

PROJECT: 33546.1.1 ID: B-4199

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STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL UNIT

STRUCTURE
SUBSURFACE INVESTIGATION

STATE PROJECT 33546.1.1 I.D. NO. B-4199

F.A. PROJECT BRZ-1782(1)

COUNTY McDOWELL

PROJECT DESCRIPTION Bridge No. 198 over the

Second Broad River on SR 1782

SITE DESCRIPTION

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.

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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.

DRAWN BY: D. Hordister

STATE	STATE PROJECT REFERENCE NO.	YEAR	MOON
N.C.	B-4199	1	29
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
33546.1.1	BRZ-1782(1)	P.E. CONST.	

For Letting

RETURNED FROM LETTING

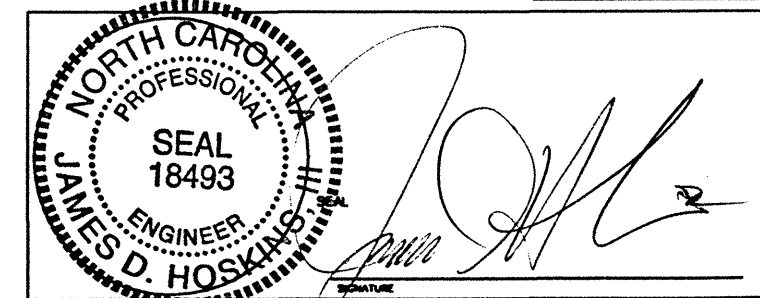
INVESTIGATED BY D. Hordister PERSONNEL D. Horris

CHECKED BY JD Hoskins III R. Burleson

SUBMITTED BY JD Hoskins III R. Kumar

DATE February 25, 2005 S. Tierney

R. Benfield



SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

REvised 09/15/00

WBS ELEMENT (TIP): 33546.1.1 (B-4199)

FEDERAL PROJECT: BRZ-1782(1)

COUNTY: McDowell

DESCRIPTION: Bridge No. 198 over the Second Broad River on SR 1782

SUBJECT: Geotechnical Report of Subsurface Exploration

Project Description:

Geoscience Group, Inc. (Geoscience) has completed the authorized geotechnical investigation for the above referenced project in McDowell County, North Carolina. The bridge will be located in southern McDowell County, south of Marion. More precisely, the bridge will be located northwest of the existing SR 1782 crossing of the Second Broad River. A Site Vicinity Map is included in the following pages. The project will consist of the construction of a three-span, cored slab bridge with an overall length of 110 feet, a width of 43 feet and skew angles ranging between 105° 39' 00" and 124° 21' 00" (tangent to curve). Fill depths of 4 to 7 feet are proposed at end bent-1 and end bent-2, respectively. Grading is not proposed at the interior bents. The 1.5H:1V end bent slopes are to be protected with rip rap.

The purpose of this exploration was to investigate the subsurface conditions at the proposed bridge bent locations. The subsurface exploration was conducted between February 2 and 8, 2005. This exploration consisted of the execution of eight (8) soil test borings. Using the baseline points provided by NCDOT, the actual boring locations were surveyed for elevation and location by Geoscience personnel. Drilled boring locations are shown on the Boring Identification Diagram included in the following pages.

The soil test borings were advanced using a CME 550x drilling machine utilizing hollow-stem auger and rotary drilling techniques. In each boring, Standard Penetration tests were performed in general accordance with NCDOT guidelines. In conjunction with this testing, split-barrel soil samples were recovered for visual classification in the field. The split-barrel soil samples were returned to our laboratory for testing. Water for drilling purposes was obtained from the Second Broad River. Drilling mud slurry was not utilized during the investigation. Core samples of the underlying weathered rock and bedrock were obtained from four (4) of the borings. The core samples were obtained using an HQ wireline barrel. The core samples were returned to our laboratory for review and classification as well as laboratory testing.

Laboratory testing was performed on representative split-barrel samples to aid in the assessment of AASHTO soil classification and to refine data for evaluation of engineering properties. The laboratory testing consisted of natural moisture content determinations, Atterberg Limits tests, and grain size analyses with hydrometer. The soil laboratory tests performed were in general accordance with AASHTO and NCDOT specifications. Rock core specimens were selected for laboratory testing of unconfined

compressive strength. These tests were performed in general accordance with ASTM Method D 2938. The results of the soil laboratory tests and a rock core test summary are included in the following pages. Complete rock core testing results are provided in Appendix C under separate cover.

Physiography and Geology:

The project site is located in the Inner Piedmont Belt of the Piedmont Physiographic Province of North Carolina. According to the 1985 Geologic Map of North Carolina, the site is located in an area consisting of metamorphosed granitic rock of Cambrian to Ordovician in age. Areas containing migmatitic granitic gneiss are present in the vicinity of the subject site. The core samples obtained on-site consist of metamorphosed granitic rock. The overlying soils are the residual product of the physical and chemical weathering of the underlying bedrock. The site is located in a valley between two ridges located north and south of the site.

Foundation Materials:

The foundation materials encountered at the site consist of alluvium, residual soils, weathered rock, and crystalline rock. Subsurface conditions will be described across the site.

With the exception of EB1-A, alluvial soil is present at the ground surface along each bent. The alluvial soil consists of moist to saturated, very loose and loose silty coarse to fine sand (A-3), with gravel present in some areas (A-1-a). Blow counts range between 2 and 7 bpf, with higher influenced blow counts.

Residual soil is present below the alluvium in EB1-B and along bent-1 and end bent-2. Additionally, residual soil is present at the ground surface along the left side of end bent-1. Residual soil is present interlayered with weathered and crystalline rock along bent-1. The residual soil consists of wet medium stiff sandy clayey silt (A-4) in EB1-A and moist to saturated, loose to very dense silty fine and coarse to fine sand elsewhere across the site (A-2-4, A-1-b). Some zones of the silty coarse to fine sand contained rock fragments. Blow counts in the residual soils range between 7 and 88 bpf.

Weathered rock is present below the alluvial soil along bent-2 and is present below the residuum in the remaining borings. The top of weathered rock elevation ranges between 1077 and 1060 feet. The weathered rock generally consists of severely weathered, soft and medium hard metamorphosed granite with very close fracture spacing. Recovery of cored weathered rock ranged between 0 and 64 percent. Boring EB1-A was terminated in weathered rock.

Crystalline rock is present in each boring, with the exception of EB1-A. The elevation of the first encounter with crystalline rock ranges between 1070 and 1050 feet. However, we would consider the crystalline rock line to range between 1053 and 1047 feet at the interior bents. The majority of the crystalline rock consists of moderately and slightly weathered, hard metamorphosed granite with close and very close fracture spacing. Recovery of the crystalline rock ranges between 60 and 100 percent and was variable boring to boring and with depth. The RQD values measured for the crystalline rock range between 0 and 92 percent. The lower values tended to occur higher in the borings with the greatest values corresponding to the depths below the crystalline rock line. Four specimens were tested for unconfined compressive strength. The specimen conditions range between moderately weathered, moderately hard to slightly weathered, hard metamorphosed granite. The unconfined compressive strength of the specimens range between 2,850 and 14,290 psi. With the exception of EB1-A, the borings were terminated in crystalline rock.

Groundwater:

After completion of each boring, temporary piezometers (slotted PVC pipe) were installed in the boreholes. Piezometers were used to measure stabilized groundwater levels at least 24 hours after the completion of drilling. Groundwater elevations range between 1079 and 1075 feet. Groundwater will typically conform to the level of the adjacent river.

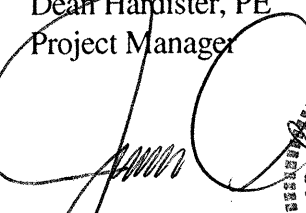
Closure:

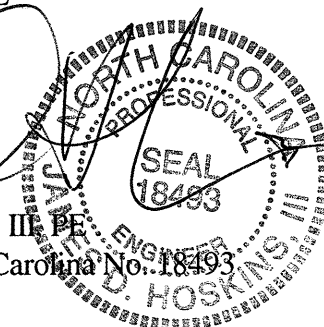
The geotechnical foundation investigation is based on the Preliminary General Drawing dated January 2005. If any significant changes are made in the design or location of the proposed structure, the subsurface information will have to be reviewed and modified as necessary. For soil descriptions and general stratification at a particular boring location, the respective Boring Log should be reviewed. Cross-sections and profiles are a generalized interpretation of soil conditions between borings and should not be considered accurate other than at the boring locations. Subsurface conditions between boring locations or elsewhere on the site may vary, and subsurface anomalies may exist which were not detected.

Geoscience Group, Inc. appreciates the opportunity to be of service to the NCDOT on this project. Should you have any questions concerning this report, please feel free to contact the undersigned.

Respectfully,
GEOSCIENCE GROUP, INC.

