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STATE OF GEORGIA

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FILE MSL00-0003-00(168),Gwinnett County
Collins Hill Road over SR 316
PI No. 0003168

OFFICE Materials and Research

DATE November 5, 2008

T.L. for

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

TO James B. Buchan, P.E., State Urban Design Engineer
Attention: ~~Neil~~ Neal O'Brien

SUBJECT Final Acceptance of Consultant's Bridge and Wall Foundation Investigation Report
Collins Hill Road over SR 316

As requested, we have reviewed the combination Bridge Foundation and Wall Foundation Investigation Report that was written on August 18, 2008 and revised October 9, 2008 by Willmer Engineering Inc. 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 Ian Rish of the Geotechnical Engineering Bureau at 404-363-7546.

GMG: IDR

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

Willmer Engineering Inc.
3772 Pleasantdale Road
Suite 165
Atlanta, GA 30340-4270
Attention: Murthy S. Kotha

BRIDGE AND RETAINING WALL
FOUNDATION INVESTIGATION REPORT
(Revised October 9, 2008)
COLLINS HILL ROAD OVER SR 316
GDOT Project No. MSL00-0003-00(168), PI No. 0003168
Gwinnett County, Georgia

WILLMER ENGINEERING INC.
Project No. ATL-171-2867C

Prepared For

PBS&J
Atlanta, Georgia

Prepared By

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

770.939.0089

WILLMER ENGINEERING INC. | WE

August 18, 2008
(Revised October 9, 2008)

VIA U.S. MAIL

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

SUBJECT: **Bridge and Retaining Wall Foundation Investigation Report**
Collins Hill Road over SR 316
GDOT Project No. MSL00-0003-00(168), PI No. 0003168
Gwinnett County, Georgia
Willmer Project No. ATL-171-2867C

Dear Mr. Moseley:

Willmer Engineering Inc. (Willmer) is pleased to provide this Bridge and Retaining Wall Foundation Investigation (BFI and WFI) report for the proposed Collins Hill Road bridge over SR 316 and the associated roadway improvements and ramps in Gwinnett County, Georgia. The BFI and WFI were 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 and retaining wall foundation investigation. This report was received to address GDOT comments dated September 19, 2008.

The attached summary presents the site and subsurface conditions along the proposed bridge alignments, and our geotechnical recommendations related to bridge and retaining wall 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.

Murthy S. Kotha
Project Engineer

Suit K. Bhowmik, PhD, PE
Chief Engineer

GEORGIA REGISTERED No. 029802 PROFESSIONAL ENGINEER SUIT K. BHOWMIK
10/9/08

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

MSK/SKB/JLW:ks
I:\Word Processing\Projects\171-GEO\171-2867\Reports\171-2867 C - REVISED BFI & WFI - Collins Hill Rd over SR 316.doc

Attachments: **Bridge and Retaining Wall Foundation Investigation**

Figures

Figure 1	Project Location Map
Figure 2A	Boring Location Plan – Bridge
Figure 2B	Retaining Wall Location Plan
Figure 2C	Boring Location Plan – Wall 8
Figure 2D	Boring Location Plan – Wall 8
Figure 2E	Boring Location Plan – Wall 9
Figure 2F	Boring Location Plan – Wall 11
Figure 2G	Boring Location Plan – Wall 12
Figure 2H	Retaining Wall Profile – Wall 12
Figure 2I	Boring Location Plan – Wall 13
Figure 2J	Boring Location Plan – Wall 14
Figure 2K	Boring Location Plan – Wall 15
Figure 3	Generalized Subsurface Profile – Section A-A'
Figure 4A	Generalized Subsurface Profile – Section B-B'
Figure 4B	Generalized Subsurface Profile – Section B-B'
Figure 5	Generalized Subsurface Profile – Section C-C'
Figure 6	Generalized Subsurface Profile – Section D-D'
Figure 7	Generalized Subsurface Profile – Section E-E'
Figure 8	Generalized Subsurface Profile – Section F-F'
Figure 9	Generalized Subsurface Profile – Section G-G'
Figure 10	Generalized Subsurface Profile – Section H-H'

Appendix I

Boring Record Legend
Unified Soil Classification System Reference Sheet
Engineering Description of Rock Hardness
Boring Records

Appendix II

Laboratory Test Results

BRIDGE FOUNDATION INVESTIGATION	
Willmer Project Number	ATL-171-2867C
GDOT Project Number	MSL00-0003-00(168)
Project P.I. Number	00031689
Location	Collins Hill Road over SR 316, Gwinnett County, Georgia (see Figure 1)

GENERAL INFORMATION	
Project Description	A new four-span bridge is planned for Collins Hill Road over SR 316. The bridge will be a 361.8 feet long by 94.5 feet wide reinforced concrete structure. The design lengths for the four spans from north to south are 83.4, 103.7, 103.7 and 70.9 feet, respectively. The project also includes seven retaining walls for bridge abutments, ramps and roadway improvements.
Geologic Information	The project alignment is geologically sited within the Piedmont Physiographic Province of Georgia, and is underlain by Metamorphosed Maffic Rock and Metagraywacke Formations which include amphibolite, mica schist and metagraywacke.
Subsurface Features	The subsurface profile is generally comprised of fill and residuum underlain by partially weathered rock (PWR) and parent bedrock. The fill material consists of loose to medium dense silty/clayey sand and stiff sandy silt. The residual soils consist of loose to very dense silty sand. Groundwater was recorded at all boring locations except at B-5. The groundwater elevation ranged from about 1026 to 1045 feet.

