

061192

BUCHAN	<i>H. S. CAM</i>
HASTY	
RICHARDSON	
VANMETER	
OTHER	
GROUPS	
FILE	

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA
INTERDEPARTMENTAL CORRESPONDENCE



FILE MSL00-0004-00(086), Gwinnett Co. **OFFICE** Materials and Research
 SR 20 over SR 316 Forest Park, Georgia
 PI No. 0004086 **DATE** November 14, 2008

T.G. for
FROM Georgene M. Geary, P.E., State Materials and Research Engineer

TO James B. Buchan, P.E., State Urban Design Engineer

SUBJECT Review of Consultant's Bridge Foundation Investigation Report

As requested, we have reviewed the Bridge Foundation Investigation Report that was written on July 7, 2008 by Willmer Engineering of Atlanta, Georgia. This report is acceptable for use in design and during construction. Copies of this report should be forwarded to the appropriate DOT offices.

If additional information is needed, please contact Catherine Armstrong of the Geotechnical Engineering Bureau at 404-363-7546.

GMG: CAA

Copy: Paul Liles, P.E., State Bridge and Structural Design Engineer

Willmer Engineering Inc.
 3772 Pleasantdale Rd.
 Suite 165
 Atlanta, Georgia 30340-4270

BRIDGE FOUNDATION INVESTIGATION REPORT
SR 20 over SR 316
(Revised November 3, 2008)
GDOT Project No. MSL00-0004-00(086), PI No. 0004086
Gwinnett County, Georgia

WILLMER ENGINEERING INC.
Project No. ATL-171-2640A

Prepared For
PBS&J
Atlanta, Georgia

Prepared By
WILLMER ENGINEERING INC.
3772 Pleasantdale Road
Suite 165
Atlanta, Georgia 30340-4270
770.939.0089

July 7, 2008
 (Revised November 3, 2008)

VIA U.S. MAIL

Michael R. Moseley Jr., PE
 PBS&J
 5665 New Northside Drive
 Suite 400
 Atlanta, Georgia 30328

**SUBJECT: Bridge Foundation Investigation Report
 SR 20 over SR 316**
 GDOT Project No. MSL00-0004-00(086), PI No. 0004086
 Gwinnett County, Georgia
 Willmer Project No. ATL-171-2640A

Dear Mr. Moseley:

Willmer Engineering Inc. (Willmer) is pleased to provide this Bridge Foundation Investigation (BFI) report for the proposed SR 20 bridge over SR 316 in Gwinnett County, Georgia. The BFI was performed in general accordance with our contract with PBS&J, Inc., dated March 27, 2008 and the Georgia Department of Transportation (GDOT) guidance documents for bridge foundation investigation. This report was revised to incorporate GDOT review comments dated October 24, 2008.

The attached summary presents the site and subsurface conditions along the proposed bridge alignment, and our geotechnical recommendations related to bridge foundation design and construction.

We appreciate the opportunity to be of service to you on this project and look forward to a continuing relationship. Please contact us if you have any questions concerning this report or require further assistance.

Sincerely,

WILLMER ENGINEERING INC.

Dubh Koa

for
 Murthy S. Kotha
 Project Engineer

James L. Willmer

James L. Willmer, PE
 Executive Vice President/Principal Consultant

MSK/SKB/JLW:ks

I:\Word Processing\Projects\171-GEO\171-2640 SR 20 over SR 316\171-2640 A REVISED BFI Report - SR 20 over SR 316.doc

Sujit K. Bhowmik
 Sujit K. Bhowmik, PhD, PE
 Chief Engineer



Geotechnical Engineering ♦ Environmental Services and Engineering ♦ Construction Services

3772 Pleasantdale Road
 Suite 165
 Atlanta, GA 30340-4270

P: 770-939-0089
 F: 770-939-4299

www.willmerengineering.com

Attachments: **Bridge Foundation Investigation**

Figures

- Figure 1 Project Location Map
- Figure 2 Boring Location Plan
- Figure 3 Generalized Subsurface Profile – Section A-A'
- Figure 4 Generalized Subsurface Profile – Section B-B'

Appendix

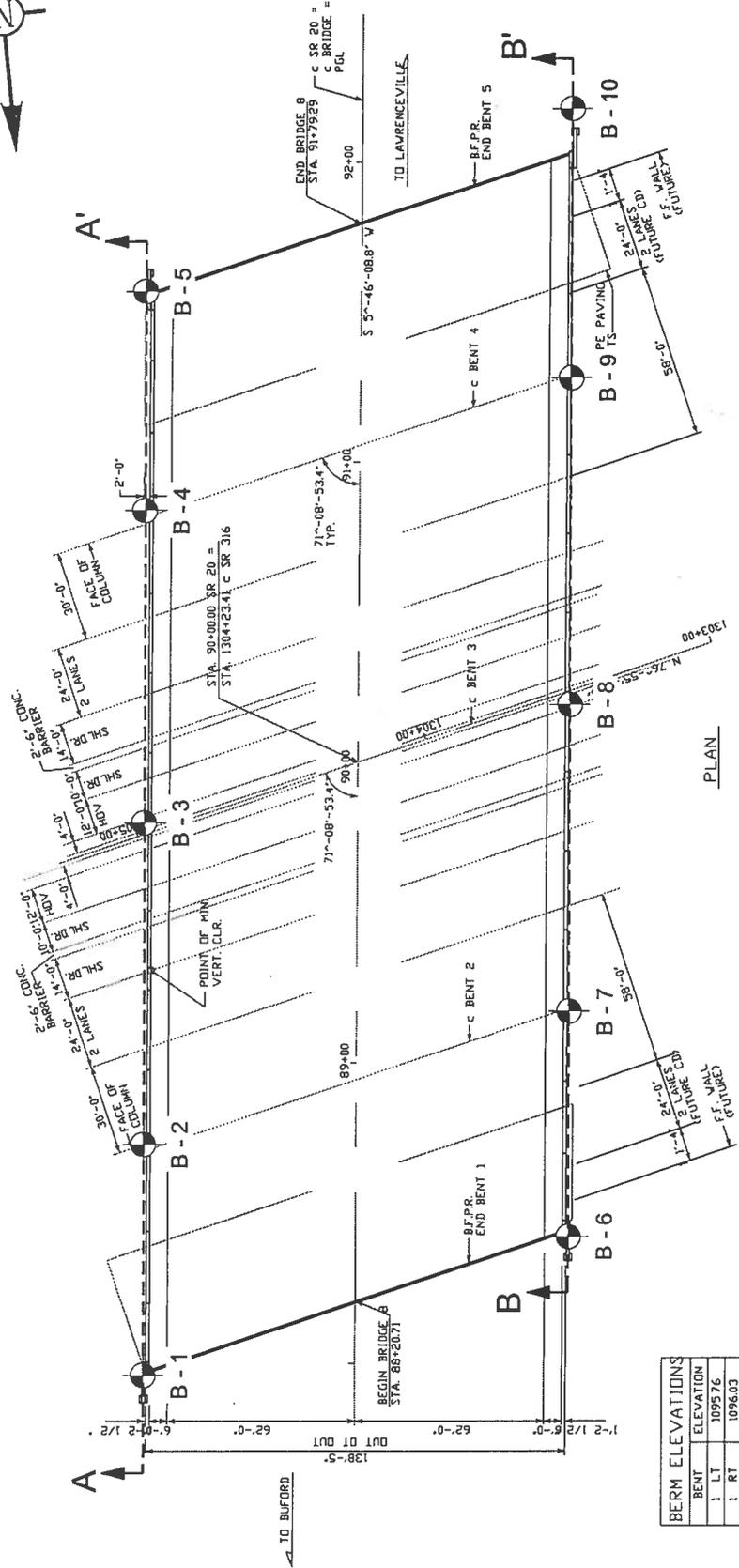
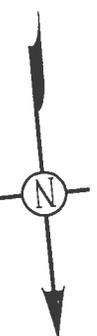
- Boring Record Legend
- Unified Soil Classification System Reference Sheet
- Engineering Description of Rock Hardness
- Boring Records: B-1 through B-10