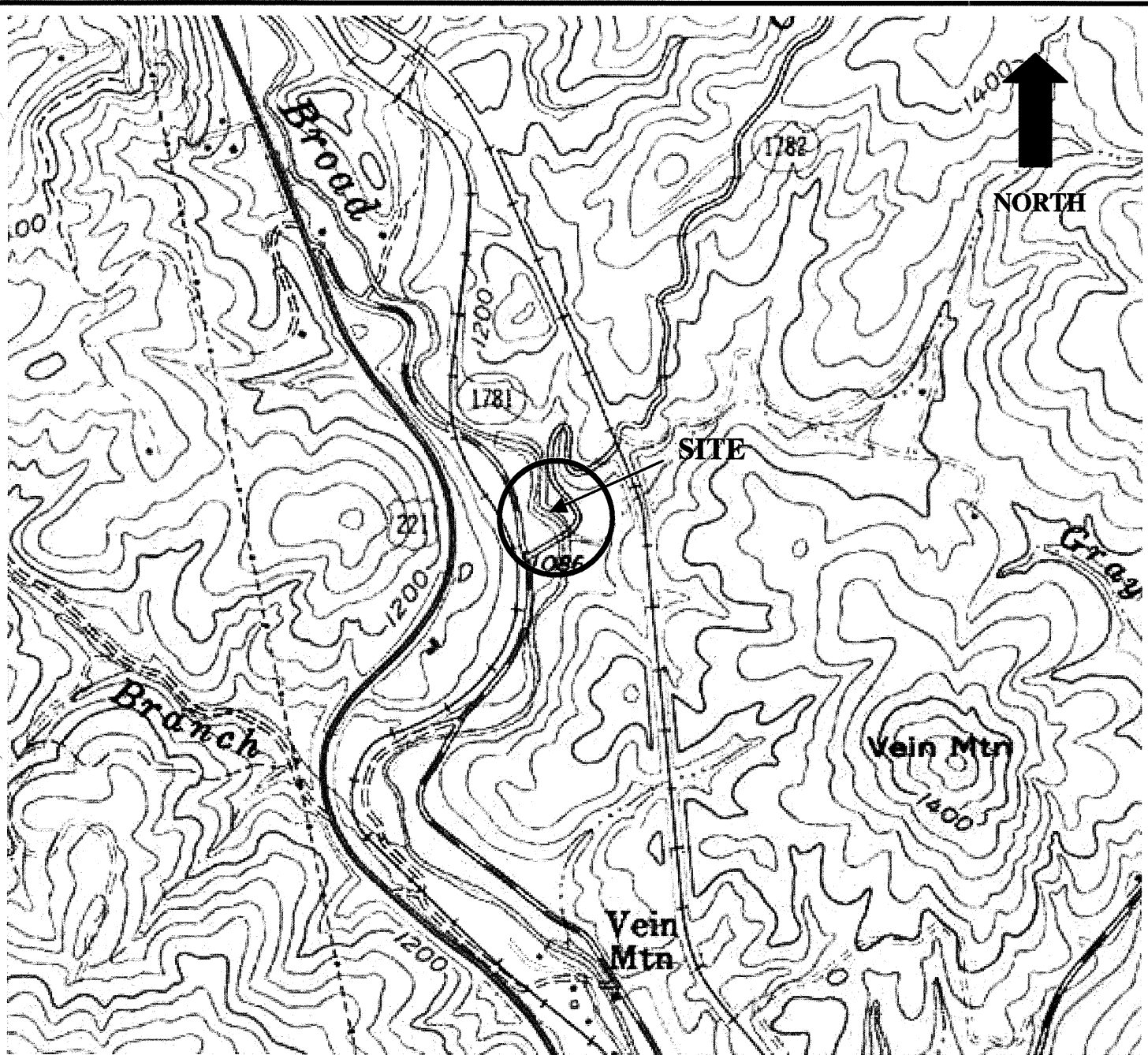

Dean Hardister, PE
Project Manager


James D. Hoskins, III, PE
Registered North Carolina No. 18493




DH:JDH:dh

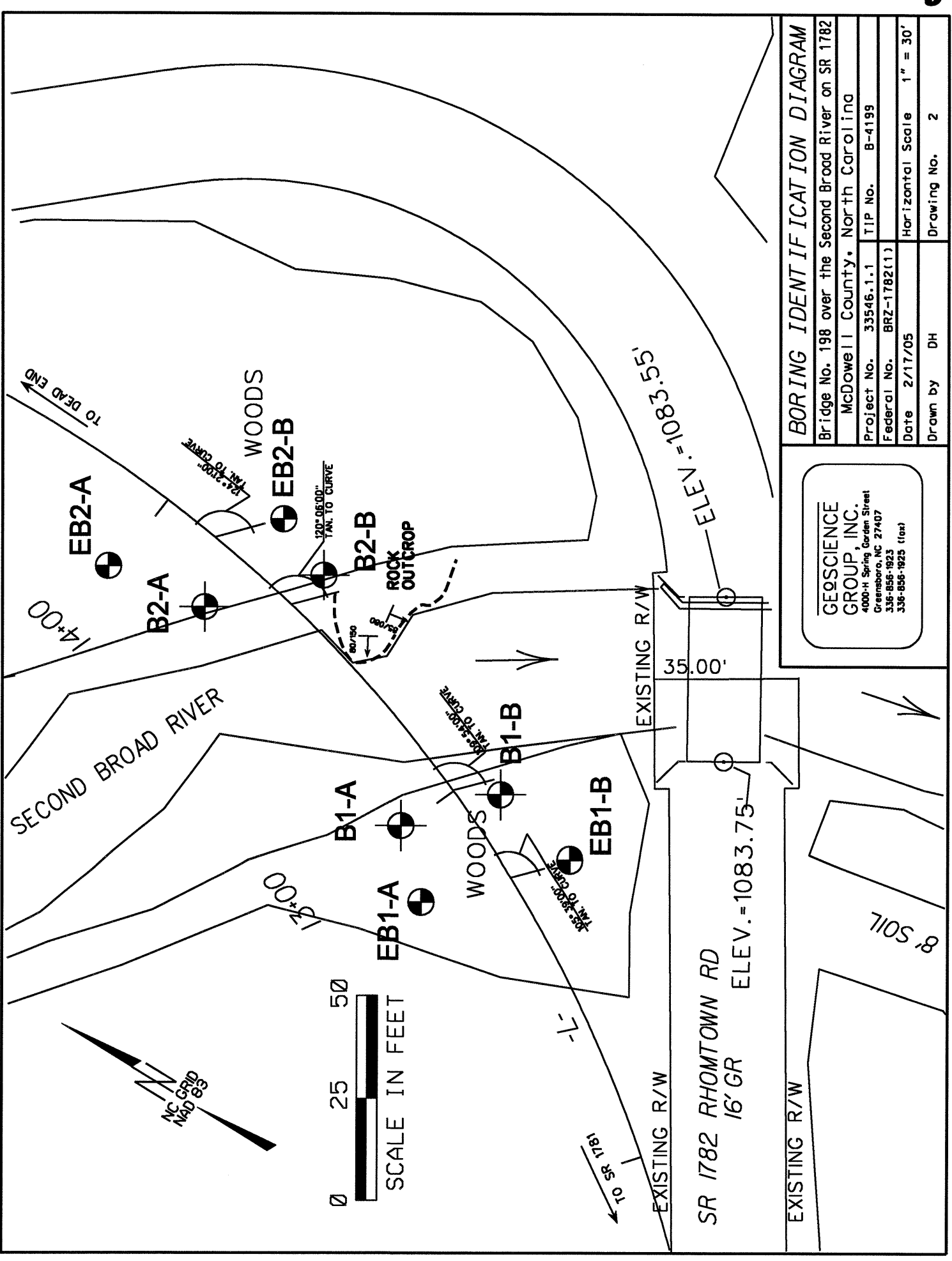
Enclosures



SCALE IN FEET

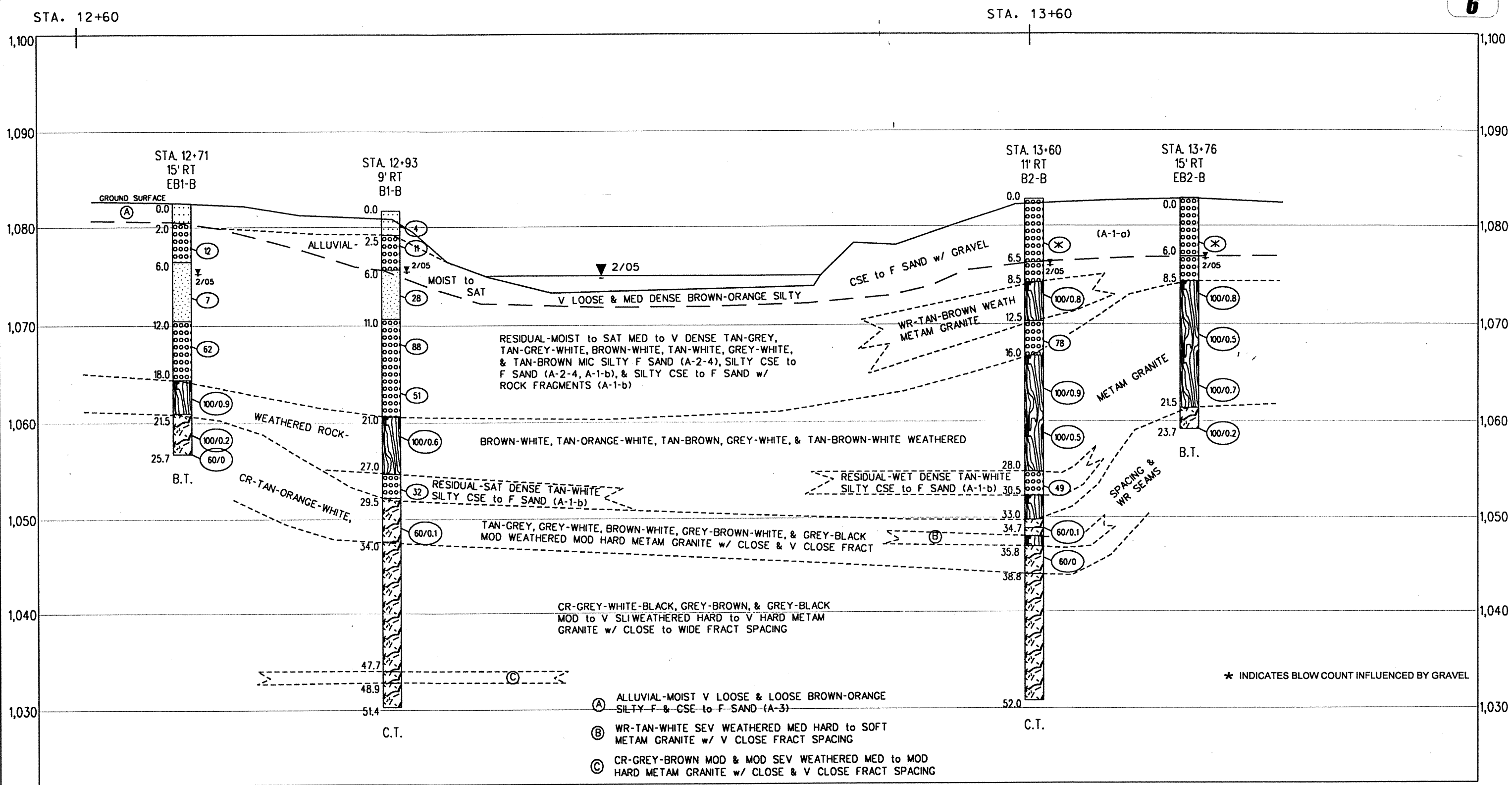


GEOSCIENCE GROUP, INC. GREENSBORO, NORTH CAROLINA		
SCALE: ±1" = 1000'	APPROVED BY: 	DRAWN BY: DH
DATE: 2/22/05		REVISED:
Bridge No. 198 over the Second Broad River on SR 1782 McDowell County, North Carolina		
33546.1.1 (B-4199) SITE VICINITY MAP		DRAWING NUMBER 1



BORING IDENTIFICATION DIAGRAM			
Bridge No. 198 over the Second Broad River on SR 1782			
McDowell County, North Carolina			
Project No.	33546.1.1	TIP No.	B-4199
Federal No.	BRZ-1782(1)		
Date	2/17/05	Horizontal Scale	1" = 30'
Drawn by	DH	Drawing No.	2

GEOSCIENCE GROUP, INC.
4000-H Spring Garden Street
Greensboro, NC 27407
336-856-1923
336-856-1925 (fax)



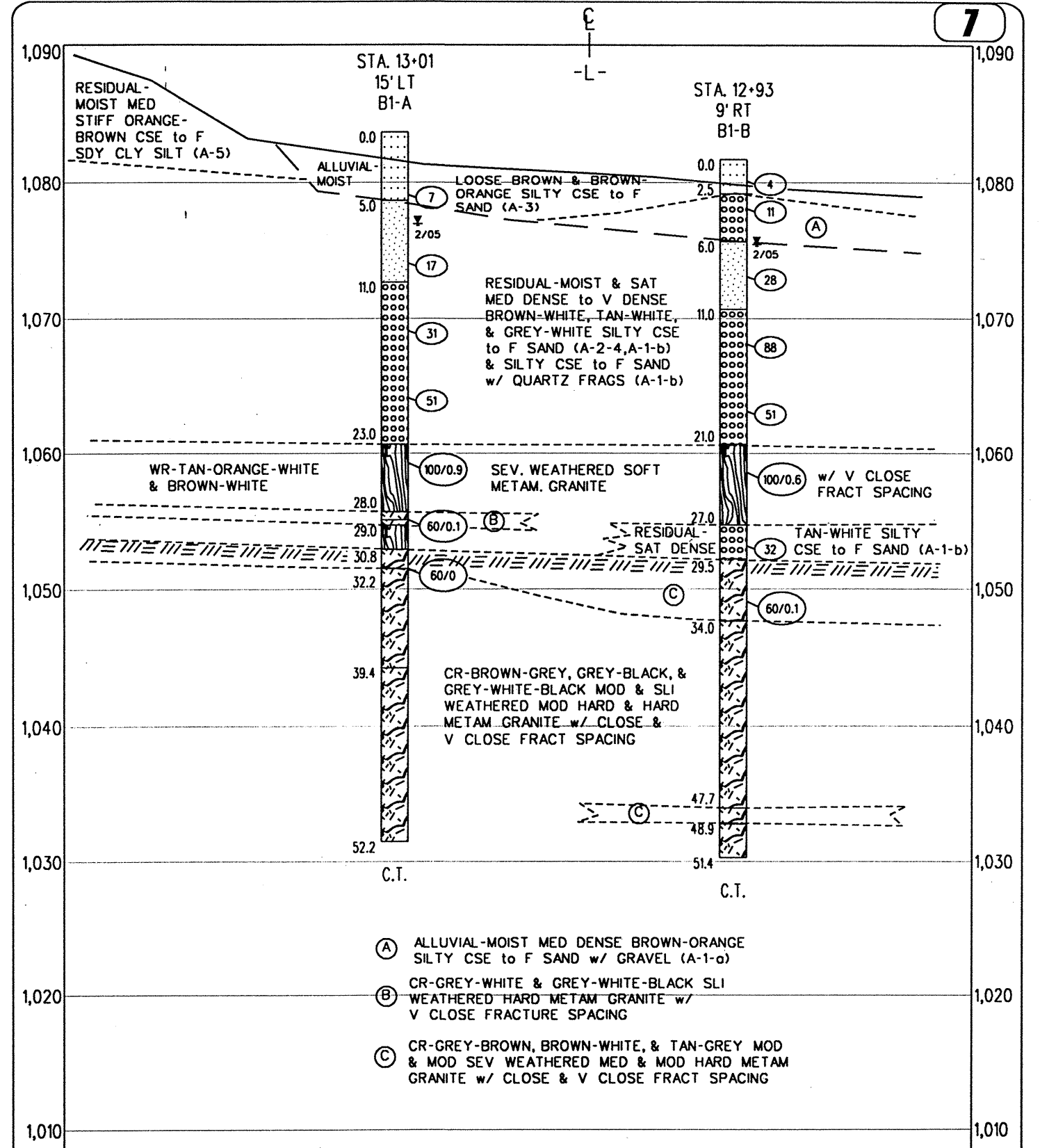
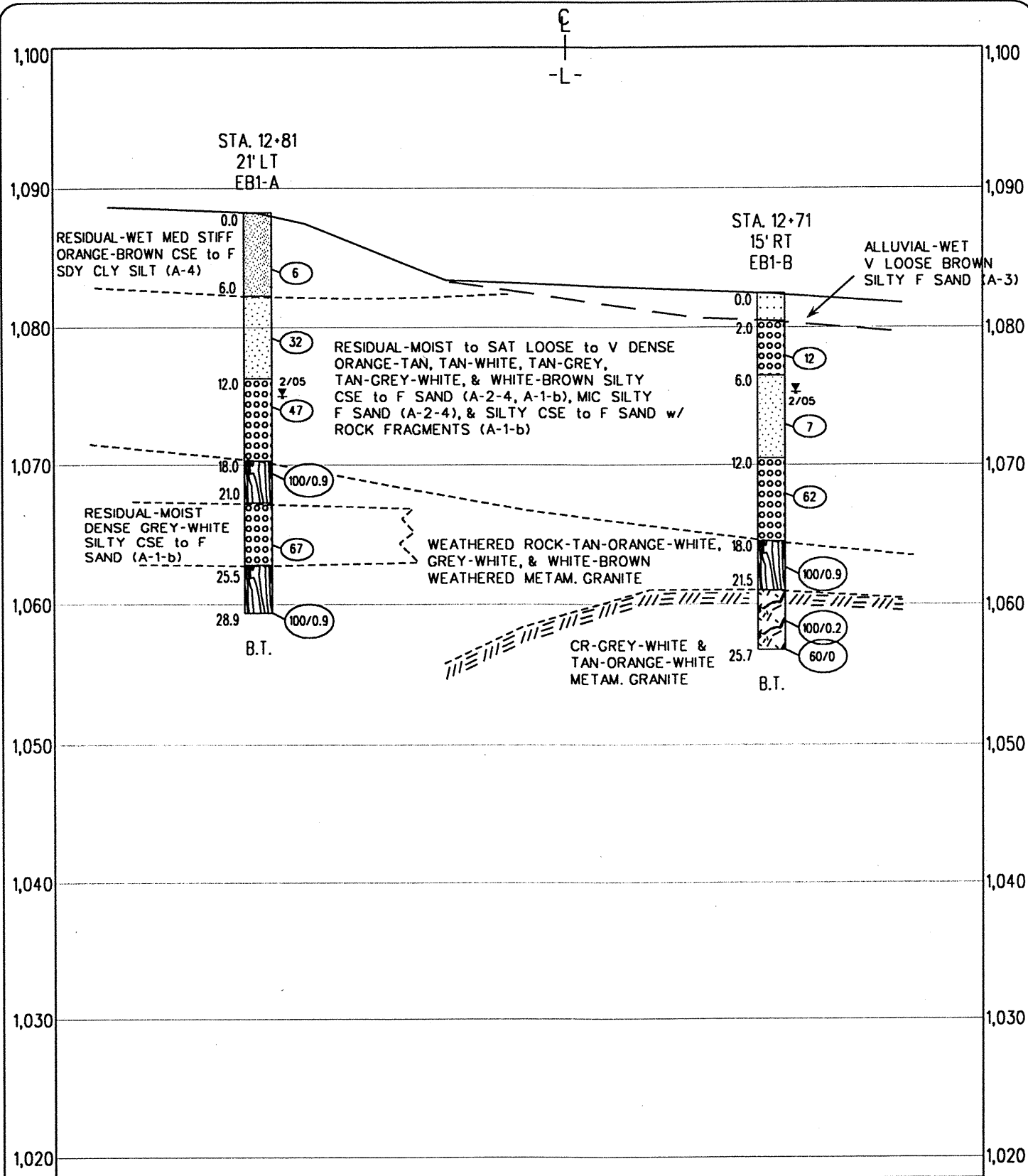
GEOSCIENCE GROUP, INC.
 4000-H Spring Garden Street
 Greensboro, NC 27407
 336-856-1923
 336-856-1925 (fax)