PWR AND AUGER REFUSAL ELEVATIONS (feet)

Bent No.	Reference Boring No.	Top of PWR	Auger Refusal
1	B-1	1021	1019
2	B-2	1039	1031
3	B-3	1002	999
4	B-4	1017	998
5	B-5	1009	1001

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		
Bridge Bent No.	**Pile Footing (Type)**	**Pile Bent (Type)**
1		H
2	H	
3	H	
4	H	
5		H

PILE TIP ELEVATIONS (feet)			
Bent No.	**Reference Boring No.**	**H-Pile**	
		Minimum Tip	**Estimated Tip**
1	B-1	1023±	1021±
2	B-2	1039±	1034±
3	B-3	1004±	1002±
4	B-4	1016±	1014±
5	B-5	1012±	1008±

NOTES	
Elevations	All elevations referenced in this report are based on a Bench Mark (1/2" rebar, EL. 1100.95 feet) established by the surveyors.
PDO	Driving resistance after Minimum Tip Elevations are achieved.
Points	Pile points are recommended for all piles driven at Bent 5 to ensure penetration through the very dense soil layer encountered above the proposed minimum tip elevation. The use of points should be at the direction of the Engineer.
Down-Drag Protection	To avoid inducing down-drag loads onto the piles from potential settlement of the loose to medium dense silty sand and firm sandy clay during construction of the MSE wall, we recommend that the piles at bents 1 and 5 be protected from down-drag using Jackets or other approved measures.
Waiting Period	None required (see MSE wall recommendations)
Special Problems	None.
As-Built Information	As-built information should be forwarded to the Geotechnical Engineering Bureau upon completion of the foundation system.
Prepared By	Murthy S. Kotha / Sujit K. Bhowmik, PhD, PE
Senior Review By	James L. Willmer, PE

RETAINING WALL INVESTIGATION	
Location and Description	Seven retaining walls (Wall Nos. 8, 9, and 11 through 15) are proposed for the bridge abutments, roadway improvements, and new ramps associated with the proposed four-span bridge for Collins Hill Road over SR 316. Locations of the proposed retaining walls are shown in Figure 2B. Wall No. 8: Wall No. 8 is a proposed cantilever retaining wall that extends from approximate Station 484+21 to 494+94 along Ramp T on the south side of eastbound SR 316 (see Figures 2B, 2C and 2D). The total length of the wall is about 1073 feet, the maximum height of the wall is about 13 feet, and the bottom elevation of the wall ranges from about 1039 to 1068 feet. Wall No. 9: Wall No. 9 is a proposed MSE wall that extends from Station 1262+00 to 1269+64 along the north side of westbound SR 316 (see Figures 2B and 2E). The total length of the wall is 764 feet. The maximum height of the wall is about 24 feet with bottom elevations ranging from about 1046 to 1066 feet. Wall No. 11: Wall No. 11 is a proposed MSE wall that extends from approximate Station 85+06 to 87+65 along the east side of Collins Hill Road (see Figures 2B and 2F). The total length of the wall is about 260 feet. The maximum height of the wall is about 19 feet with bottom elevations ranging from about 1075 to 1084 feet. Wall No. 12: Wall No. 12 is a proposed MSE wall that extends from approximate Station 71+94 to 78+05 along the west side of Collins Hill Road and then turns and forms the abutment wall for Bent 1 of the proposed Collins Hill Road bridge over SR 316 (see Figures 2B, 2G and 2H). The total length of the wall is about 740 feet. The maximum height of the wall is about 28 feet with bottom elevations ranging from about 1065.5 to 1072.5 feet. Wall No. 13: Wall No. 13 is a proposed MSE wall that forms the abutment and wing walls at Bent 5 of the proposed Collins Hill Road bridge over SR 316 (see Figures 2B and 2I). The total length of the wall is about 187 feet. The maximum height of the wall is about 21 feet with bottom elevations ranging from about 1066 to 1067 feet. Wall No. 14: Wall No. 14 is a proposed cantilever retaining wall that extends from approximate Station 504+26 to 509+22 along Ramp U on the south side of eastbound SR 316 (see Figures 2B and 2J). The total length of the wall is about 496 feet. The maximum height of the wall is about 15 feet with bottom elevations ranging from about 1051 to 1064 feet.