BRIDGE FOUNDATION INVESTIGATION				
Willmer Project Number	ATL-171-2640A			
GDOT Project Number	MSL00-0004-00(086)			
Project P.I. Number	0004086			
Location	SR 20 over SR 316, Gwinnett County, Georgia (see Figure 1)			
GENERAL INFORMATION				
Project Description	A new four-span bridge is planned for SR 20 over SR 316. The bridge will be a 358.6 feet long by 138.4 feet wide reinforced concrete structure. The design lengths for the four spans from north to south are 73.8, 105.5, 105.5 and 73.8 feet, respectively. The construction of the proposed bridge will involve lowering of the vertical alignment of SR 316 at this intersection.			
Geologic Information	The project alignment is geologically sited within the Piedmont Physiographic Province of Georgia, and is underlain by Metamorphosed Maffic Rock and Quartzite Formations which include amphibolite and quartzite.			
Subsurface Features	<p>The subsurface profile is generally comprised of fill and residuum underlain by partially weathered rock (PWR) and parent bedrock, except at B-9 where no residuum was encountered. The fill material consists of loose to medium dense silty/clayey sand and/or firm to very stiff sandy silt/sandy clay. The residual soils consist of loose to very dense silty sand and firm to very stiff sandy silt.</p> <p>Ground water was encountered at all boring locations except at B-9. The ground water elevation ranged from about 1075 to 1084 feet.</p>			
PWR AND AUGER REFUSAL ELEVATIONS (feet)				
Bent No.		Reference Boring No.	Top of PWR	Auger Refusal
1	Left	B-1	1056	1052
	Right	B-6	1065	1057
2	Left	B-2	1072	1070
	Right	B-7	1067	1065
3	Left	B-3	1071	1065
	Right	B-8	1075	1071
4	Left	B-4	1077	1074
	Right	B-9	1091	1086
5	Left	B-5	--	1064
	Right	B-10	1081	1079
MAXIMUM PILE DESIGN LOADS				
Pile Type	Load Transfer (%)		Design Load	
	Friction	End Bearing		
H-Piles	20	80	10 BP 42 = 55 Tons	
			12 BP 53 = 70 Tons	
			14 BP 73 = 96 Tons	
			14 BP 89 = 117 Tons	

FOUNDATION RECOMMENDATIONS					
Bent No.		Spread Footing (Bearing)		Pile Bent (Type)	
1	Left			H	
	Right			H	
2	Left	10 ksf on PWR			
	Right	6 ksf on Soil			
3	Left	10 ksf on PWR			
	Right	10 ksf on PWR			
4	Left	20 ksf on rock			
	Right	20 ksf on rock			
5	Left			H	
	Right			H	
ELEVATIONS (feet)					
Bent No.		Reference Boring No.	Bottom of Spread Footing	H-Pile Tip Elevations	
				Minimum Tip	Estimated Tip
1	Left	B-1		1055±	1053±
	Right	B-6		1064±	1062±
2	Left	B-2	1072 or below		
	Right	B-7	1072 or below		
3	Left	B-3	1071 or below		
	Right	B-8	1075 or below		
4	Left	B-4	1072 on rock		
	Right	B-9	1072 on rock		
5	Left	B-5		1064±	1064±
	Right	B-10		1080±	1079±
NOTES: GENERAL					
Elevations		All elevations referenced in this report are based on a Bench Mark (1/2" rebar, EL. 1100.95 feet) established by the surveyors.			
As-built Information		As-built information should be forwarded to the Geotechnical Engineering Bureau upon completion of the foundation system.			
NOTES: SPREAD FOOTINGS					
Temporary Shoring		Temporary shoring may be required to construct spread footings at Bents 2, 3 and 4 if the footing excavations cannot be sloped back safely. Since ground water was encountered above the possible footing bottom elevations, dewatering of the excavations will also be required.			

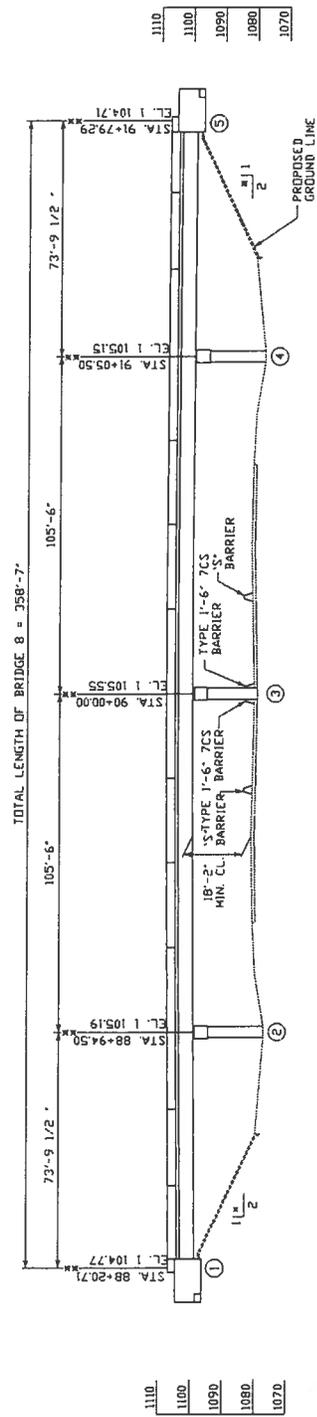
Spread Footings	Due to high ground water near the footing bottom elevation at Bents 2 and 3, we recommend that 12 inches of Type II foundation backfill material be set up for use in the footing areas. The use of this material should be at the direction of the Engineer and may be eliminated during construction if the footing area is dry.
NOTES: PILE BENTS	
PDO	Driving resistance after Minimum Tip Elevations are achieved.
Points	Pile points are recommended for piles driven at Bent 5 to insure adequate penetration through/into dense/very dense soils and PWR. The use of points should be at the direction of the project Geotechnical Engineer.
Waiting Period	None required.
Prepared By	Murthy S. Kotha / Sujit K. Bhowmik, PhD, PE
Senior Review By	James L. Willmer, PE

FIGURES



BERM ELEVATIONS	
BENT	ELEVATION
1 LT	1095.76
1 RT	1096.03
5 LT	1095.97
5 RT	1095.72

NOTE:
FOR BRIDGE CHOROLL STAKING ONLY.



LEGEND:
BORING LOCATION
B - 1

SCALE: 1" = 60'
DATE: 6/17/2008
DRAWN BY: CBS
REVIEWED BY: MK

WILLMER ENGINEERING INC.

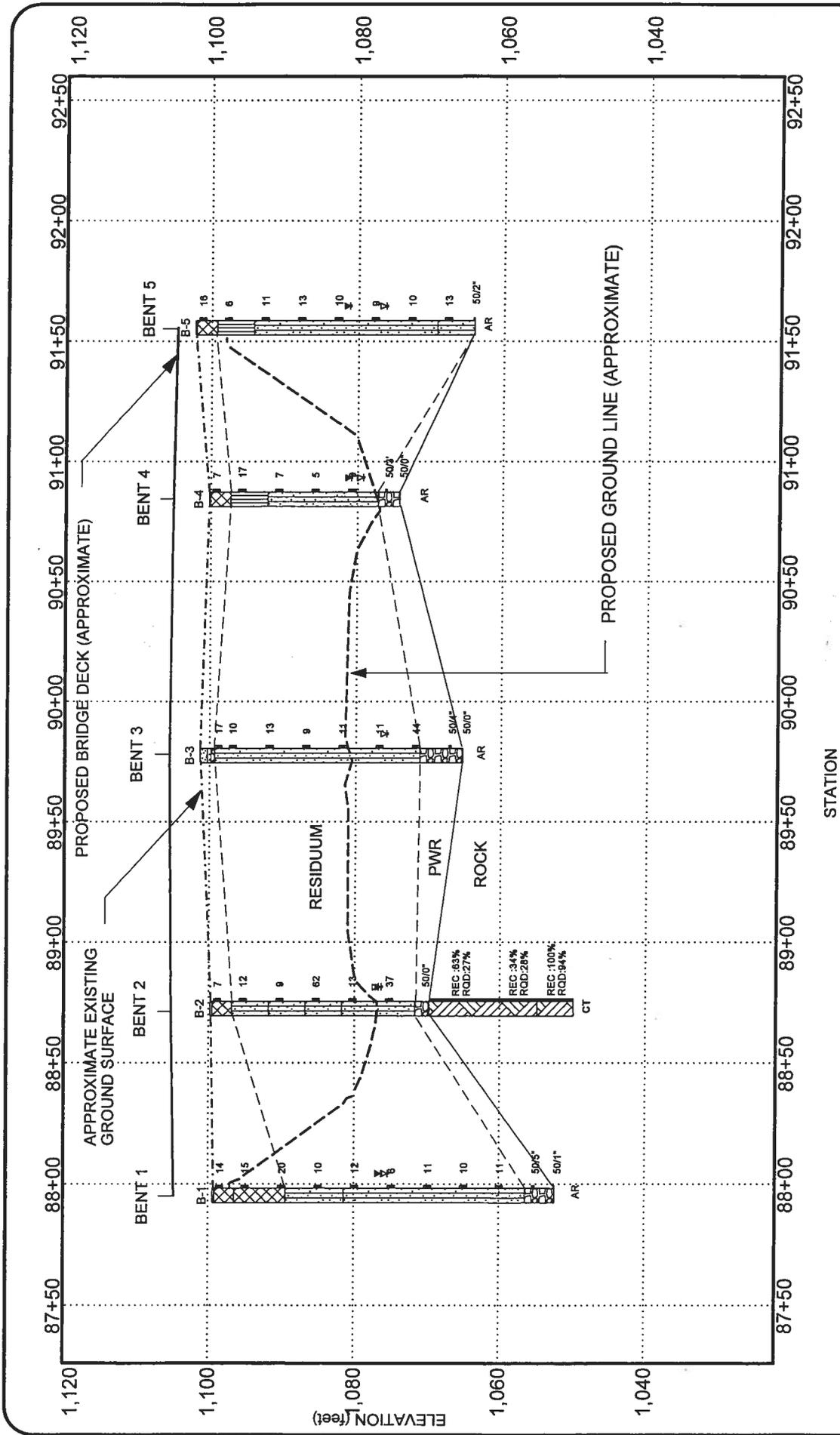


GEOTECHNICAL ENGINEERING & CONSTRUCTION SERVICES
ENVIRONMENTAL SERVICES AND ENGINEERING
3772 PLEASANTDALE ROAD - SUITE 165
ATLANTA, GA 30340-4270