SUBSURFACE PROFILE 15ft RIGHT of -L-

Bridge No. 198 over the Second Broad River on SR 1782

McDowell County, North Carolina

Project No. 33546.1.1	TIP No. B-4199
Federal No. BRZ-1782(1)	Vert. Scale 1" = 10'
Date 2/21/05	Horiz. Scale 1" = 10'
Drawn by DH	Drawing No. 3



- (A) ALLUVIAL-MOIST MED DENSE BROWN-ORANGE SILTY CSE to F SAND w/ GRAVEL (A-1-a)
- (B) CR-GREY-WHITE & GREY-WHITE-BLACK SLI WEATHERED HARD METAM. GRANITE w/ V CLOSE FRACTURE SPACING
- (C) CR-GREY-BROWN, BROWN-WHITE, & TAN-GREY MOD & MOD SEV WEATHERED MED & MOD HARD METAM. GRANITE w/ CLOSE & V CLOSE FRACT SPACING

0 5 10
HORIZ. & VERT.
SCALE IN FEET

**GEOSCIENCE
GROUP, INC.**
4000-H Spring Garden Street
Greensboro, NC 27407
336-856-1923
336-856-1925 (fax)

CROSS-SECTION THROUGH END BENT-1

Bridge No. 198 over the Second Broad River on SR 1782

McDowell County, North Carolina

Project No. 33546.1.1

TIP No. B-4199

Federal No. BRZ-1782(1)

Vert. Scale 1" = 10'

Date 2/21/05

Horiz. Scale 1" = 10'

Drawn by DH

Drawing No. 4

0 5 10
HORIZ. & VERT.
SCALE IN FEET

**GEOSCIENCE
GROUP, INC.**
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Greensboro, NC 27407
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336-856-1925 (fax)

CROSS-SECTION THROUGH BENT-1

Bridge No. 198 over the Second Broad River on SR 1782

McDowell County, North Carolina

Project No. 33546.1.1

TIP No. B-4199

Federal No. BRZ-1782(1)

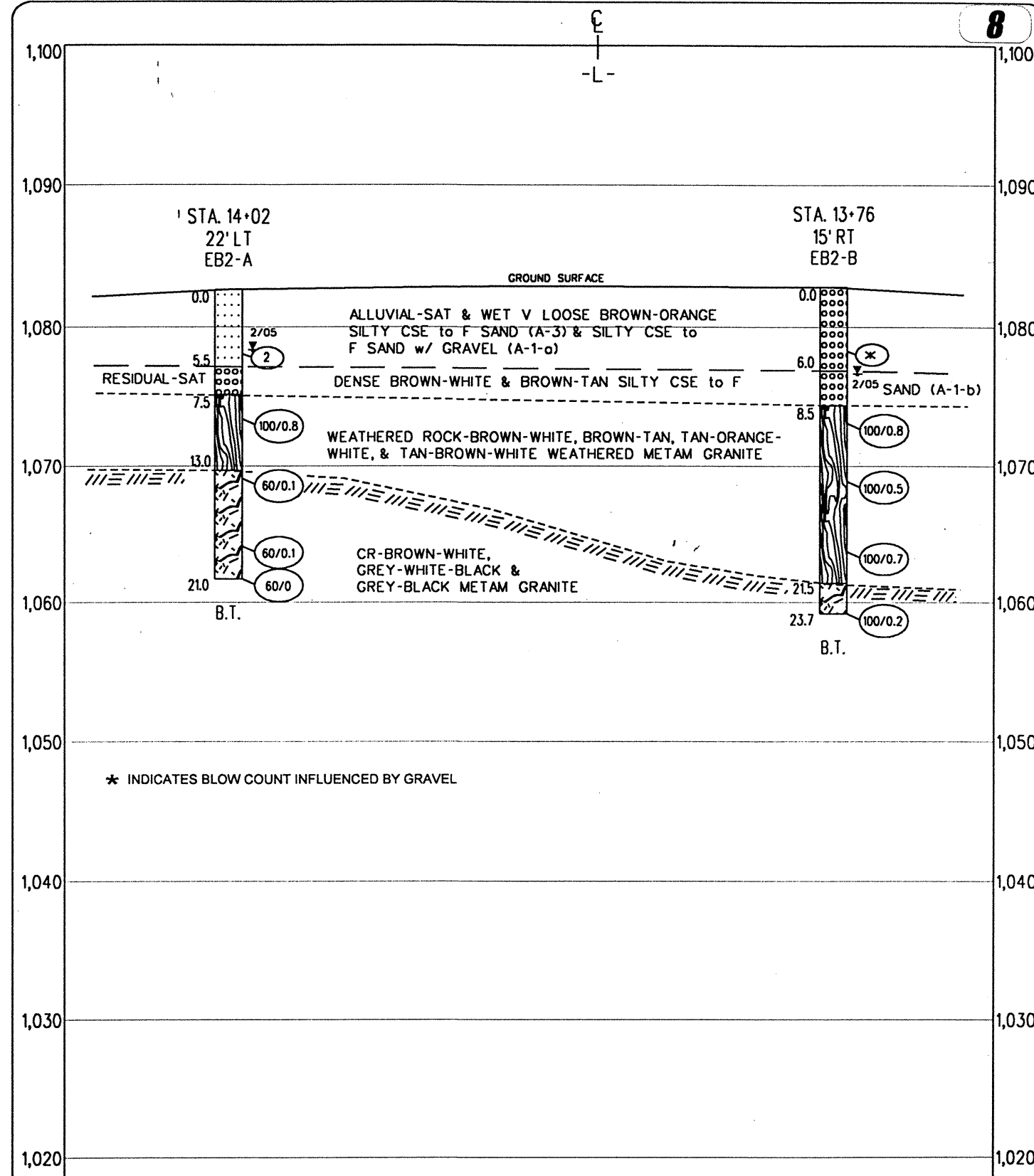
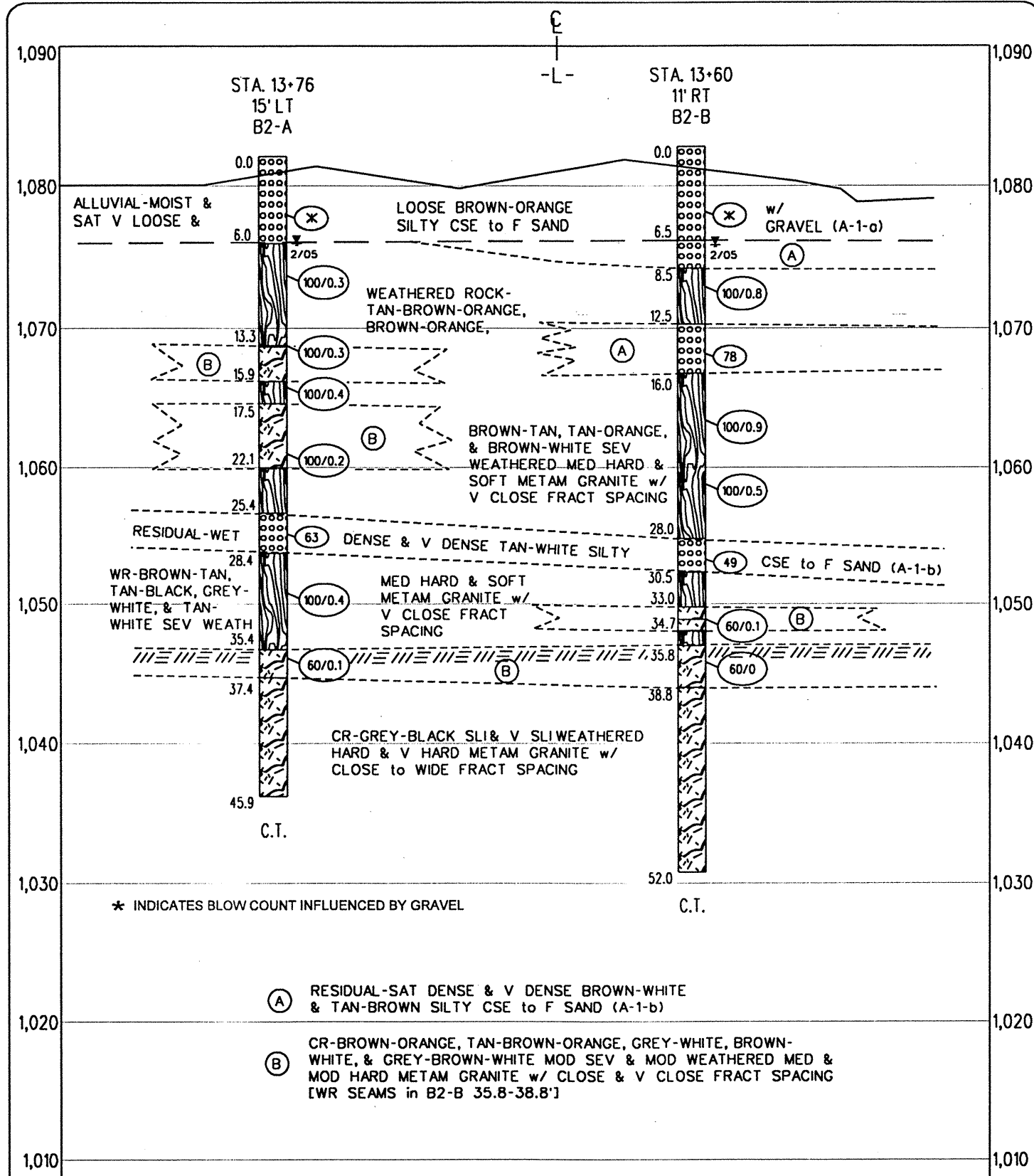
Vert. Scale 1" = 10'

Date 2/21/05

Horiz. Scale 1" = 10'

Drawn by DH

Drawing No. 5



0 5 10
HORIZ. & VERT.
SCALE IN FEET

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CROSS-SECTION THROUGH BENT-2

Bridge No. 198 over the Second Broad River on SR 1782

McDowell County, North Carolina

Project No. 33546.1.1

TIP No. B-4199

Federal No. BRZ-1782(1)

Vert. Scale 1" = 10'

Date 2/21/05

Horiz. Scale 1" = 10'

Drawn by DH

Drawing No. 6

0 5 10
HORIZ. & VERT.
SCALE IN FEET

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Greensboro, NC 27407
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CROSS-SECTION THROUGH END BENT-2

Bridge No. 198 over the Second Broad River on SR 1782

McDowell County, North Carolina

Project No. 33546.1.1

TIP No. B-4199

Federal No. BRZ-1782(1)

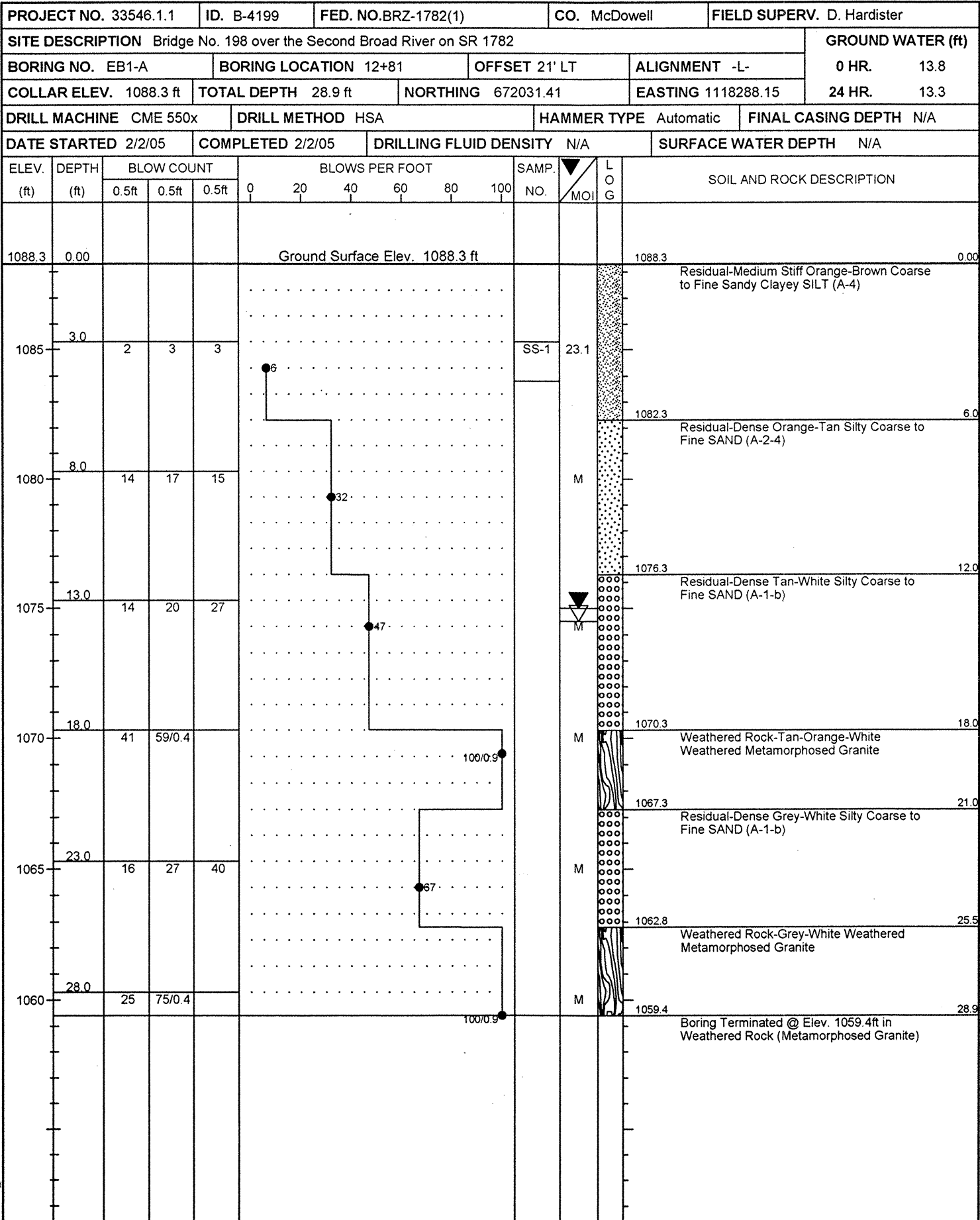
Vert. Scale 1" = 10'

