endwall and wingwall

EXTENT (4): 2 meters outside edge of bridge

EFFECTIVENESS (5): Appears satisfactory

OBSTRUCTIONS (6) (DAMS, DEBRIS, ETC.): None

DESIGN INFORMATION

CHANNEL BED MATERIAL (7) (SAMPLE RESULTS ATTACHED): sandy clay (SS-4) and sandy silt (SS-46)

CHANNEL BANK MATERIAL (8) (SAMPLE RESULTS ATTACHED): sandy and silty clay (SS-11,12,19,20,21,36,74), fine to coarse sand (SS-13,14,76,77) and clayey sand (SS-37)

FOUNDATION BEARING MATERIAL (9): Medium dense to very dense sand and hard silt and clay

CHANNEL BANK COVER (10): Woods and shrubs

FLOOD PLAIN WIDTH (11): 2 m to 7 m on each side of creek

FLOOD PLAIN COVER (12): Woods and shrubs

DESIGN INFORMATION CONT.

STREAM IS [] DEGRADING [X] AGGRADING [] EQUILIBRIUM (13)

OTHER OBSERVATIONS AND COMMENTS:

CHANNEL MIGRATION TENDENCY (14): North toward End Bent 1 and Bent 1

CRITICAL SCOUR ELEVATIONS (15): Geotechnical analysis agrees with the Hydraulic Unit's estimate of scour potential to a maximum elevation of 6.3± meters.

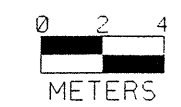
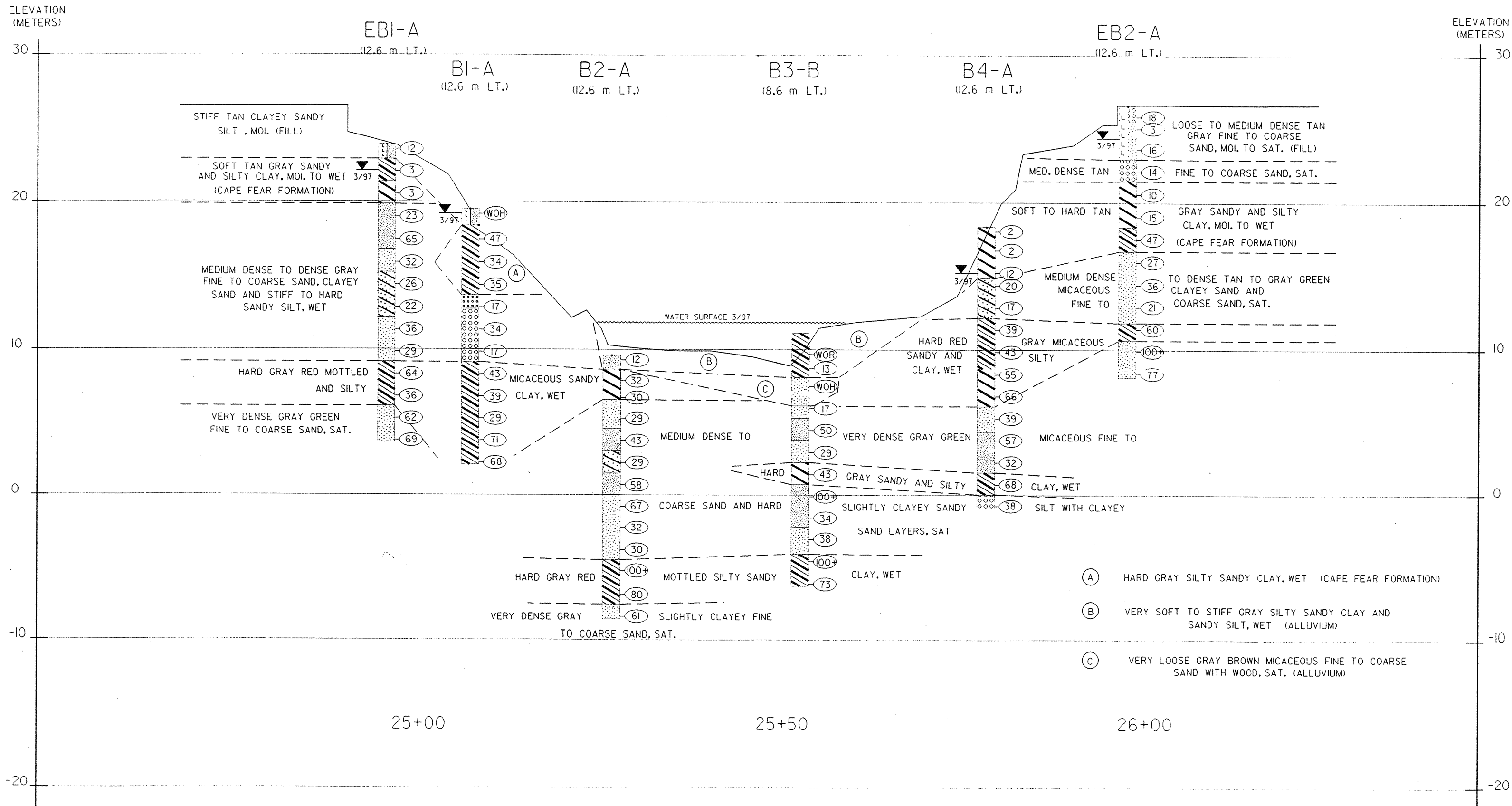
REPORTED BY: [Signature] DATE: 8/28/97

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 (RIPRAP, 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, RIPRAP, 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, AGGRADING, OR EQUILIBRIUM.
(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 ELEVATION IS DEPENDENT ON SCOUR COUNTER MEASURES, EXPLAIN. (RIPRAP ARMORING ON SLOPES, ETC.) THE CRITICAL SCOUR ELEVATION IS BASED ON THE ERODABILITY OF MATERIALS WITH CONSIDERATION FOR JOINTING, FOLIATION, BEDDING ORIENTATION AND FREQUENCY; CORE RECOVERY PERCENTAGE; PERCENT RQD; DIFFERENTIAL WEATHERING; SHEAR STRENGTH; OBSERVATIONS AT EXISTING STRUCTURES; OTHER TESTS DEEMED APPROPRIATE; AND OVERALL GEOLOGIC CONDITIONS AT THE SITE.

PROFILE THROUGH BORINGS: NC 87 NBL (-L-REV.) OVER ROCKFISH CREEK

6.43900IT R-2562AA
 CUMBERLAND CO.
 BRIDGE NO. 21 (A-19)



PROFILE THROUGH BORINGS: NC 87 SBL (-L-REV.) OVER ROCKFISH CREEK

6.43900IT R-2562AA
 CUMBERLAND CO.
 BRIDGE NO. 21 (A-20)