FIGURE 2

BORING LOCATION PLAN
SR 20 OVER SR 316
GWINNETT COUNTY, GEORGIA
WILLMER PROJECT No. ATL-171-2640A

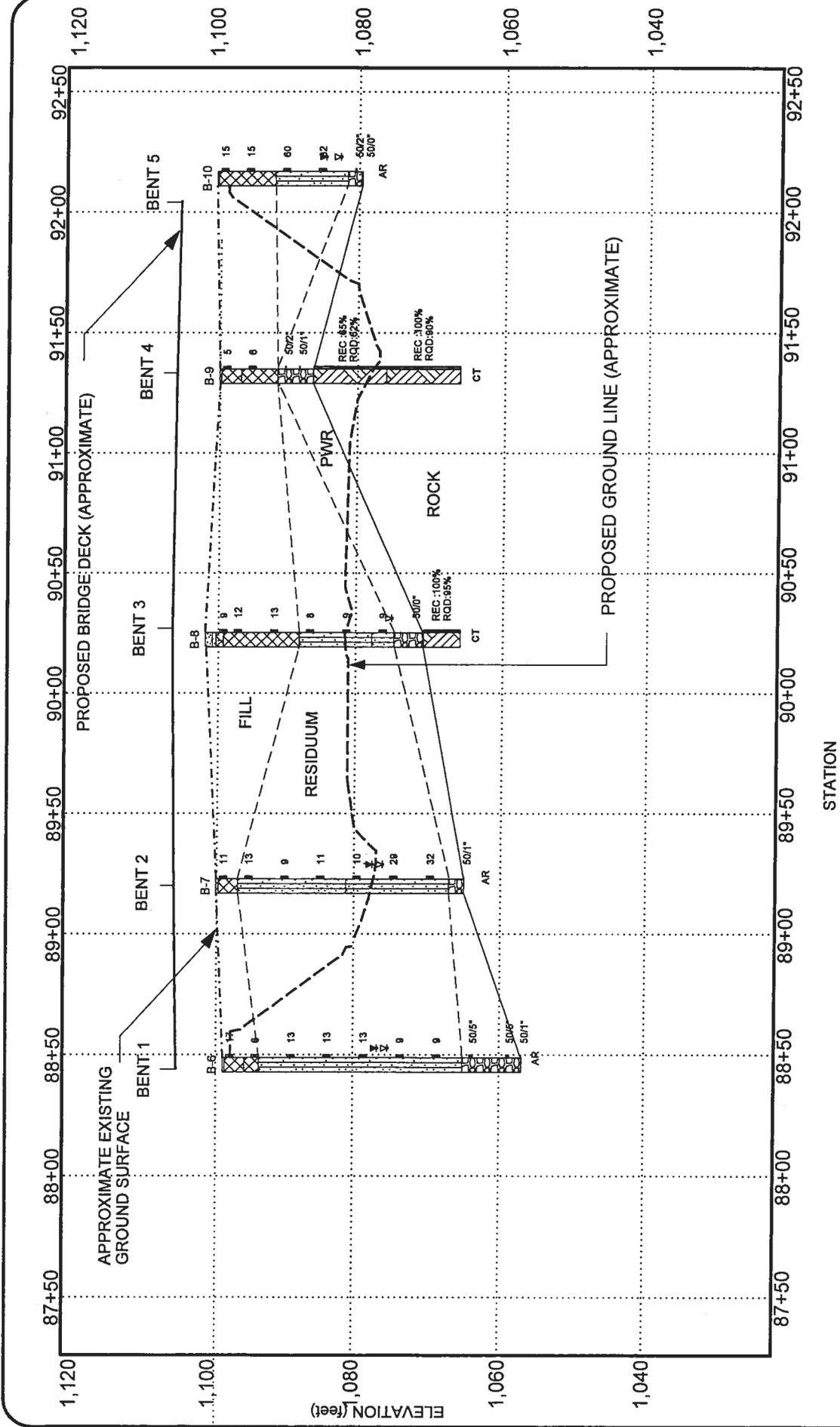
GDOT PROJECT NUMBER
MSL00-0004-00(086)
PI No. 0004086



GENERALIZED SUBSURFACE PROFILE SECTION A-A'		
SR 20 over SR 316 Gwinnett County, Georgia GDOT Proj. No. MSL00-0004-00(086); PI No. 0004086		
PROJECT #	DATE	FIGURE
171-2640A	Jun 03, 2008	3

LEGEND:
 † - Groundwater Table @ 24 hours
 ‡ - Groundwater Table @ Time of Boring
 AR - Auger Refusal
 CT - Coring Terminated
 PWR - Partially Weathered Rock
 REC - Rock Core Recovery
 RQD - Rock Quality Designation

SCALE : 1 inch = 20 feet (vertical)
 1 inch = 60 feet (horizontal)



GENERALIZED SUBSURFACE PROFILE SECTION B-B'

SR 20 over SR 316 Gwinnett County, Georgia	
GDOT Proj. No. MSL00-0004-00(086); PI No. 0004086	
PROJECT #	DATE
171-2640A	Jun 03, 2008
	FIGURE
	4

STATION

LEGEND:

- ⊥ - Groundwater Table @ 24 hours
- ⊥ - Groundwater Table @ Time of Boring
- AR - Auger Refusal
- CT - Coring Terminated
- PWR - Partially Weathered Rock
- REC - Rock Core Recovery
- RQD - Rock Quality Designation

SCALE : 1 inch = 20 feet (vertical)
1 inch = 60 feet (horizontal)

APPENDIX

BORING RECORD LEGEND

SM, CL, etc. - GROUP SYMBOL based on Unified Soil Classification System.
(Refer to ASTM D-2488 and Table 1 of D-2487)

N-VALUE: BLOWS PER FOOT- Standard Penetration Resistance (SPT) blow count ,
the sum of the second and third 6-inch increments of the SPT test.
(Refer to ASTM D-1586)

CONSISTENCY / RELATIVE DENSITY Correlated with SPT Blow Count, N:

<u>SILTS AND CLAYS</u>		<u>SANDS</u>	
<u>N</u> <u>(blows per foot)</u>	<u>Consistency</u>	<u>N</u> <u>(blows per foot)</u>	<u>Relative</u> <u>Density</u>
0 - 2	Very Soft	0 - 4	Very Loose
3 - 4	Soft	5 - 10	Loose
5 - 8	Firm	11 - 30	Medium Dense
9 - 15	Stiff	31 - 50	Dense
16 - 30	Very Stiff	> 50	Very Dense
31 - 50	Hard		
> 50	Very Hard		

NOTES:

- Groundwater Measurements: Water level at time of backfilling
- Water level at time of boring
- Caved level at 24 hours

ASPHALT 	CONCRETE 	TOPSOIL 	FILL 	GW 	GP 	GM
GC 	SW 	SP 	SM 	SC 	SANDY SILT 	SANDY CLAY
ML 	MH 	CL-ML 	CL 	CH 	OL 	OH
PEAT 	PWR 	ROCK 				