Date 2/21/05

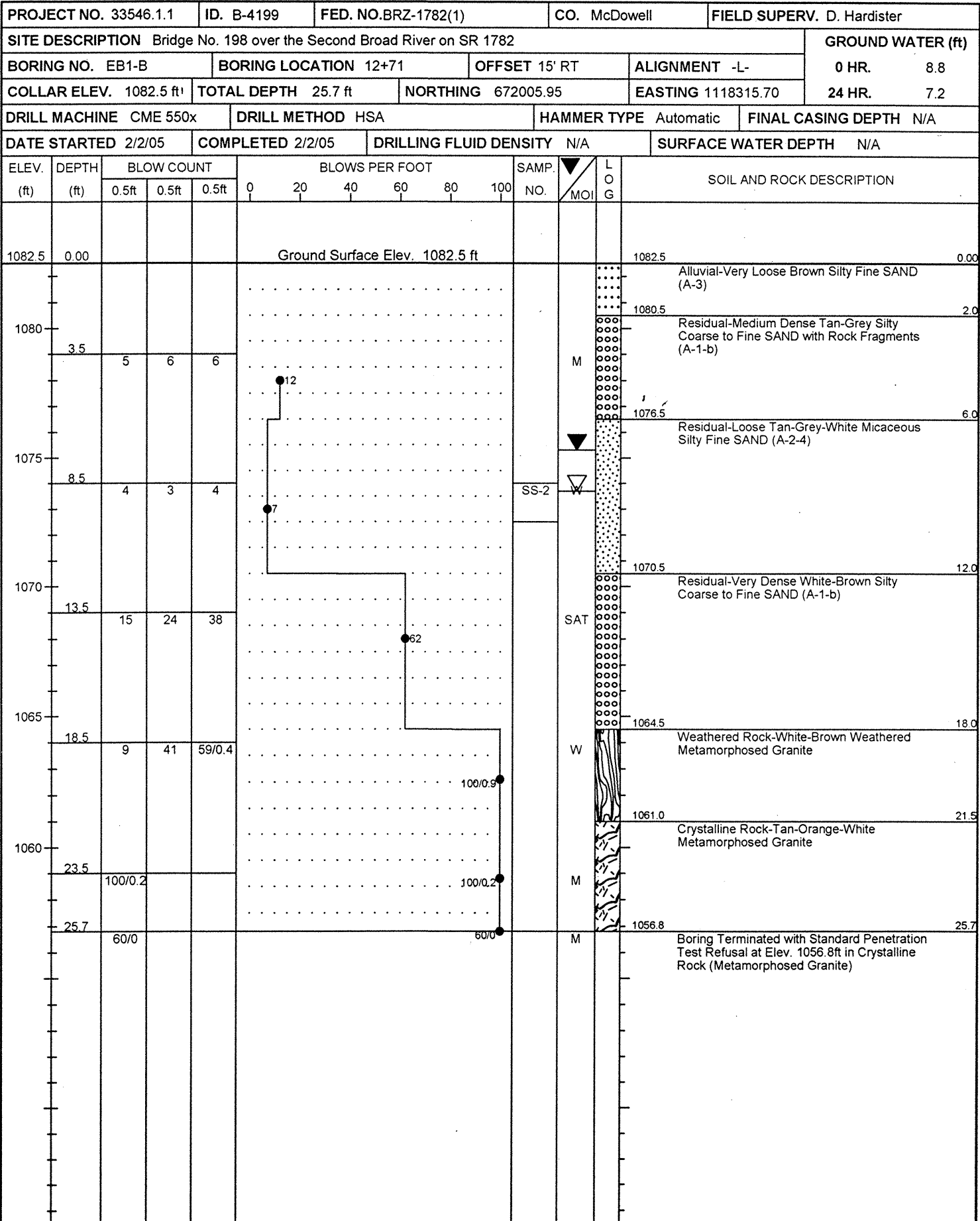
Horiz. Scale 1" = 10'

Drawn by DH

Drawing No. 7




ICDOT_BORE11X17M GR050033.GPJ NCDOT2.GDT 2/21/05



ICDOT_BORE11X17M GR050033.GPJ NCDOT2.GDT 2/21/05

PROJECT NO. 33546.1.1		ID. B-4199	FED. NO.BRZ-1782(1)		CO. McDowell		FIELD SUPERV. D. Hardister							
SITE DESCRIPTION Bridge No. 198 over the Second Broad River on SR 1782							GROUND WATER (ft)							
BORING NO. B1-A		BORING LOCATION 13+01		OFFSET 15' LT		ALIGNMENT -L-		0 HR. N/M						
COLLAR ELEV. 1083.7 ft		TOTAL DEPTH 52.2 ft		NORTHING 672045.16		EASTING 1118301.02		24 HR. 6.7						
DRILL MACHINE CME 550x		DRILL METHOD HSA/HQ			HAMMER TYPE Automatic		FINAL CASING DEPTH 28.6 ft							
DATE STARTED 2/4/05		COMPLETED 2/7/05		DRILLING FLUID DENSITY Creek Water		SURFACE WATER DEPTH N/A								
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION		
		0.5ft	0.5ft	0.5ft	0	20	40	60	80	100	MOI			
1083.7	0.00	Ground Surface Elev. 1083.7 ft												1083.7 0.00
													Alluvial-Loose Brown Silty Coarse to Fine SAND (A-3)	
1080	3.5	2	2	5								M		1078.7 5.0
													Residual-Medium Dense Brown-White Silty Coarse to Fine SAND (A-2-4)	
1075	8.5	6	11	6								SAT		1072.7 11.0
													Residual-Dense to Very Dense Brown-White Silty Coarse to Fine SAND with Quartz Fragments (A-1-b)	
1070	13.5	5	11	20								SAT		
1065	18.5	6	17	34								SS-3 SAT		
1060	23.5	35	65/0.4									W	Weathered Rock-Brown-White Weathered Metamorphosed Granite	23.0
1055	28.5	60/0.1										W	Crystalline Rock-Grey-White Metamorphosed Granite	28.0
													Crystalline Rock-Grey-White-Black Slightly Weathered Hard Metamorphosed Granite with Very Close Fracture Spacing	28.6
													Weathered Rock-Brown-White Severely Weathered Soft Metamorphosed Granite with Very Close Fracture Spacing	30.8
													Crystalline Rock-Grey-Brown and Brown-White Moderately Severely Weathered Moderately Hard Metamorphosed Granite with Close and Very Close Fracture Spacing	32.2
1050	32.2	60/0										M	Crystalline Rock-Brown-Grey and Grey-Black Moderately Weathered Moderately Hard and Hard Metamorphosed Granite with Close and Very Close Fracture Spacing	
												RS-1		

PROJECT NO. 33546.1.1				ID. B-4199		FED. NO.BRZ-1782(1)				CO. McDowell		FIELD SUPERV. D. Hardister					
SITE DESCRIPTION Bridge No. 198 over the Second Broad River on SR 1782												GROUND WATER (ft)					
BORING NO. B1-A				BORING LOCATION 13+01				OFFSET 15' LT				ALIGNMENT -L-				0 HR. N/M	
COLLAR ELEV. 1083.7 ft				TOTAL DEPTH 52.2 ft				NORTHING 672045.16				EASTING 1118301.02				24 HR. 6.7	
DRILL MACHINE CME 550x				DRILL METHOD HSA/HQ				HAMMER TYPE Automatic				FINAL CASING DEPTH 28.6 ft					
DATE STARTED 2/4/05				COMPLETED 2/7/05				DRILLING FLUID DENSITY Creek Water				SURFACE WATER DEPTH N/A					
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT						SAMP. NO.		L O G	SOIL AND ROCK DESCRIPTION			
		0.5ft	0.5ft	0.5ft	0	20	40	60	80	100							
1045															1044.3	39.4	
1040																	
1035																	

PROJECT NO. 33546.1.1		ID. B-4199		FED. NO. BRZ-1782(1)		CO. McDowell		FIELD SUPERV. D. Hardister	
SITE DESCRIPTION Bridge No. 198 over the Second Broad River on SR 1782								GROUND WATER (ft)	
BORING NO. B1-A		BORING LOCATION 13+01		OFFSET 15' LT		ALIGNMENT -L-		0 HR.	N/M
COLLAR ELEV. 1083.7 ft		TOTAL DEPTH 52.2 ft		NORTHING 672045.16		EASTING 1118301.02		24 HR.	6.7
DRILL MACHINE CME 550x		DRILL METHOD HSA/HQ			HAMMER TYPE Automatic		FINAL CASING DEPTH 28.6 ft		
DATE STARTED 2/4/05		COMPLETED 2/7/05		DRILLING FLUID DENSITY Creek Water		SURFACE WATER DEPTH N/A			
CORE SIZE HQ			TOTAL RUN 23.6 ft		DRILLER D. Harris				
ELEV.	DEPTH	RUN	DRILL RATE	RUN		SAMP.	STRATA		DESCRIPTION AND REMARKS
(ft)	(ft)	(ft)	(Min./ft)	REC.	RQD	NO.	REC.	RQD	
				(ft)	(ft)		%	%	
				%	%				
1055.1									Begin Coring @ 1055.10 ft
1055.1	28.6	3.6	2:26	(1.8)	(0.4)	N=60/0	0.4	0.0	1054.7 Crystalline Rock-Grey-White-Black Slightly Weathered Hard Metamorphosed Granite with Very Close Fracture Spacing 29.0
			2:06	50%	11%		100%	0%	4 Jts @ 0-10'
			1:52				0.0	N/A	Weathered Rock-Brown-White Severely Weathered Soft Metamorphosed Granite with Very Close Fracture Spacing
			1:53/0.6						1052.9 No Discernible Jts 30.8
1051.5	32.2						1.4	0.4	Crystalline Rock-Grey-Brown and Brown-White Moderately Severely Weathered Moderately Hard Metamorphosed Granite with Close and Very Close Fracture Spacing
1051.5	32.2	5.0	4:11	(4.7)	(2.3)		100%	29%	1051.5 8 Jts @ 0-10' 3 Jts @ 20-30' 1 Jt @ 60-70'
			2:11	94%	46%		6.9	2.6	Crystalline Rock-Brown-Grey and Grey-Black Moderately Weathered Moderately Hard and Hard Metamorphosed Granite with Close and Very Close Fracture Spacing
			2:06						27 Jts @ 0-10' 2 Jts @ 10-20' 3 Jts @ 20-30' 5 Jts @ 50-60' 3 Jts @ 80-90'
			2:57						
			2:18						
1046.5	37.2					RS-1			
1046.5	37.2	5.0	4:17	(5.0)	(2.8)				
			3:38	100%	56%				
			5:11						1044.3 Crystalline Rock-Grey-White-Black and Grey-Black Slightly Weathered Hard Metamorphosed Granite with Close and Very Close Fracture Spacing 39.4
			3:57				12.4	8.6	
			3:30				97%	67%	23 Jts @ 0-10' 5 Jts @ 10-20' 3 Jts @ 20-30' 1 Jt @ 30-40' 2 Jts @ 50-60' 4 Jts @ 60-70' 7 Jts @ 70-80'
1041.5	42.2								
1041.5	42.2	5.0	5:13	(4.6)	(2.3)				
			6:27	92%	46%				
			9:14						
			13:35						
			15:10						
1036.5	47.2								
1036.5	47.2	5.0	3:27	(5.0)	(3.8)				
			4:01	100%	76%				
			8:19						
			7:25						

CDDT_CORE#3-11X17 GR050033.GPJ NCDOT2.GDT 2/21/05

PROJECT NO. 33546.1.1				ID. B-4199		FED. NO.BRZ-1782(1)			CO. McDowell		FIELD SUPERV. D. Hardister	
SITE DESCRIPTION Bridge No. 198 over the Second Broad River on SR 1782										GROUND WATER (ft)		
BORING NO. B1-A				BORING LOCATION 13+01			OFFSET 15' LT		ALIGNMENT -L-		0 HR.	N/M
COLLAR ELEV. 1083.7 ft				TOTAL DEPTH 52.2 ft		NORTHING 672045.16			EASTING 1118301.02		24 HR.	6.7
DRILL MACHINE CME 550x				DRILL METHOD HSA/HQ				HAMMER TYPE Automatic		FINAL CASING DEPTH 28.6 ft		
DATE STARTED 2/4/05			COMPLETED 2/7/05			DRILLING FLUID DENSITY Creek Water			SURFACE WATER DEPTH N/A			
CORE SIZE HQ				TOTAL RUN 23.6 ft			DRILLER D. Harris					
ELEV.	DEPTH	RUN	DRILL RATE	RUN		SAMP.	STRATA		DESCRIPTION AND REMARKS			
(ft)	(ft)	(ft)	(Min./ft)	REC.	RQD	NO.	REC.	RQD				
				(ft)	(ft)		%	%				
				%	%				Continued from previous page			
1031.5	52.2		8:13						1031.5	52.2		
									Coring Terminated at Elev. 1031.5ft in Crystalline Rock (Metamorphosed Granite)			

CDDT_CORE#3-11X17 GR050033.GPJ NCDOT2.GDT 2/21/05

33546.1.1/B-4199

B1-A

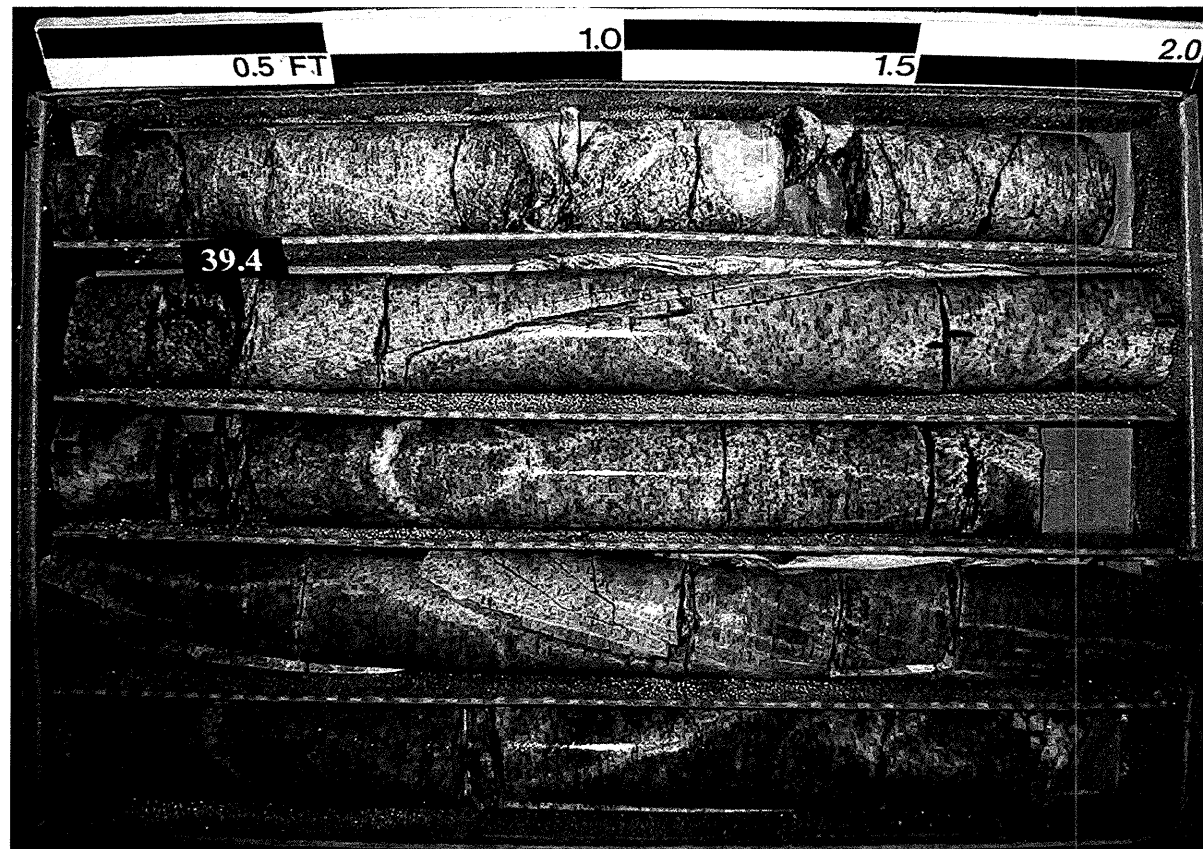
Box 1 of 3



33546.1.1/B-4199

B1-A

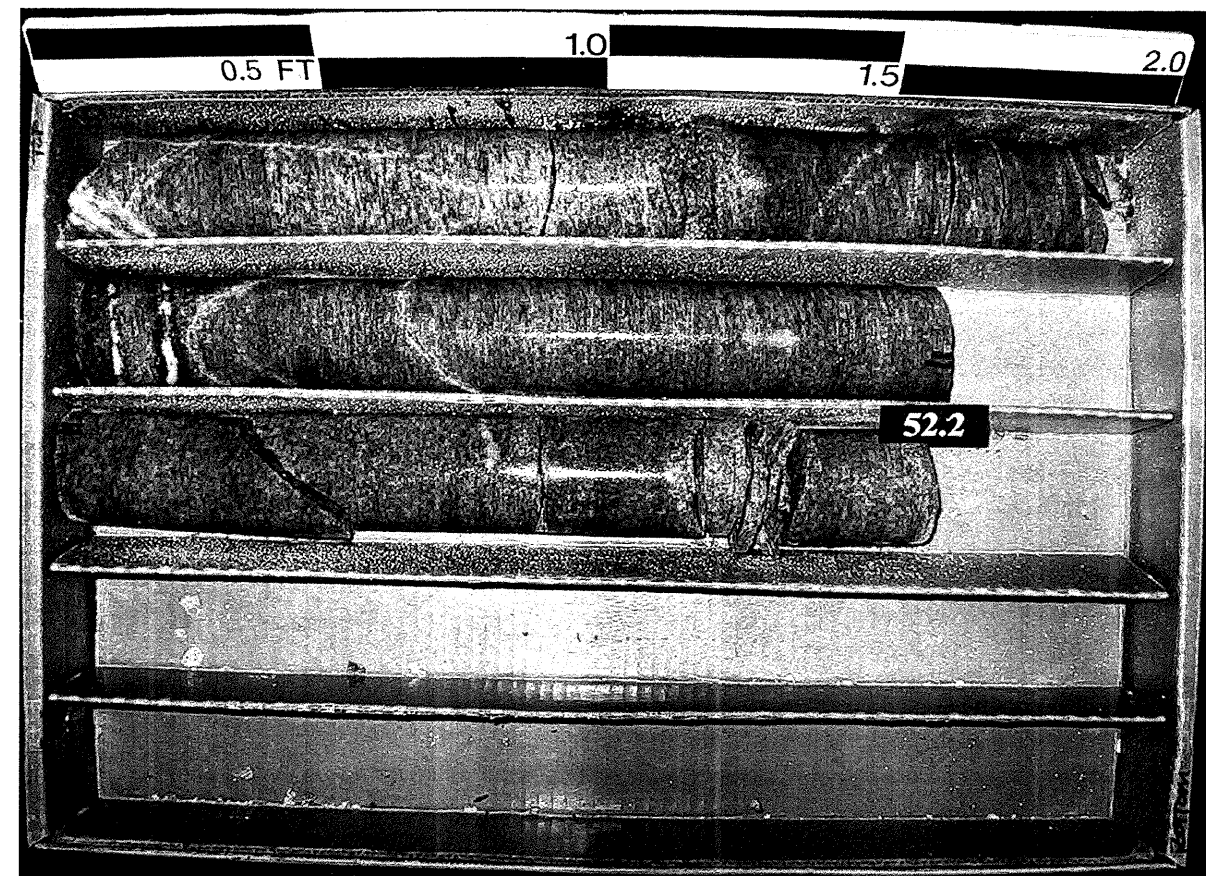
Box 2 of 3



33546.1.1/B-4199

B1-A

Box 3 of 3



PROJECT NO. 33546.1.1		ID. B-4199		FED. NO. BRZ-1782(1)		CO. McDowell		FIELD SUPERV. D. Hardister				
SITE DESCRIPTION Bridge No. 198 over the Second Broad River on SR 1782								GROUND WATER (ft)				
BORING NO. B1-B		BORING LOCATION 12+93		OFFSET 9' RT		ALIGNMENT -L-		0 HR.	N/M			
COLLAR ELEV. 1081.7 ft		TOTAL DEPTH 51.4 ft		NORTHING 672028.59		EASTING 1118320.22		24 HR.	6.2			
DRILL MACHINE CME 550x		DRILL METHOD HSA/HQ		HAMMER TYPE Automatic		FINAL CASING DEPTH 34.0 ft						
DATE STARTED 2/2/05		COMPLETED 2/4/05		DRILLING FLUID DENSITY Creek Water		SURFACE WATER DEPTH N/A						
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION
		0.5ft	0.5ft	0.5ft	0	20	40	60	80	100		
1081.7	0.00				Ground Surface Elev. 1081.7 ft							
	0.5											
		1	2	2								
1080	2.5	3	4	7								
1075	7.5	7	11	17								
1070	12.5	22	37	51								
1065	17.5	18	23	28								
1060	22.5	70	30/0.1									
1055	27.5	6	7	25								
1050	32.5	60/0.1										
1045												

[illegible]

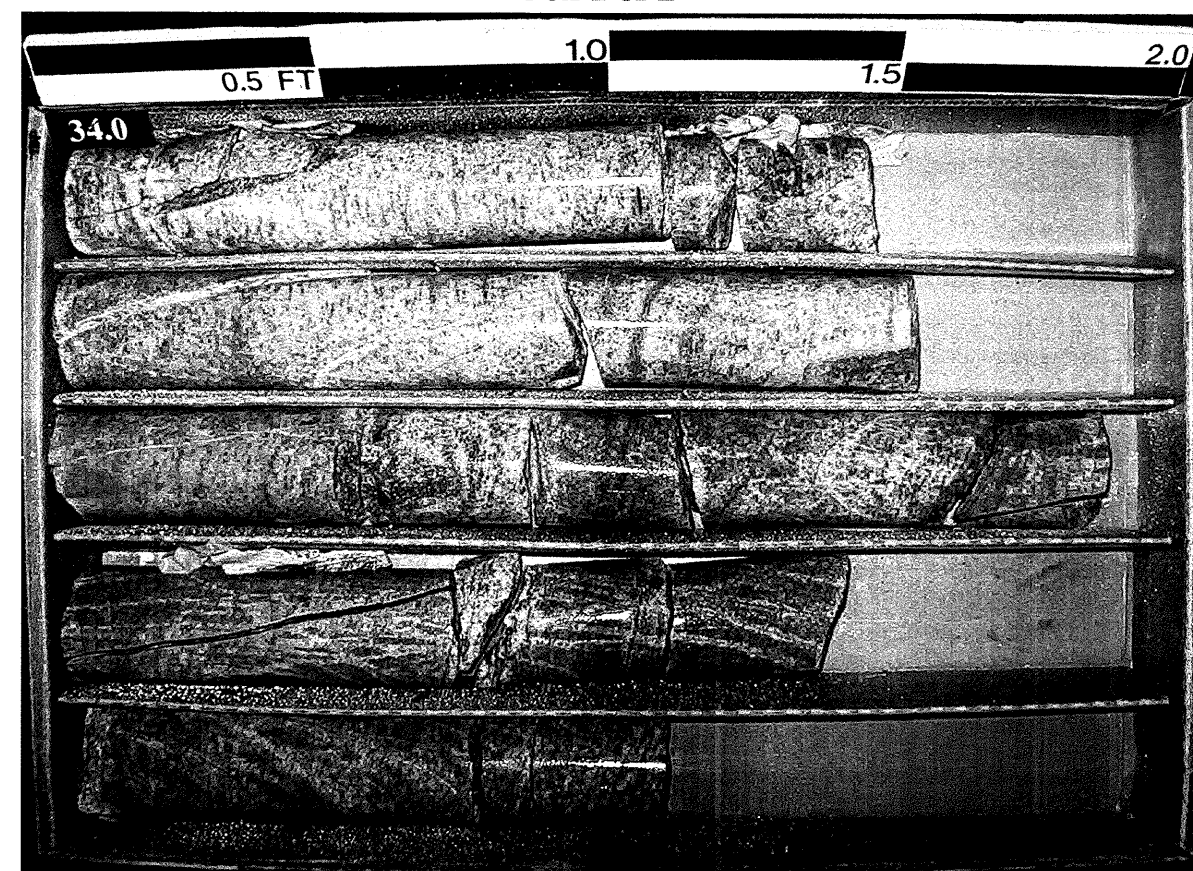
NCDOT_BORE11X17 GR050033.GPJ NCDOT2.GDT 2/21/05