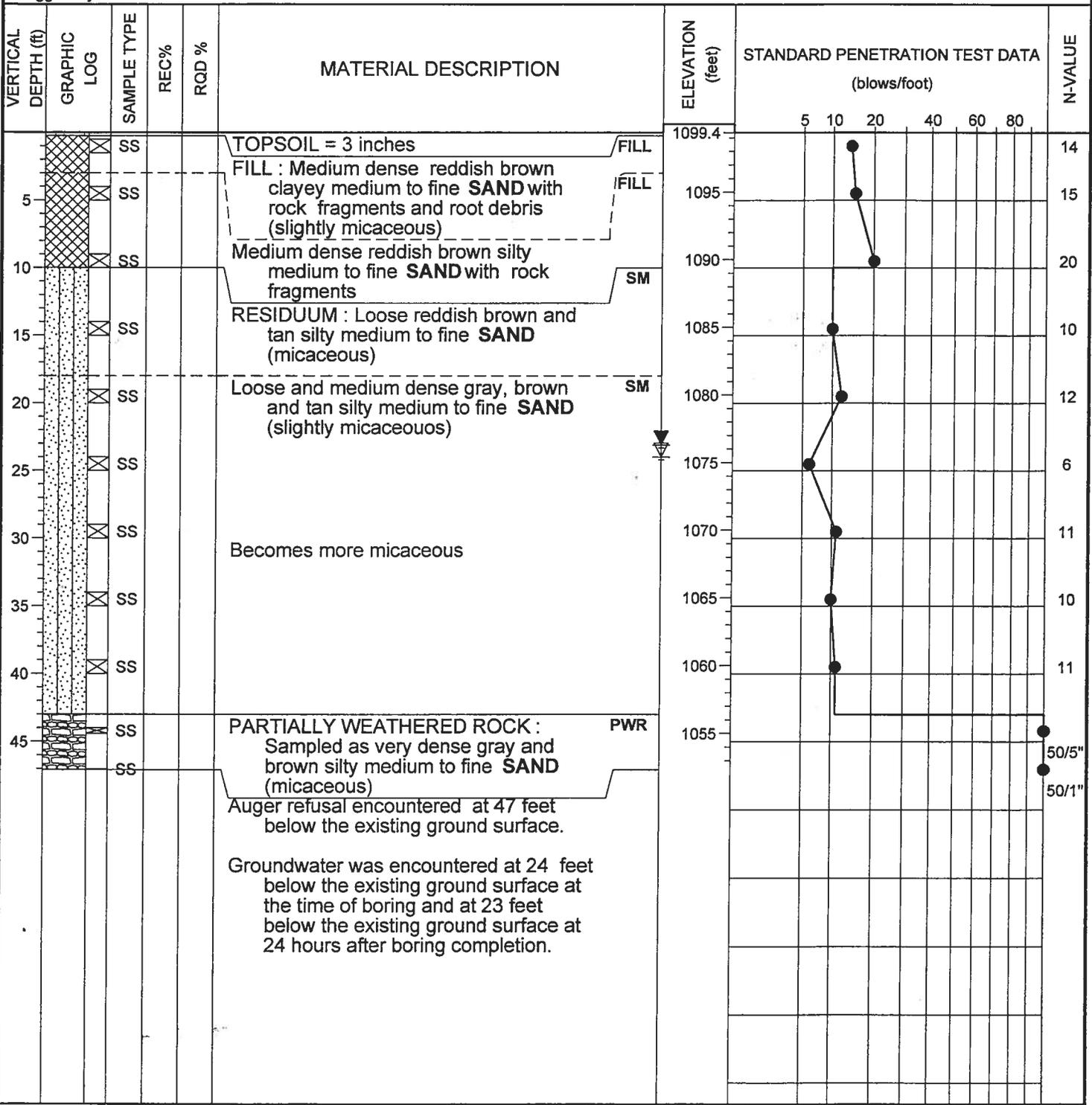
UNIFIED SOIL CLASSIFICATION SYSTEM REFERENCE SHEET

MAJOR DIVISIONS			LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN #200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION <u>RETAINED</u> #4 SIEVE	CLEAN GRAVELS LITTLE OR NO FINES	(GW)	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
			(GP)	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES APPRECIABLE AMOUNT OF FINES	(GM)	SILTY GRAVELS and GRAVEL-SAND-SILT MIXTURES
			(GC)	CLAYEY GRAVELS and GRAVEL-SAND-CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION <u>PASSING</u> #4 SIEVE	CLEAN SAND LITTLE OR NO FINES	(SW)	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
			(SP)	POORLY GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		SANDS WITH FINES APPRECIABLE AMOUNT OF FINES	(SM)	SILTY SANDS and SAND-SILT MIXTURES
			(SC)	CLAYEY SANDS and SAND-CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS <u>SMALLER</u> THAN #200 SIEVE SIZE	SILTS AND CLAYS LIQUID LIMIT <u>LESS</u> THAN 50		(ML)	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR VERY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			(CL)	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			(OL)	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT <u>GREATER</u> THAN 50		(MH)	INORGANIC ELASTIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS
			(CH)	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			(OH)	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			(PT)	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

**ENGINEERING DESCRIPTION
OF
ROCK HARDNESS**

Hardness	Description
Very hard	Cannot be scratched with knife or sharp pick. Breaking of hand specimens requires several hard blows of geologist's pick.
Hard	Can be scratched with knife or pick only with difficulty. Hard blow of hammer required to detach hand specimen.
Moderately hard	Can be scratched with knife or pick. can be excavated by hard blow of point of a geologist's pick. Hand specimens can be detached by moderate blow.
Medium	Can be grooved or gouged 1/16 inch deep by firm pressure on knife or pick point. Can be excavated in small chips to pieces about 1 inch maximum size by hard blows of the point of a geologist's pick.
Soft	Can be gouged or grooved readily with knife or pick point. Can be excavated in chips to pieces several inches in size by moderate blows of a pick point. Small thin pieces can be broken by finger pressure.
Very soft	Can be carved with knife. Can be excavated readily with point of pick. Pieces 1 inch or more in thickness can be broken with finger pressure. Can be scratched readily by fingernail.
Partially Weathered Rock	For engineering purposes, partially weathered rock (PWR) is locally defined as residual soils exhibiting Standard Penetration Test N-values in excess of 50 blows for 6 inches of penetration.

Project: **SR 20 over SR 316**
 Location: **Gwinnett County, Georgia**
 Project Number: **171-2640; GDOT Proj. No. MSL00-0004-00(086); PI No. 0004086** Location: **Bent 1 - Left**
 Azimuth: -- Angle from Horizontal: **90** Surface Elevation (ft): **1099.39** Station: **87+96, 70' Lt. of CL**
 Drilling Equipment: **CME 55** Drilling Method: **HSA Automatic Hammer**
 Core Boxes: **NA** Samples: **11** Overburden (ft): **47** Rock (ft): **NA** Total Depth (ft): **47.0**
 Logged By: **PT** Date Drilled: **5/1/08**



SPTN 171-2640.GPJ 6/16/08

SAMPLER TYPE SS - Split Spoon ST - Shelby Tube NQ - Rock Core, 1-7/8"	NX - Rock Core, 2-1/8" CU - Cuttings CT - Continuous Tube	DRILLING METHOD HSA - Hollow Stem Auger CFA - Continuous Flight Augers DC - Driving Casing	RW - Rotary Wash RC - Rock Core	Hole No. B-1
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Project: SR 20 over SR 316

Location: Gwinnett County, Georgia

Project Number: 171-2640; GDOT Proj. No. MSL00-0004-00(086); PI No. 0004086

HOLE No. B-2

Sheet 1 of 1

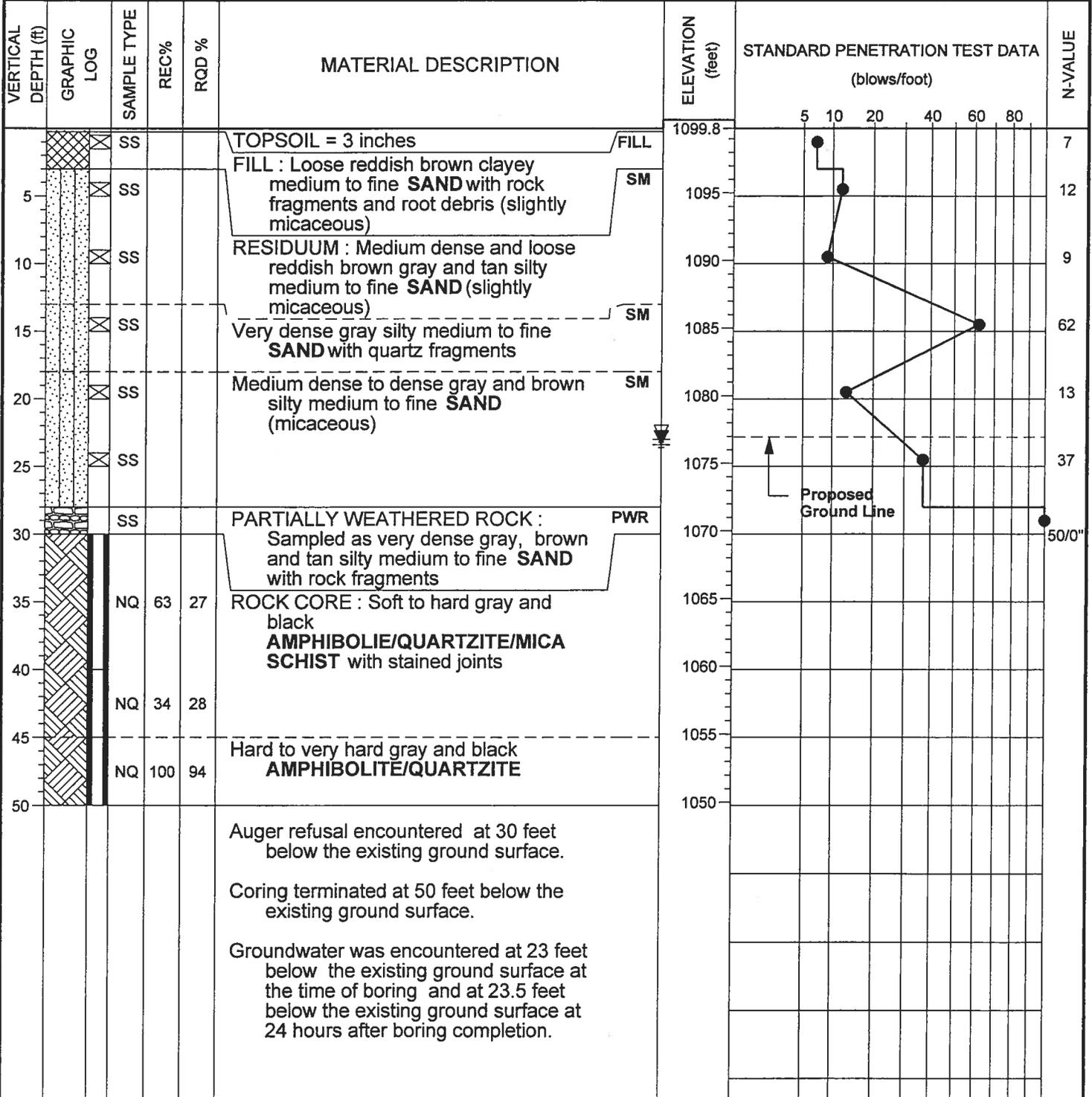
Location: Bent 2 - Left

Azimuth: -- Angle from Horizontal: 90 Surface Elevation (ft): 1099.77 Station: 88+73, 70' Lt. of CL