CDOT_BORE11X17 GR050033.GPJ NCDOT2.GDT 2/21/05

33546.1.1/B-4199

B1-B

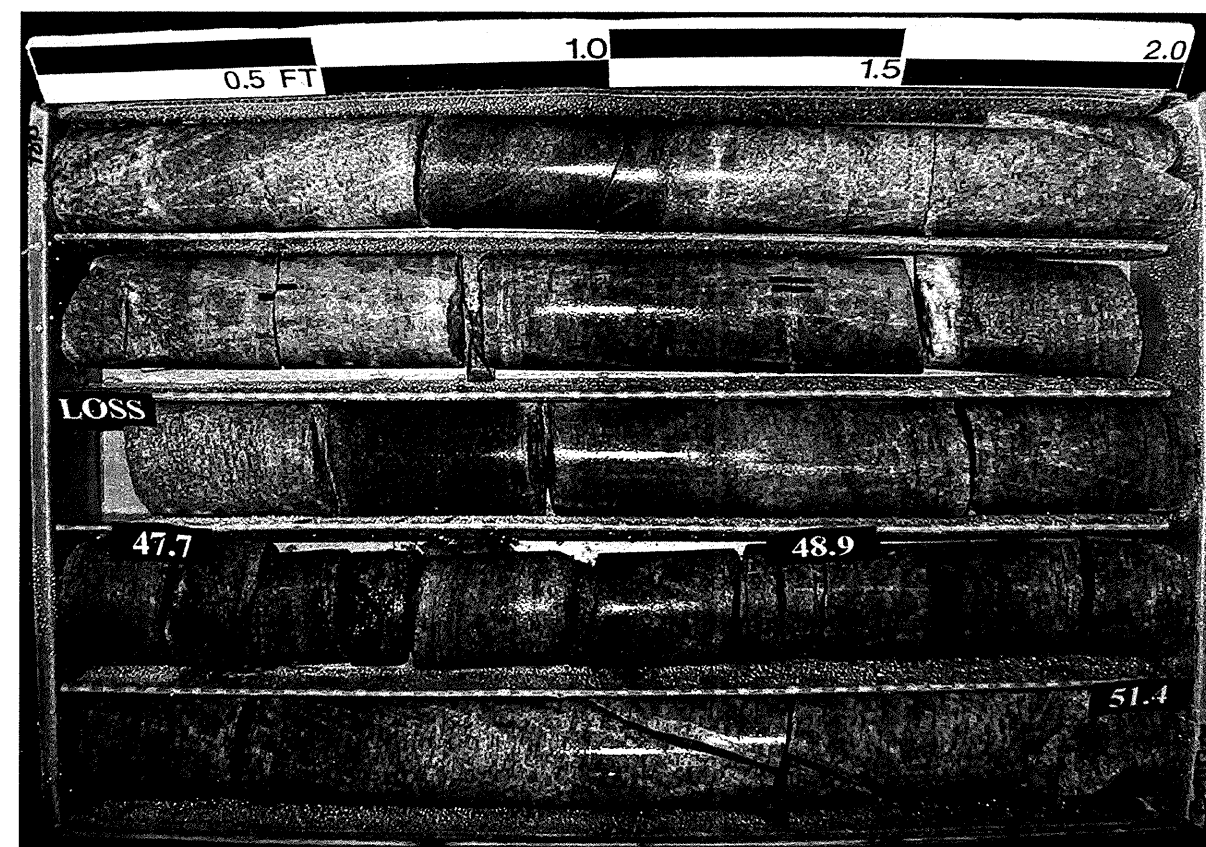
Box 1 of 2



33546.1.1/B-4199

B1-B

Box 2 of 2



PROJECT NO. 33546.1.1			ID. B-4199			FED. NO.BRZ-1782(1)			CO. McDowell			FIELD SUPERV. D. Hardister		
SITE DESCRIPTION Bridge No. 198 over the Second Broad River on SR 1782											GROUND WATER (ft)			
BORING NO. B2-A			BORING LOCATION 13+76				OFFSET 15' LT			ALIGNMENT -L-		0 HR. N/M		
COLLAR ELEV. 1082.1 ft			TOTAL DEPTH 45.9 ft			NORTHING 672113.85			EASTING 1118321.21			24 HR. 6.0		
DRILL MACHINE CME 550x			DRILL METHOD HSA/HQ				HAMMER TYPE Automatic			FINAL CASING DEPTH 13.4 ft				
DATE STARTED 2/8/05			COMPLETED 2/8/05			DRILLING FLUID DENSITY Creek Water			SURFACE WATER DEPTH N/A					
CORE SIZE HQ				TOTAL RUN 29.9 ft			DRILLER D. Harris							
ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min./ft)	RUN		SAMP. NO.	STRATA		DESCRIPTION AND REMARKS					
				REC. (ft) %	RQD (ft) %		REC. %	RQD %						
1068.7									Begin Coring @ 1068.70 ft					
1068.7	13.4	2.5	2:03	(2.5) 100%	(0.0) 0%	N=100/ 0.4	2.5 100%	0.0 0%	Crystalline Rock-Brown-Orange Moderately Severely Weathered Medium Hard Metamorphosed Granite with Very Close to Close Fracture Spacing					
			1:51							12 Jts @ 0-10° 5 Jts @ 10-20° 1 Jt @ 80-90° (continuous from 13.4 to 15.3')				
1066.2	15.9	1:08/0.5					1066.2			15.9				
1065.8	16.3	4.6	4:02	(4.0) 87%	(1.5) 33%	N=100/ 0.2	0.6 38%	N/A	Weathered Rock-Brown-Orange Severely Weathered Soft to Medium Hard Metamorphosed Granite with Very Close Fracture Spacing					
			2:51				4.4 96%	2.3 50%	1064.6 8 Jts @ 0-10° Other Jts Not Discernible 17.5					
			3:25						Crystalline Rock-Brown-Orange and Tan-Black-Orange Moderately Severely to Moderately Weathered Medium to Moderately Hard Metamorphosed Granite with Close and Very Close Fracture Spacing					
			3:13						13 Jts @ 0-10° 3 Jts @ 10-20° 6 Jts @ 80-90° (from 18.5 to 20.5')					
1061.2	20.9	1:59/0.6												
1061.0	21.1	4.8	2:46	(1.0) 21%	(0.8) 17%	N=63			1060.0 22.1					
			1:38				0.0 0%	N/A	Weathered Rock-Brown-Tan Severely Weathered Soft Metamorphosed Granite with Very Close Fracture Spacing					
			1:48						No Discernible Jts					
			1:42						1056.7 25.4					
1056.2	25.9	1:15/0.8						N/A	N/A	Residual-Very Dense White-Tan Silty Coarse to Fine SAND (A-1-b)				
						N=100/ 0.4								
1054.7	27.4	3.5	3:18	(0.0) 0%	N/A				1053.7 28.4					
			2:11				0.5 7%	N/A	Weathered Rock-Brown-Tan and Tan-Black Severely Weathered Soft Metamorphosed Granite with Very Close Fracture Spacing					
			1:15						7 Jts @ 0-10° Other Jts Not Discernible					
1051.2	30.9	0:51/0.5												
1050.8	31.3	4.6	2:05	(1.0) 22%	N/A									
			2:16											
			1:36											
			3:12											
1046.2	35.9	1:34/0.6					1.5 0.0		1046.7 35.4 Crystalline Rock-Tan-White-Black Moderately and Moderately Severely					

\\CDOT_CORE#3-11X17 GR050033.GPJ NCDOT2.GDT 2/21/05

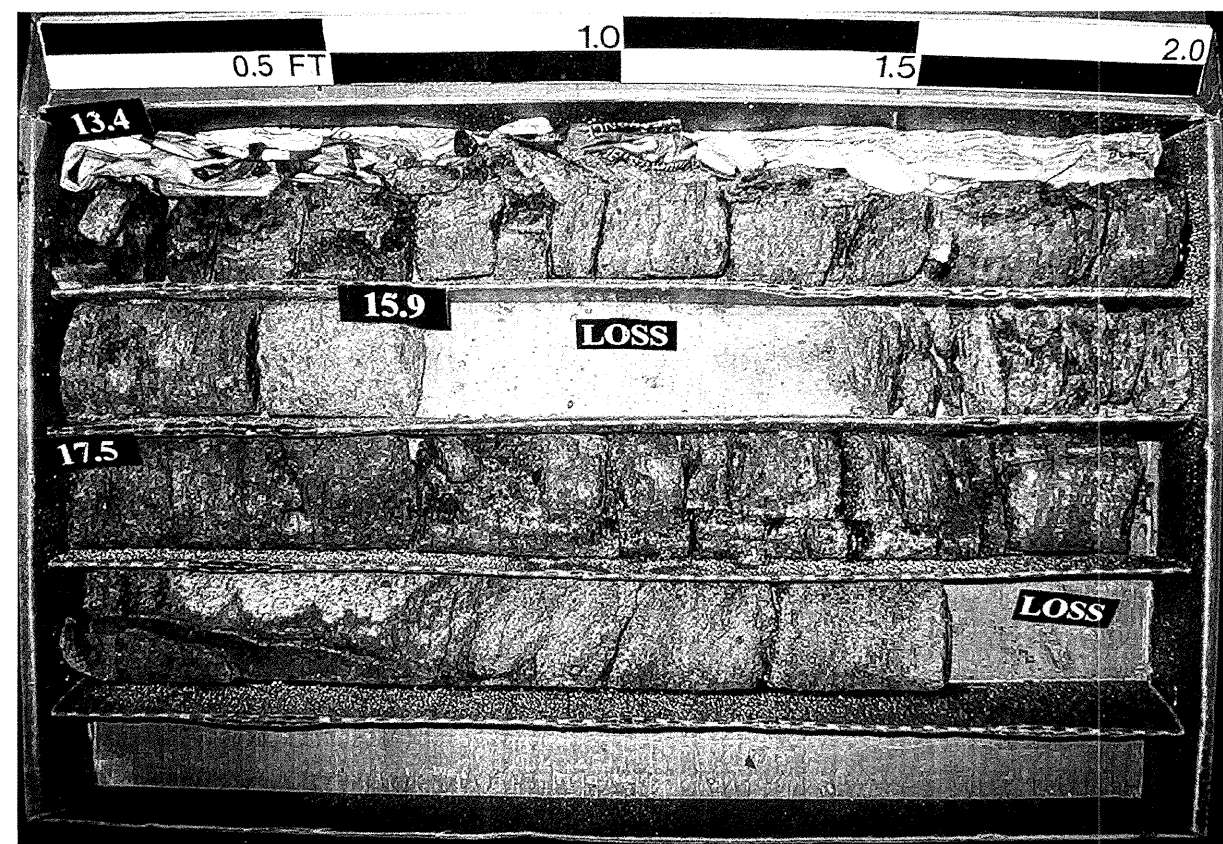
PROJECT NO. 33546.1.1			ID. B-4199			FED. NO.BRZ-1782(1)			CO. McDowell			FIELD SUPERV. D. Hardister		
SITE DESCRIPTION Bridge No. 198 over the Second Broad River on SR 1782											GROUND WATER (ft)			
BORING NO. B2-A			BORING LOCATION 13+76			OFFSET 15' LT			ALIGNMENT -L-			0 HR. N/M		
COLLAR ELEV. 1082.1 ft			TOTAL DEPTH 45.9 ft			NORTHING 672113.85			EASTING 1118321.21			24 HR. 6.0		
DRILL MACHINE CME 550x			DRILL METHOD HSA/HQ			HAMMER TYPE Automatic			FINAL CASING DEPTH 13.4 ft					
DATE STARTED 2/8/05			COMPLETED 2/8/05			DRILLING FLUID DENSITY Creek Water			SURFACE WATER DEPTH N/A					
CORE SIZE HQ			TOTAL RUN 29.9 ft			DRILLER D. Harris								
ELEV.	DEPTH	RUN	DRILL RATE	RUN		SAMP.	STRATA		DESCRIPTION AND REMARKS					
(ft)	(ft)	(ft)	(Min./ft)	REC.	RQD	NO.	REC.	RQD						
				(ft)	(ft)		%	%						
				%	%									
Continued from previous page														
1046.1	36.0	4.9	3:10	(4.6) 94%	(2.9) 59%	N=60/ 0.1	75%	0%	Weathered Moderately and Medium Hard Metamorphosed Granite with Close and Very Close Fracture Spacing					
			2:00				8.5	7.6	1044.7 13 Jts @ 0-10° 3 Jts @ 10-20° 1 Jt @ 50-60°					
			2:25				100%	89%	Crystalline Rock-Grey-Black Slightly Weathered Hard Metamorphosed Granite with Close and Moderately Close Fracture Spacing					
			2:40						9 Jts @ 0-10° 6 Jts @ 10-20° 1 Jt @ 50-60° 1 Jt @ 80-90°					
			2:46/0.9			RS-3								
1041.2	40.9													
1041.2	40.9	5.0	2:31	(4.9) 98%	(4.7) 94%									
			2:30											
			3:10											
			3:38											
			2:24											
1036.2	45.9								1036.2					
									45.9					
Coring Terminated at Elev. 1036.2ft in Crystalline Rock (Metamorphosed Granite)														

\\CDOT_CORE#3-11X17 GR050033.GPJ NCDOT2.GDT 2/21/05

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B2-A

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B2-A

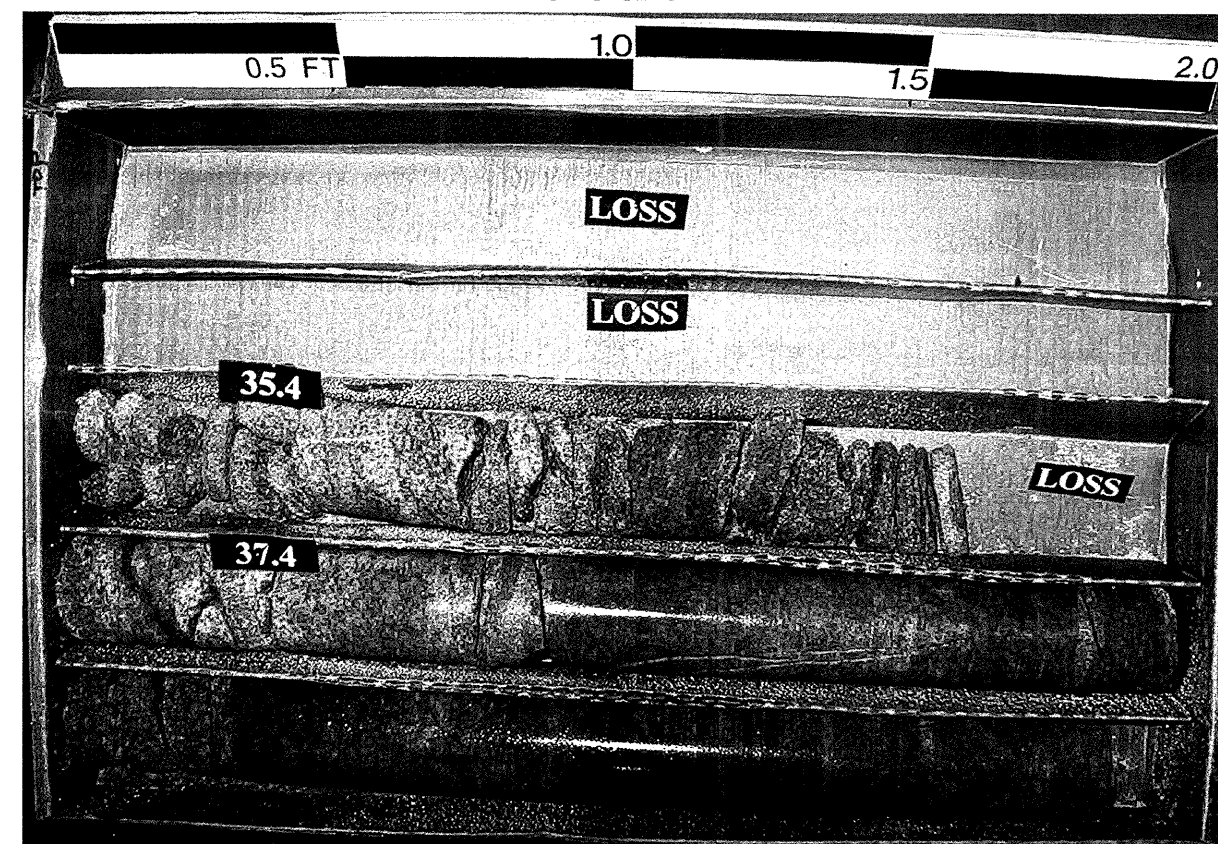
Box 2 of 4



33546.1.1/B-4199

B2-A

Box 3 of 4



33546.1.1/B-4199

B2-A

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SHEET 1 OF 2

PROJECT NO. 33546.1.1		ID. B-4199		FED. NO. BRZ-1782(1)		CO. McDowell		FIELD SUPERV. D. Hardister						
SITE DESCRIPTION Bridge No. 198 over the Second Broad River on SR 1782								GROUND WATER (ft)						
BORING NO. B2-B		BORING LOCATION 13+60		OFFSET 11' RT		ALIGNMENT -L-		0 HR.	N/M					
COLLAR ELEV. 1082.8 ft		TOTAL DEPTH 52.0 ft		NORTHING 672093.32		EASTING 1118343.18		24 HR.	6.8					
DRILL MACHINE CME 550x		DRILL METHOD Rotary/HQ			HAMMER TYPE Automatic		FINAL CASING DEPTH 33.9 ft							
DATE STARTED 2/7/05		COMPLETED 2/8/05		DRILLING FLUID DENSITY Creek Water		SURFACE WATER DEPTH N/A								
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	▼ MOI	L O G	SOIL AND ROCK DESCRIPTION	
		0.5ft	0.5ft	0.5ft	0	20	40	60	80					100
1082.8	0.00				Ground Surface Elev. 1082.8 ft								1082.8	0.00
1080	3.5	13	7	16										
1075	8.5	26	51	49/0.3										
1070	13.5	29	33	45										
1065	18.5	24	76/0.4											
1060	23.5	100/0.5												
1055	28.5	11	16	33										
1050	33.8	60/0.1												
	37.0													