Drilling Equipment: CME 55 Drilling Method: HSA Automatic Hammer/ RC

Core Boxes: 2 Samples: 7 Overburden (ft): 30 Rock (ft): 20 Total Depth (ft): 50.0

Logged By: PT Date Drilled: 5/13/08



SPTN 171-2640.GPJ 6/16/08

SAMPLER TYPE

SS - Split Spoon NX - Rock Core, 2-1/8"
 ST - Shelby Tube CU - Cuttings
 NQ - Rock Core, 1-7/8" CT - Continuous Tube

DRILLING METHOD

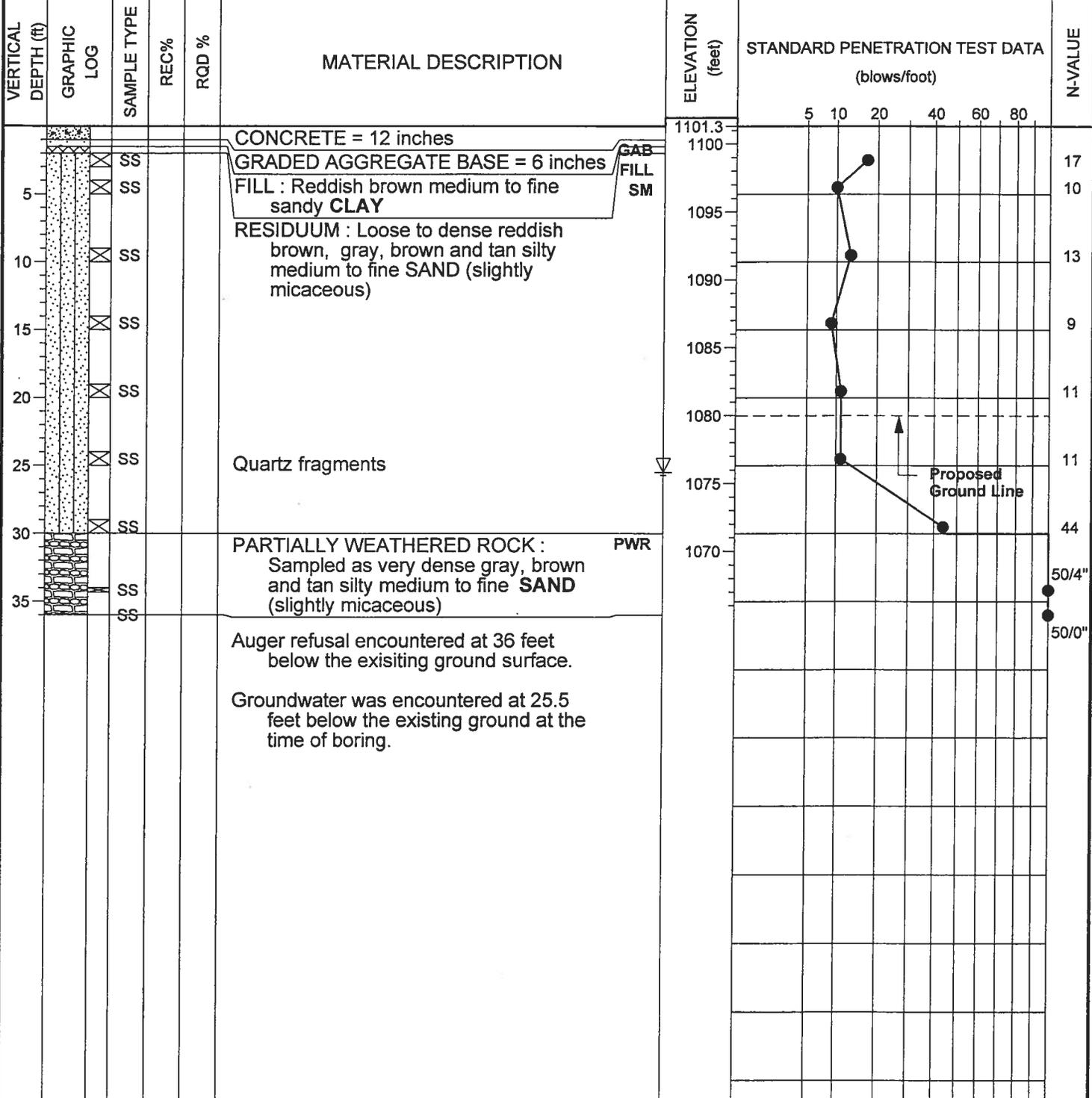
HSA - Hollow Stem Auger RW - Rotary Wash
 CFA - Continuous Flight Augers RC - Rock Core
 DC - Driving Casing

Hole No.
B-2



Rock Core Photograph: Boring B-2
SR 20 over SR 316, Gwinnett County, Georgia
GDOT Project No. MSL00-0004-00(0086), PI No. 0004086
Willmer Project No. 171-2640A

Project: **SR 20 over SR 316** HOLE No. **B-3**
 Location: **Gwinnett County, Georgia** Sheet 1 of 1
 Project Number: **171-2640; GDOT Proj. No. MSL00-0004-00(086); PI No. 0004086** Location: **Bent 3 - Left**
 Azimuth: **Angle from Horizontal: 90** Surface Elevation (ft): **1101.30** Station: **89+80, 70' Rt. of CL**
 Drilling Equipment: **CME 55** Drilling Method: **HSA Automatic Hammer**
 Core Boxes: **NA** Samples: Overburden (ft): Rock (ft): **NA** Total Depth (ft): **36.0**
 Logged By: **PT** Date Drilled: **5/15/08**



SAMPLER TYPE SS - Split Spoon ST - Shelby Tube NQ - Rock Core, 1-7/8"	DRILLING METHOD HSA - Hollow Stem Auger CFA - Continuous Flight Augers DC - Driving Casing	Hole No. <p style="text-align: center; font-size: 1.2em;">B-3</p>
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SPTN 171-2640.GPJ 6/16/08

Project: SR 20 over SR 316

Location: Gwinnett County, Georgia

Project Number: 171-2640; GDOT Proj. No. MSL00-0004-00(086); PI No. 0004086

HOLE No. B-4

Sheet 1 of 1

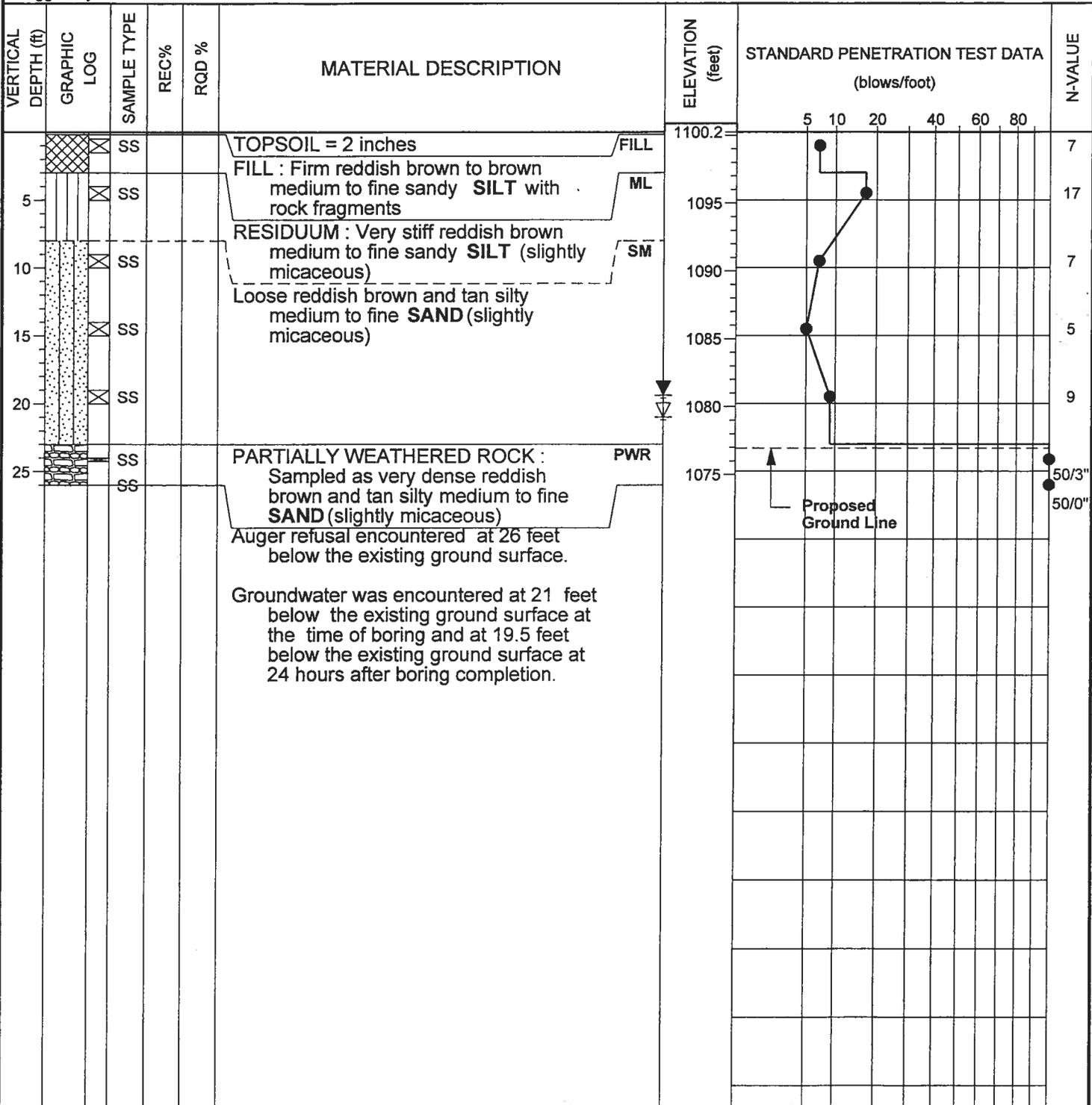
Location: Bent 4 - Left

Azimuth: -- Angle from Horizontal: 90 Surface Elevation (ft): 1100.24 Station: 90+84, 70' Lt. of CL

Drilling Equipment: CME 55 Drilling Method: HSA Automatic Hammer

Core Boxes: NA Samples: 8 Overburden (ft): 26 Rock (ft): NA Total Depth (ft): 26.0

Logged By: PT Date Drilled: 5/1/08



SAMPLER TYPE

SS - Split Spoon
 ST - Shelby Tube
 NQ - Rock Core, 1-7/8"

NX - Rock Core, 2-1/8"
 CU - Cuttings
 CT - Continuous Tube

DRILLING METHOD

HSA - Hollow Stem Auger
 CFA - Continuous Flight Augers
 DC - Driving Casing

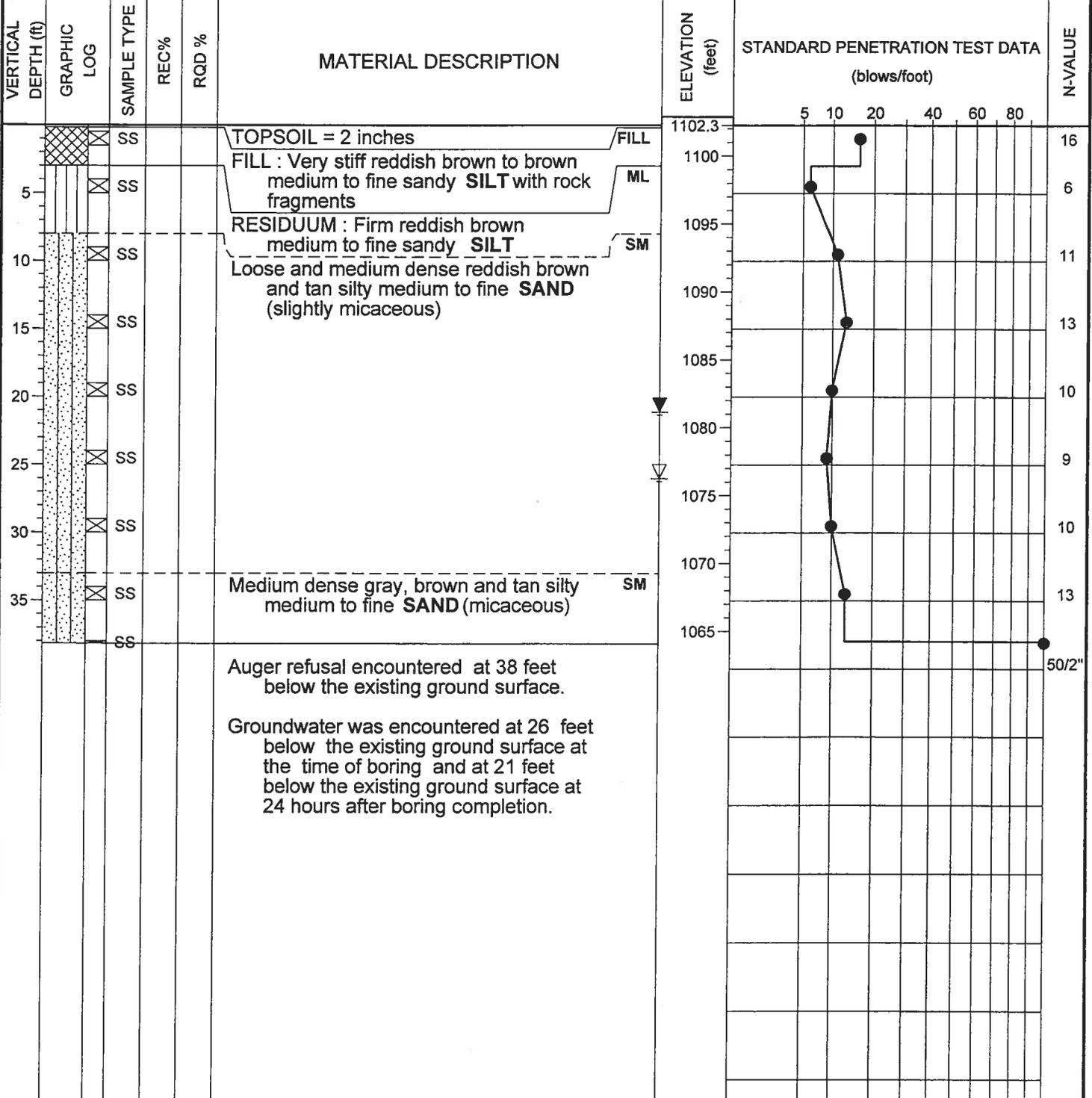
RW - Rotary Wash
 RC - Rock Core

Hole No.

B-4

Project: **SR 20 over SR 316**
 Location: **Gwinnett County, Georgia**
 Project Number: **171-2640; GDOT Proj. No. MSL00-0004-00(086); PI No. 0004086** Location: **Bent 5 - Left**
 Azimuth: -- Angle from Horizontal: **90** Surface Elevation (ft): **1102.25** Station: **91+57, 70' Lt. of CL**
 Drilling Equipment: **CME 55** Drilling Method: **HSA Automatic Hammer**
 Core Boxes: **NA** Samples: **9** Overburden (ft): **38** Rock (ft): **NA** Total Depth (ft): **38.0**
 Logged By: **PT** Date Drilled: **5/1/08**

HOLE No. B-5
 Sheet 1 of 1



SAMPLER TYPE

DRILLING METHOD

Hole No.

SS - Split Spoon
 ST - Shelby Tube
 NQ - Rock Core, 1-7/8"
 NX - Rock Core, 2-1/8"
 CU - Cuttings
 CT - Continuous Tube

HSA - Hollow Stem Auger
 CFA - Continuous Flight Augers
 DC - Driving Casing
 RW - Rotary Wash
 RC - Rock Core