NCDOT_BORE11X17 GR050033.GPJ NCDOT2.GDT 2/21/05

NCDOT_BORE11X17 GR050033.GPJ NCDOT2.GDT 2/21/05

SHEET 2 OF 2

PROJECT NO. 33546.1.1		ID. B-4199		FED. NO. BRZ-1782(1)		CO. McDowell		FIELD SUPERV. D. Hardister						
SITE DESCRIPTION Bridge No. 198 over the Second Broad River on SR 1782								GROUND WATER (ft)						
BORING NO. B2-B		BORING LOCATION 13+60		OFFSET 11' RT		ALIGNMENT -L-		0 HR. N/M						
COLLAR ELEV. 1082.8 ft		TOTAL DEPTH 52.0 ft		NORTHING 672093.32		EASTING 1118343.18		24 HR. 6.8						
DRILL MACHINE CME 550x		DRILL METHOD Rotary/HQ			HAMMER TYPE Automatic		FINAL CASING DEPTH 33.9 ft							
DATE STARTED 2/7/05		COMPLETED 2/8/05		DRILLING FLUID DENSITY Creek Water		SURFACE WATER DEPTH N/A								
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.		L O G	SOIL AND ROCK DESCRIPTION	
		0.5ft	0.5ft	0.5ft	0	20	40	60	80	100				
1045		60/0												Weathered Medium Hard to Soft Metamorphosed Granite with Very Close Fracture Spacing
														Crystalline Rock-Brown-White to Grey-Brown-White Moderately Weathered Moderately Hard Metamorphosed Granite with Close and Very Close Fracture Spacing & Weathered Rock Seams
1040														Crystalline Rock-Grey-Black Very Slightly Weathered Very Hard Metamorphosed Granite with Wide and Moderately Close Fracture Spacing
1035														

NOTE: * indicates blow count influenced by gravel

PROJECT NO. 33546.1.1				ID. B-4199		FED. NO.BRZ-1782(1)			CO. McDowell		FIELD SUPERV. D. Hardister		
SITE DESCRIPTION Bridge No. 198 over the Second Broad River on SR 1782										GROUND WATER (ft)			
BORING NO. B2-B			BORING LOCATION 13+60			OFFSET 11' RT		ALIGNMENT -L-		0 HR. N/M			
COLLAR ELEV. 1082.8 ft		TOTAL DEPTH 52.0 ft		NORTHING 672093.32			EASTING 1118343.18		24 HR. 6.8				
DRILL MACHINE CME 550x			DRILL METHOD Rotary/HQ			HAMMER TYPE Automatic			FINAL CASING DEPTH 33.9 ft				
DATE STARTED 2/7/05			COMPLETED 2/8/05		DRILLING FLUID DENSITY Creek Water			SURFACE WATER DEPTH N/A					
CORE SIZE HQ				TOTAL RUN 18.1 ft		DRILLER D. Harris							
ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min./ft)	RUN REC. (ft) %RQD (ft) %		SAMP. NO.	STRATA REC. %RQD %		DESCRIPTION AND REMARKS				
1048.9									Begin Coring @ 1048.90 ft				
1048.9	33.9	3.1	3:06	(2.8) 90%	(1.5) 48%	RS-4 N=60/0	0.8 100%	0.4 50%	1048.1	Crystalline Rock-Brown-White to Grey-White Moderately Weathered Moderately Hard Metamorphosed Granite with Close Fracture Spacing 34.7			
			2:44				0.7 64%	N/A		3 Jts @ 10-20° 3 Jts @ 80-90°			
			1:36				1.8 60%	1.0 33%	1047.0	Weathered Rock-Tan-White Severely Weathered Medium Hard to Soft Metamorphosed Granite with Very Close Fracture Spacing 35.8			
1045.8	37.0		0:15/0.1							11 Jts @ 0-10° 5 Jts @ 80-90° Other Jts Not Discernible			
1045.8	37.0	5.0	4:53	(3.7) 74%	(2.8) 56%					Crystalline Rock-Brown-White to Grey-Brown-White Moderately Weathered Moderately Hard Metamorphosed Granite with Close and Very Close Fracture Spacing & Weathered Rock Seams			
			5:24						1044.0	1 Jt @ 0-10° 3 Jts @ 10-20° 2 Jts @ 20-30° 1 Jt @ 40-50° 38.8			
			4:44			13.0 98%	12.2 92%		Crystalline Rock-Grey-Black Very Slightly Weathered Very Hard Metamorphosed Granite with Wide and Moderately Close Fracture Spacing				
			4:34						6 Jts @ 0-10° 2 Jts @ 10-20°				
			4:58										
1040.8	42.0												
1040.8	42.0	5.0	5:38	(5.0) 100%	(4.7) 94%								
			5:23										
			6:10										
			8:11										
			10:00										
1035.8	47.0												
1035.8	47.0	5.0	10:17	(4.8) 96%	(4.6) 92%								
			10:56										
			13:47										
			17:43										
			25:51										
1030.8	52.0								1030.8	52.0			
									Coring Terminated at Elev. 1030.8ft in Crystalline Rock (Metamorphosed Granite)				

CDOI_CORE#3-11X17 GR050033.GPJ NCDOT2.GDT 2/21/05

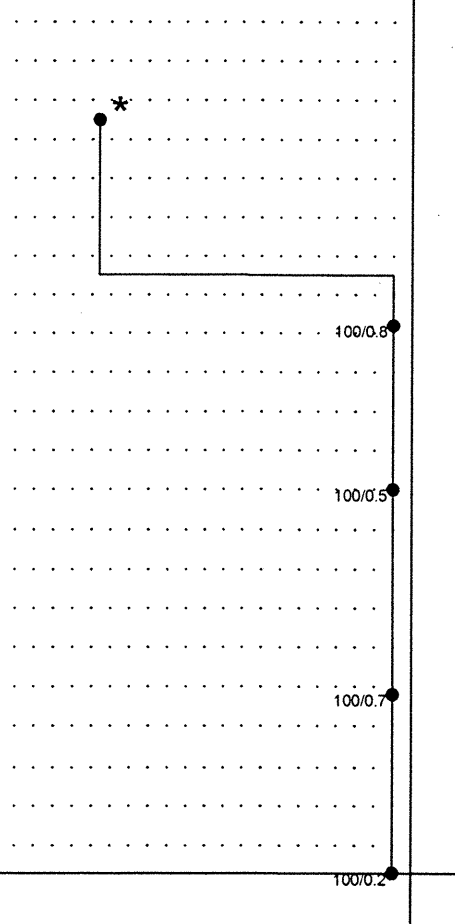
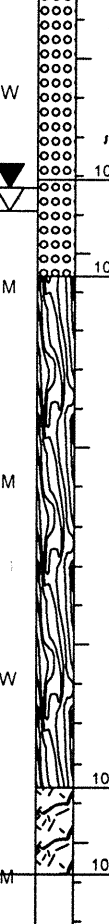
33546.1.1/B-4199
B2-B
Box 1 of 2



33546.1.1/B-4199
B2-B
Box 2 of 2



PROJECT NO. 33546.1.1		ID. B-4199		FED. NO.BRZ-1782(1)		CO. McDowell		FIELD SUPERV. D. Hardister						
SITE DESCRIPTION Bridge No. 198 over the Second Broad River on SR 1782								GROUND WATER (ft)						
BORING NO. EB2-A		BORING LOCATION 14+02		OFFSET 22' LT		ALIGNMENT -L-		0 HR.	4.7					
COLLAR ELEV. 1082.7 ft		TOTAL DEPTH 21.0 ft		NORTHING 672139.16		EASTING 1118317.56		24 HR.	4.3					
DRILL MACHINE CME 550x		DRILL METHOD HSA			HAMMER TYPE Automatic		FINAL CASING DEPTH N/A							
DATE STARTED 2/7/05		COMPLETED 2/7/05		DRILLING FLUID DENSITY N/A		SURFACE WATER DEPTH N/A								
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION		
		0.5ft	0.5ft	0.5ft	0	20	40	60	80	100	MOI		G	
1082.7	0.00				Ground Surface Elev. 1082.7 ft								1082.7	0.00
1080	3.5	3	1	1						SS-6				
1075	8.5	23	77/0.3											
1070	13.5	60/0.1												
1065	18.5	60/0.1												
	21.0	60/0												

PROJECT NO. 33546.1.1		ID. B-4199		FED. NO. BRZ-1782(1)		CO. McDowell		FIELD SUPERV. D. Hardister							
SITE DESCRIPTION Bridge No. 198 over the Second Broad River on SR 1782								GROUND WATER (ft)							
BORING NO. EB2-B		BORING LOCATION 13+76		OFFSET 15' RT		ALIGNMENT -L-		0 HR.	6.8						
COLLAR ELEV. 1082.9 ft		TOTAL DEPTH 23.7 ft		NORTHING 672108.90		EASTING 1118349.85		24 HR.	6.2						
DRILL MACHINE CME 550x		DRILL METHOD HSA			HAMMER TYPE Automatic		FINAL CASING DEPTH N/A								
DATE STARTED 2/7/05		COMPLETED 2/7/05		DRILLING FLUID DENSITY N/A			SURFACE WATER DEPTH N/A								
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION			
		0.5ft	0.5ft	0.5ft	0	20	40	60	80	100					
1082.9	0.00				Ground Surface Elev. 1082.9 ft								1082.9	0.00	
1080	3.5	4	13	9								W		1076.9	6.0
1075	8.5	21	48	52/0.3								100/0.6			M
1070	13.5	100/0.5										M			
1065	18.5	86	14/0.2									W			
1060	23.5	100/0.2										M		1061.4	21.5
														1059.2	23.7
													Boring Terminated with Standard Penetration Test Refusal at Elev. 1059.2ft in Crystalline Rock (Metamorphosed Granite)		
NOTE: * indicates blow count influenced by gravel															

NCDOT_BORE11X17M GR050033.GPJ NCDOT2.GDT 2/21/05

ICDOT_BORE11X17M GR050033.GPJ NCDOT2.GDT 2/21/05

33546.1.1/B-4199

**Bridge No. 198 over The Second Broad River on SR 1782
McDowell, North Carolina**

GEOSCIENCE GROUP, INC.
GREENSBORO, NORTH CAROLINA

PROJECT NO: GR05.0033.GE
PAGE 1 of 1

33546.1.1 (B-4199)

**Bridge No. 198 over The Second Broad River on SR 1782
McDowell County, North Carolina**

ROCK TESTING SUMMARY

[illegible]

GEOTECHNICAL UNIT FIELD SCOUR REPORT

PROJECT: 33546.1.1 ID: B-4199 COUNTY: McDowell

DESCRIPTION(1): Bridge No. 198 over the Second Broad River on SR 1782

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

COUNTY BRIDGE NO. 198 BRIDGE LENGTH 40 NO. BENTS IN: CHANNEL 0 FLOOD PLAIN 2

FOUNDATION TYPE: Footings

EVIDENCE OF SCOUR(2):

ABUTMENTS OR END BENT SLOPES: None

INTERIOR BENTS: N/A

CHANNEL BED: None

CHANNEL BANKS: Major sloughing of upstream west bank

EXISTING SCOUR PROTECTION:

TYPE(3): Concrete wingwalls

EXTENT(4): 5' outside of bridge

EFFECTIVENESS(5): OK

OBSTRUCTIONS(6) (DAMS,DEBRIS,ETC.): Fallen trees in channel

DESIGN INFORMATION

CHANNEL BED MATERIAL(7) (SAMPLE RESULTS ATTACHED): Alluvial-Brown-Tan Silty Cse to F SAND w/

Gravel (A-1-a), Residual-V Dense Grey-White & Brown-White Silty Cse to F SAND (A-1-b) & w/ Quartz Frags (A-1-b)

CHANNEL BANK MATERIAL(8) (SAMPLE RESULTS ATTACHED): Alluvial-Silty Coarse to Fine SAND (A-3, A-1-b),

Silty Coarse to Fine SAND w/ Gravel (A-1-a)

CHANNEL BANK COVER(9): Underbrush, trees

FLOOD PLAIN WIDTH(10): 200'

FLOOD PLAIN COVER(11): Trees, underbrush, grass

DESIGN INFORMATION CONT.

STREAM IS DEGRADING X AGGRADING (12)

OTHER OBSERVATIONS AND COMMENTS:

CHANNEL MIGRATION TENDENCY (13): Southeast

REPORTED BY: DATE: 2/24/05
GEOSCIENCE GROUP, INC.

GEOTECHNICALLY ADJUSTED SCOUR ELEVATION (14):

The Geotechnical Unit agrees with the Computed Scour depths in the

Bridge Survey & Hydraulic Design Report dated 10/21/04.

REPORTED BY: DATE: 3/10/05
NCDOT GEOTECHNICAL UNIT

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 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 RELATIONSHIP BETWEEN THE HYDRAULICS THEORETICAL SCOUR AND THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION. THE GEOTECHNICALLY ADJUSTED SCOUR ELEVEVATION 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.

PROJECT #:

33546.1.1/B-4199

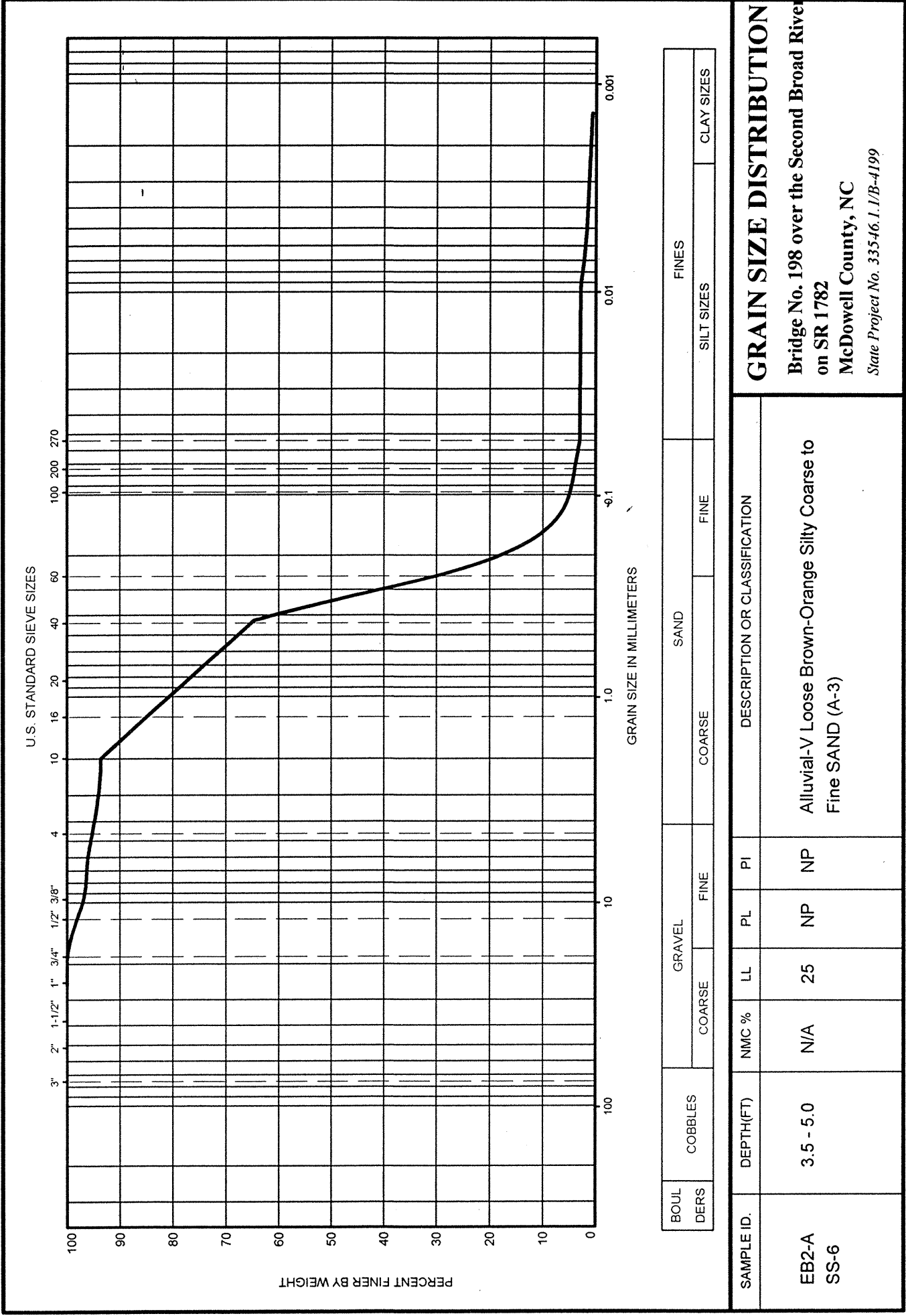
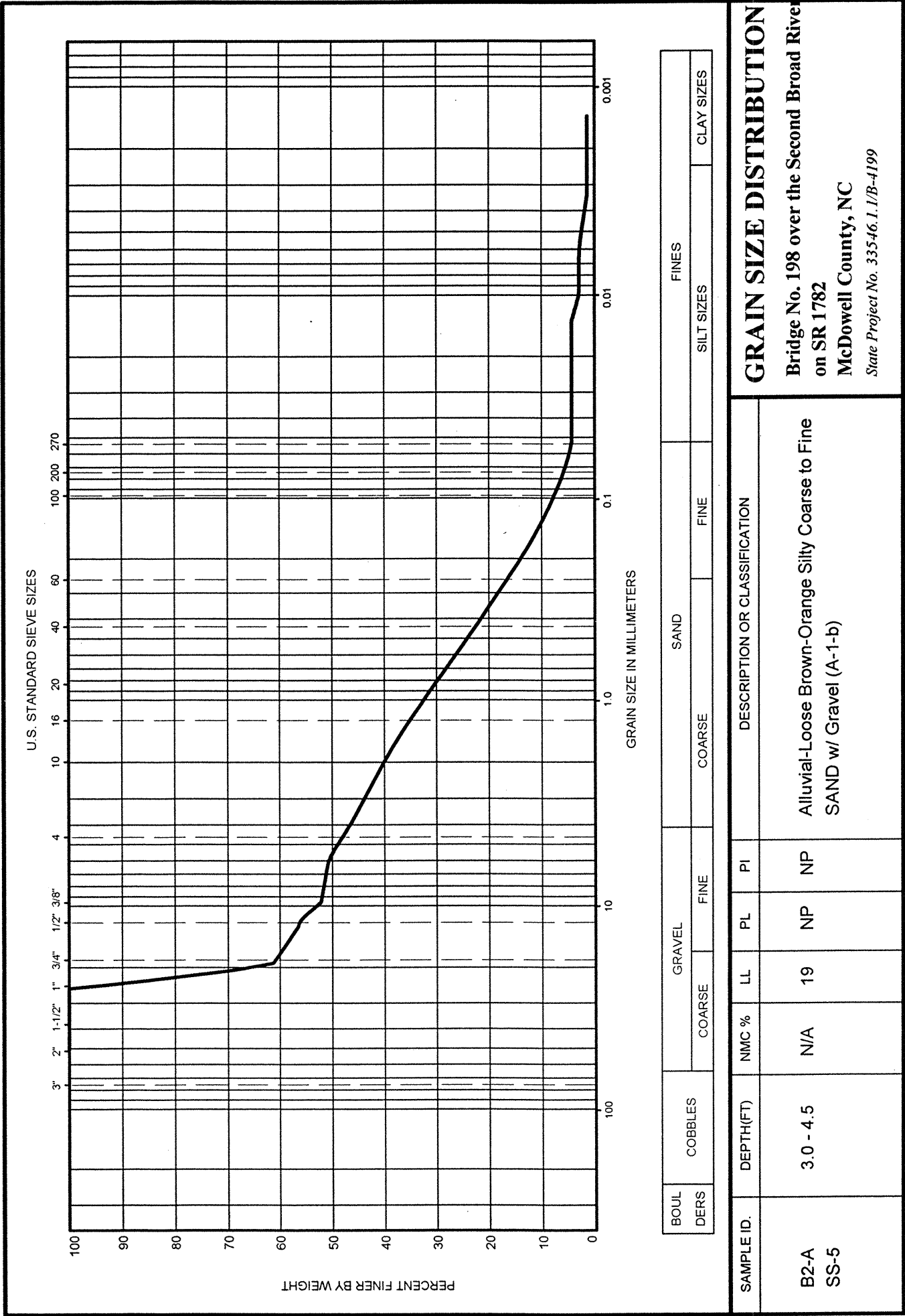
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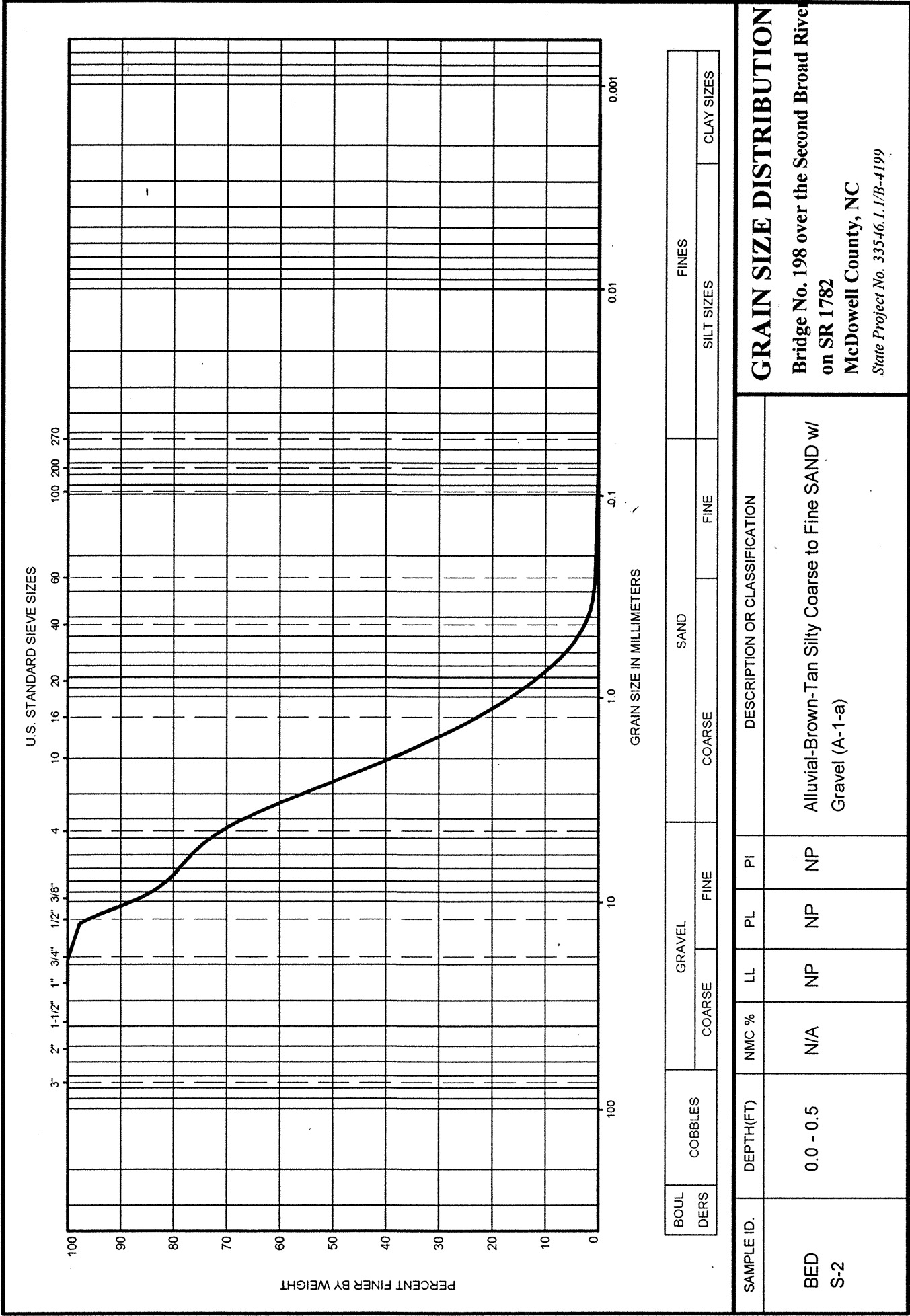
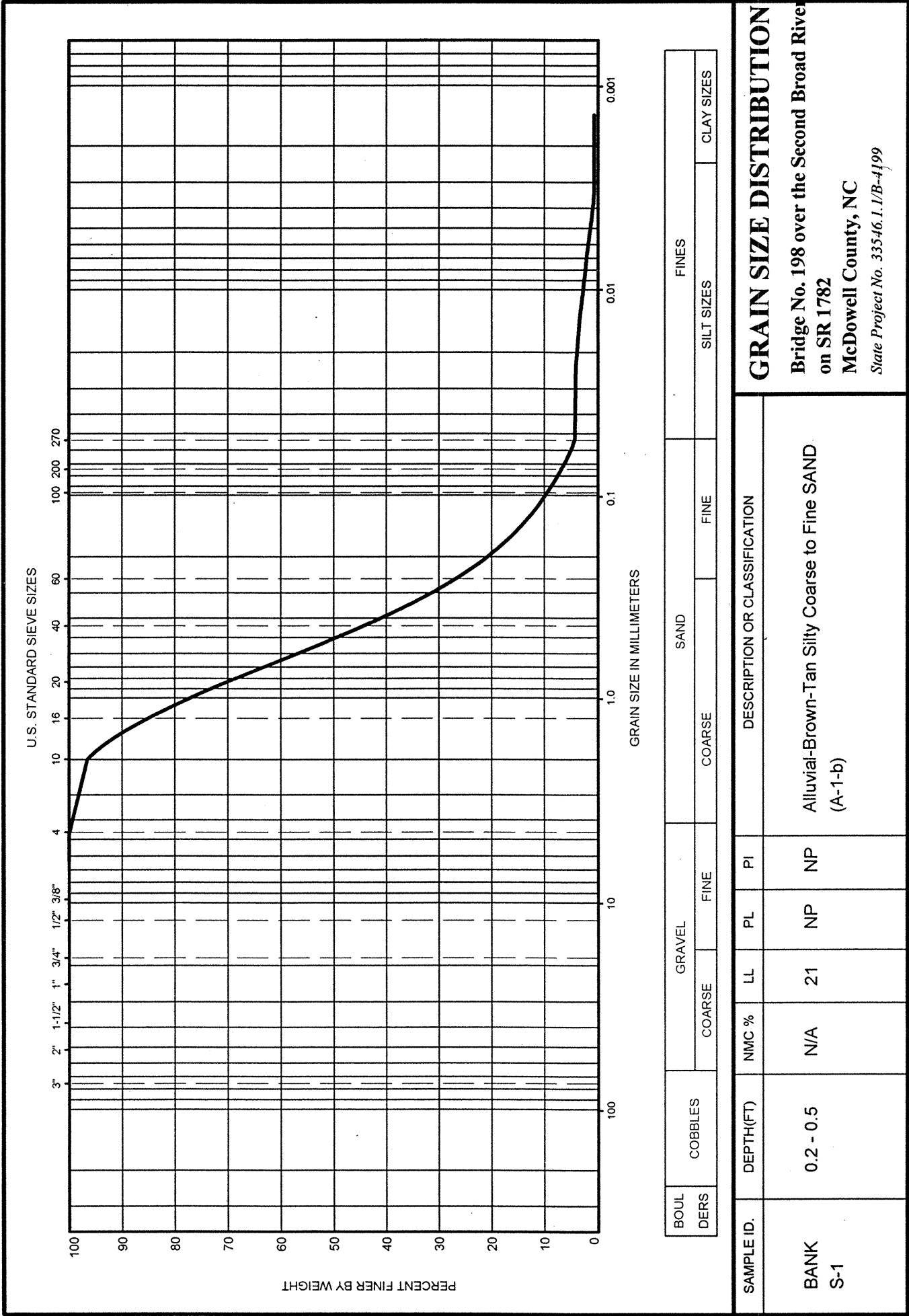
McDowell

DESCRIPTION:

Bridge No. 198 over The Second Broad River on SR 1782

	CHANNEL BED MATERIAL			CHANNEL BANK MATERIAL			
SAMPLE #	SS-4	SS-3	S-2	SS-5	SS-6	S-1	
RETAINED #4	5	14	28	54	5	0	
PASSING #10	84	75	39	40	94	97	
PASSING #40	49	44	2	22	65	43	
PASSING #200	17	16	0	6	4	7	
COARSE SAND	56.0	56.0	99.0	59.0	69.0	73.0	
FINE SAND	29.0	30.0	1.0	30.0	27.0	23.0	
SILT	9.0	9.0	0.0	6.0	2.0	3.0	
CLAY	6.0	5.0	0.0	5.0	2.0	1.0	
LL	23	21	0	19	25	21	
PL	0	0	0	0	0	0	
AASHTO CLASSIFICATION	A-1-b(0)	A-1-b(0)	A-1-a(0)	A-1-a(0)	A-3(0)	A-1-b(0)	
STATION	12+93	13+1	13+35	13+76	14+2	13+50	
OFFSET	9' RT	15' LT	5' RT	15' LT	22' LT	CL	
DEPTH	12.5-14.0	18.5-20.0	0.0-0.5	3.0-4.5	3.5-5.0	0.2-0.5	





SITE PHOTOGRAPHS



Looking Left to Right along End Bent-1



Looking Left to Right along Bent-1

SITE PHOTOGRAPHS



Looking Left to Right along Bent-2



Looking Left to Right along End Bent-2

SITE PHOTOGRAPHS**Looking Increasing Station along -L-****Looking along Profile – 15' RT of -L-****SITE PHOTOGRAPHS****Looking Upstream****Looking Downstream**