B-5

SFTN 171-2640.GPJ 6/16/08

Project: SR 20 over SR 316

Location: Gwinnett County, Georgia

Project Number: 171-2640; GDOT Proj. No. MSL00-0004-00(086); PI No. 0004086

HOLE No. B-7
Sheet 1 of 1

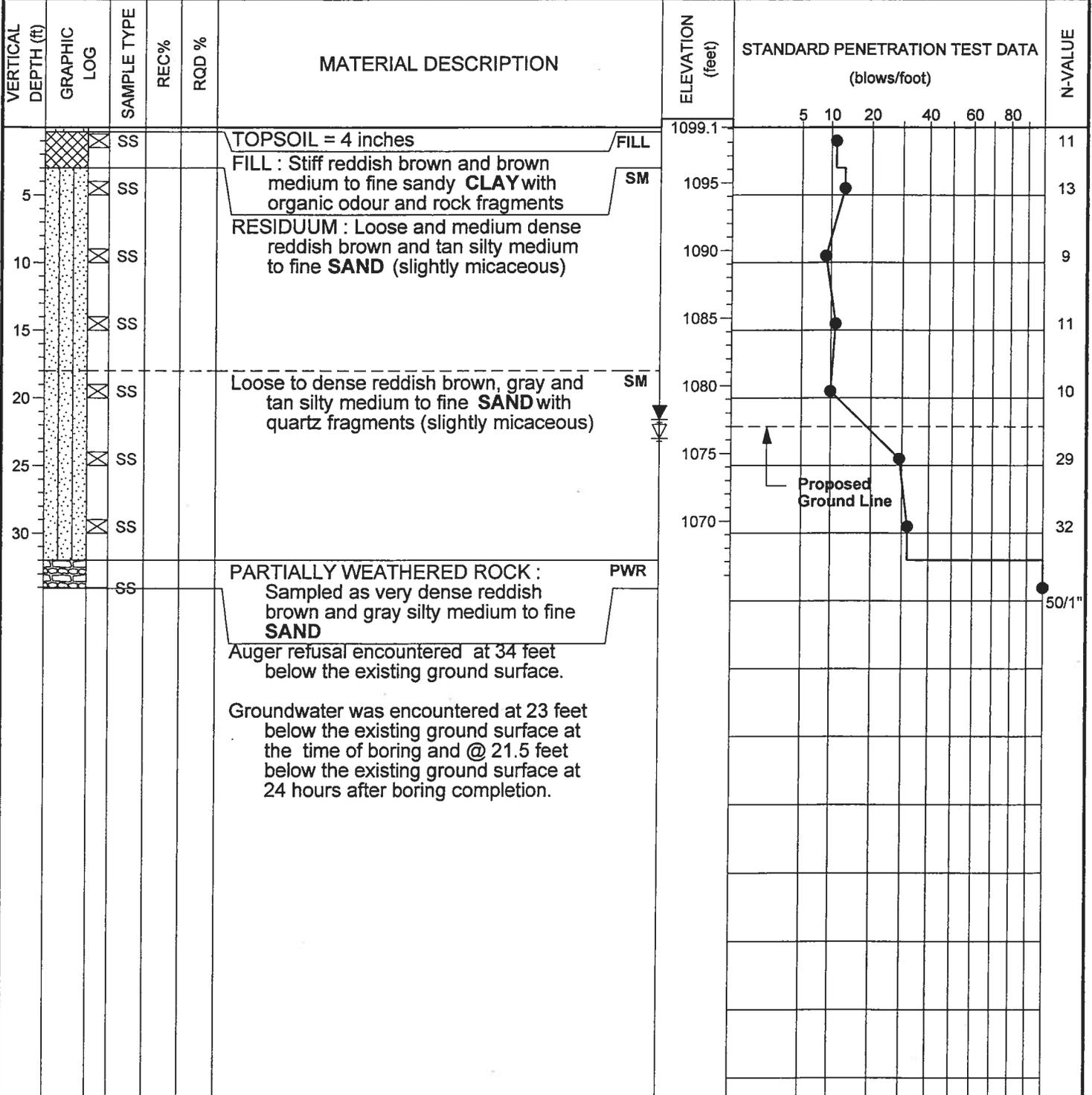
Location: Bent 2 - Right

Azimuth: -- Angle from Horizontal: 90 Surface Elevation (ft): 1099.10 Station: 89+17, 70' Rt. of CL

Drilling Equipment: CME 55 Drilling Method: HSA Automatic Hammer

Core Boxes: NA Samples: 8 Overburden (ft): 34 Rock (ft): NA Total Depth (ft): 34.0

Logged By: PT Date Drilled: 5/1/08



SPTN 171-2640.GPJ 6/16/08

SAMPLER TYPE

SS - Split Spoon
 ST - Shelby Tube
 NQ - Rock Core, 1-7/8"

NX - Rock Core, 2-1/8"
 CU - Cuttings
 CT - Continuous Tube

DRILLING METHOD

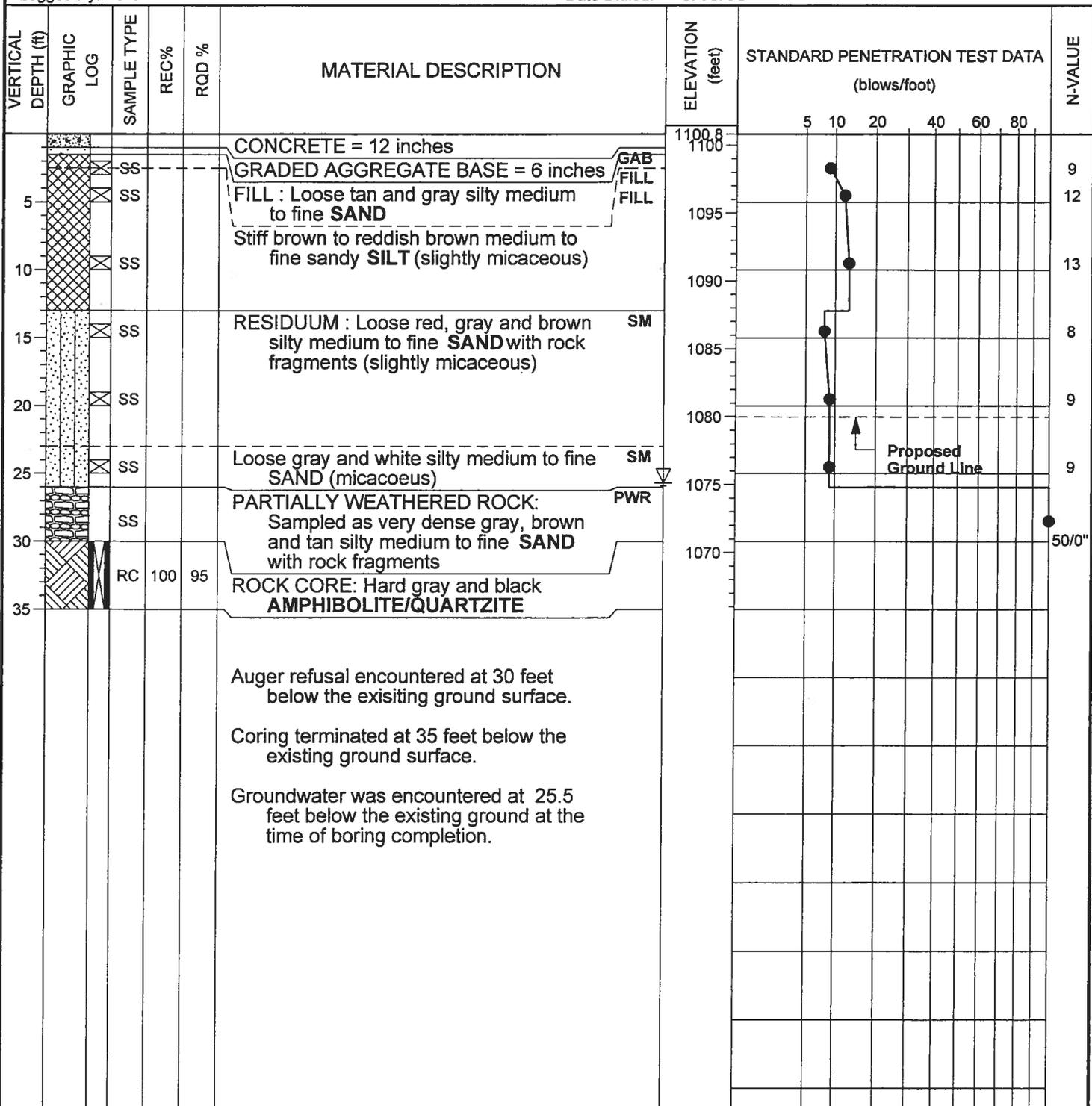
HSA - Hollow Stem Auger
 CFA - Continuous Flight Augers
 DC - Driving Casing

RW - Rotary Wash
 RC - Rock Core

Hole No.

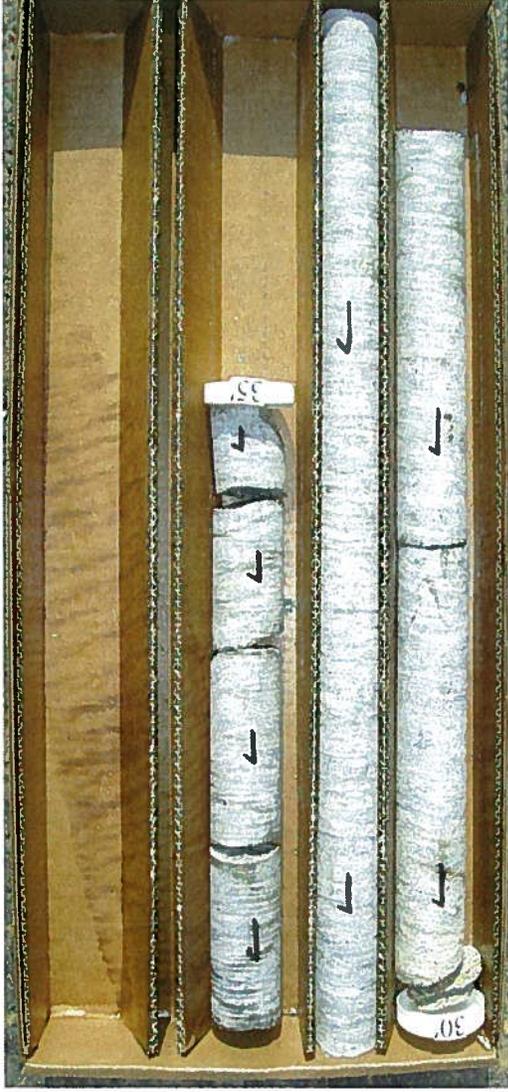
B-7

Project: **SR 20 over SR 316**
 Location: **Gwinnett County, Georgia**
 Project Number: **171-2640; GDOT Proj. No. MSL00-0004-00(086); PI No. 0004086** Location: **Bent 3 - Right**
 Azimuth: -- Angle from Horizontal: **90** Surface Elevation (ft): **1100.80** Station: **90+19, 70' Rt. of CL**
 Drilling Equipment: **CME 55** Drilling Method: **HSA Automatic Hammer**
 Core Boxes: **1** Samples: **7** Overburden (ft): **30** Rock (ft): **5** Total Depth (ft): **35.0**
 Logged By: **PT** Date Drilled: **5/15/08**



SPTN 171-2640.GPJ 6/16/08

SAMPLER TYPE SS - Split Spoon ST - Shelby Tube NQ - Rock Core, 1-7/8"	NX - Rock Core, 2-1/8" CU - Cuttings CT - Continuous Tube	DRILLING METHOD HSA - Hollow Stem Auger CFA - Continuous Flight Augers DC - Driving Casing	RW - Rotary Wash RC - Rock Core	Hole No. B-8
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Rock Core Photograph: Boring B-8
SR 20 over SR 316, Gwinnett County, Georgia
GDOT Project No. MSL00-0004-00(0086), PI No. 0004086
Willmer Project No. 171-2640A

Project: **SR 20 over SR 316**
 Location: **Gwinnett County, Georgia**
 Project Number: **171-2640; GDOT Proj. No. MSL00-0004-00(086); PI No. 0004086** Location: **Bent 4 - Right**
 Azimuth: -- Angle from Horizontal: **90** Surface Elevation (ft): **1099.06** Station: **91+28, 65' Rt. of CL**
 Drilling Equipment: **CME 55** Drilling Method: **HSA Automatic Hammer**
 Core Boxes: **2** Samples: **4** Overburden (ft): **13** Rock (ft): **20** Total Depth (ft): **33.0**

HOLE No. B-9
 Sheet 1 of 1

Logged By: **PT** Date Drilled: **5/1/08**

VERTICAL DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION	ELEVATION (feet)	STANDARD PENETRATION TEST DATA (blows/foot)	N-VALUE
0 - 3	[Cross-hatched pattern]	SS			TOPSOIL = 3 inches	1099.1	5	5
3 - 5	[Cross-hatched pattern]	SS			FILL : Firm reddish brown medium to fine sandy SILT with rock fragments (strong hydrocarbon odor)	1095	5	6
5 - 10	[Dotted pattern]	SS			Loose brown silty medium to fine SAND with rock fragments	1090		
10 - 13	[Dotted pattern]	SS			PARTIALLY WEATHERED ROCK : Sampled as very dense reddish brown and tan silty medium to fine SAND with rock fragments	1085		50/2"
13 - 25	[Diagonal lines]	NQ	65	62	ROCK CORE : Hard gray and black AMPHIBOLITE/MICA SCHIST/QUARTZITE with stained joints	1080		50/1"
25 - 33	[Diagonal lines]	NQ	100	90	Very hard gray and black AMPHIBOLITE/MICA SCHIST/QUARTZITE	1075		
33 - 33.0					Auger refusal encountered at 13 feet below the existing ground surface. Coring was terminated at 33 feet below the existing ground surface. Groundwater was not encountered at the time of boring completion.	1070		

SPTN 171-2640.GPJ 6/16/08

SAMPLER TYPE SS - Split Spoon ST - Shelby Tube NQ - Rock Core, 1-7/8"	NX - Rock Core, 2-1/8" CU - Cuttings CT - Continuous Tube	DRILLING METHOD HSA - Hollow Stem Auger CFA - Continuous Flight Augers DC - Driving Casing	RW - Rotary Wash RC - Rock Core	Hole No. B-9
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Rock Core Photograph: Boring B-9
SR 20 over SR 316, Gwinnett County, Georgia
GDOT Project No. MSL00-0004-00(0086), PI No. 0004086
Willmer Project No. 171-2640A

Project: SR 20 over SR 316

Location: Gwinnett County, Georgia

Project Number: 171-2640; GDOT Proj. No. MSL00-0004-00(086); PI No. 0004086

HOLE No. B-10

Sheet 1 of 1

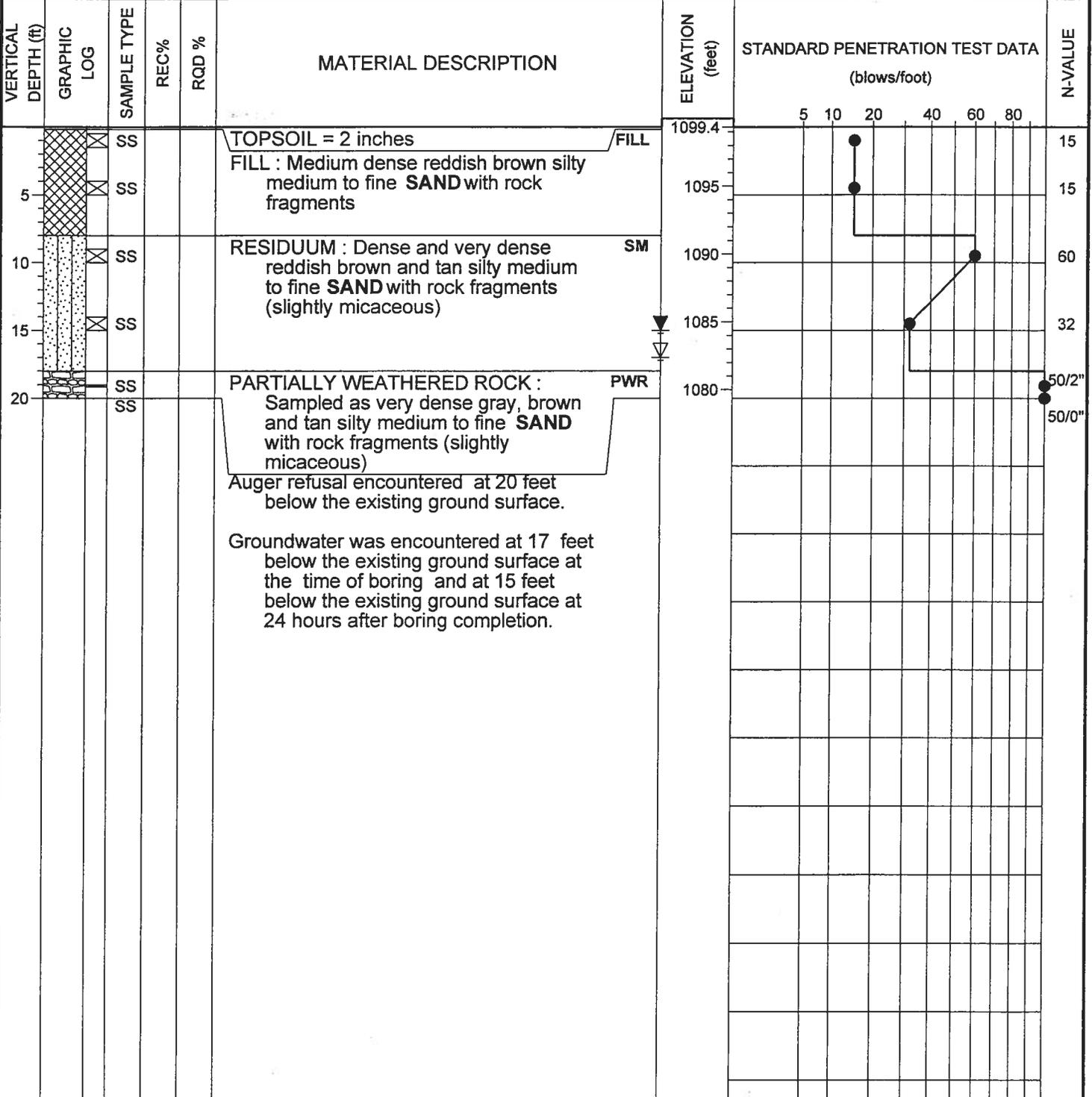
Location: Bent 5 - Right

Azimuth: -- Angle from Horizontal: 90 Surface Elevation (ft): 1099.36 Station: 92+18, 70' Rt. of CL

Drilling Equipment: CME 55 Drilling Method: HSA Automatic Hammer

Core Boxes: NA Samples: 6 Overburden (ft): 20 Rock (ft): NA Total Depth (ft): 20.0

Logged By: PT Date Drilled: 5/1/08



SPTN 171-2640.GPJ 6/16/08

SAMPLER TYPE
 SS - Split Spoon NX - Rock Core, 2-1/8"
 ST - Shelby Tube CU - Cuttings
 NQ - Rock Core, 1-7/8" CT - Continuous Tube

DRILLING METHOD
 HSA - Hollow Stem Auger RW - Rotary Wash
 CFA - Continuous Flight Augers RC - Rock Core
 DC - Driving Casing

Hole No.
B-10