Location and Description (continued)	Wall No. 15: Wall No. 15 is a proposed MSE wall that extends from approximate Station 686+00 to Station 682+05 along Ramp V on the north side of westbound SR 316 (see Figures 2B and 2K). The total length of the wall is about 395 feet. The maximum height of the wall is about 34 feet with bottom elevations ranging from about 1021 to 1031 feet.
Subsurface Features	Wall No. 8: The subsurface profile along Wall No. 8 (see boring logs RW 8-1 through RW 8-7 and Figures 4A and 4B) is comprised mostly of residual soils with fill encountered at two of the seven boring locations. The fill consists of loose to medium dense silty sand or stiff sandy silt. The residual soils consist of very loose to medium dense silty sand and firm to stiff sandy clay. Ground water was not encountered in any of the borings at the time of our field investigation. Wall No. 9: The subsurface profile along Wall No. 9 (see boring logs RW 9-1 through RW 9-5 and Figure 5) is comprised mostly of residual soils with fill encountered at two of the five boring locations. The fill consists of loose to medium dense silty sand. The residual soils consist of very loose to medium dense silty sand and stiff sandy silt. Ground water was encountered at two boring locations between approximate elevations of 1030 and 1032 feet. Wall No. 11: The subsurface profile along Wall No. 11 (see boring logs RW 11-1 through RW 11-3 and Figure 6) is comprised of residual soils consisting of loose to medium dense silty sand. Auger refusal was encountered at boring RW 11-2 at an elevation of 1071 feet. Ground water was not encountered at the time of our field investigation. Wall No. 12: The subsurface profile along Wall No. 12 (see boring logs B-1, RW 12-1 through RW 12-4 and Figure 7) is comprised of fill underlain by residual soils, partially weathered rock (PWR) and parent bedrock. The fill consists of loose silty sand and very soft to firm sandy silt. The residual soils consist of loose to very dense silty sand and firm to stiff sandy silt. Ground water was encountered at an elevation between 1026 1041 feet. Wall No. 13: The subsurface profile along Wall No. 13 (see boring logs B-5, RW 13-1 and RW 13-2, and Figure 8) is comprised of fill and/or residual soils underlain by PWR and parent bedrock. The fill consist of loose to medium dense silty sand and the residual soils consist of loose to very dense silty sand. Ground water was encountered at boring RW 13-1 at an elevation of about 1039 feet.

Subsurface Features (continued)	Wall No. 14: The subsurface profile along Wall No. 14 (see boring logs RW 14-2 through RW 14-5, and Figure 9) is comprised of fill and residuum underlain by partially weathered rock (PWR) and parent bedrock. The fill consists of loose to medium dense silty sand and residual soils consist of very loose to medium dense silty sand. Auger refusal was encountered at boring RW 14-5 at an elevation of about 1034 feet. Ground water was encountered at boring RW 14-4 at an elevation of about 1046 feet. Wall No. 15: The subsurface profile at Wall No. 15 (see boring logs RW 15-1 through RW 15-3 and Figure 10) is comprised of fill and residual soils underlain by partially weathered rock (PWR) and parent bedrock. The fill consists of loose to medium dense silty sand or stiff sandy silt. The residual soils consist of very loose to medium dense silty sand. Auger refusal was encountered at all the borings between elevations of 1005 and 1013 feet. Ground water was encountered at all the borings between approximate elevations 1024 and 1028 feet.
Soil Parameters	MSE Walls: The following soil design parameters are recommended for use in design of the proposed MSE walls (i.e., Wall Nos. 9, 11, 12, 13 and 15): Soil Unit Weight γ = 120 pcf Cohesion c = 0 psf Angle of Internal Friction ϕ = 30 degrees Coefficient of Sliding Friction μ = 0.40 The above design parameters assume the backfill material behind the MSE wall reinforced fill will consist of silty sand compacted to the specified density, and the subgrade prepared as recommended in this report. Cantilever Retaining Walls: The following soil design parameters are recommended for use in design of the proposed cantilever retaining walls (i.e., Wall Nos. 8 and 14): Soil Unit Weight γ = 120 pcf Cohesion c = 0 psf Angle of Internal Friction ϕ = 30 degrees Coefficient of Sliding Friction μ = 0.35 The above design parameters assume the backfill material behind the wall will consist of silty sand compacted to the specified density, and the subgrade prepared as recommended in this report.

Recommendations

Based on the boring data, the soil type and strength along the various walls are expected to vary significantly. The following steps are recommended for the proposed walls:

(i) We recommend that soft/loose soils from beneath the MSE wall reinforced fill or cantilever retaining wall footing be undercut to a depth of 2 feet and replaced with compacted wall backfill material at the following locations:

Wall No.	Station to Station
9	1263+00± to 1266+50±
12	74+00± to 77+00±
14	504+00± to 505+50±
15	682+00± to 683+00±

(ii) We recommend the following maximum allowable bearing pressures for use in design of the walls:

Wall Nos. 8, 9, 12, 13, 14 and 15: 2,000 psf

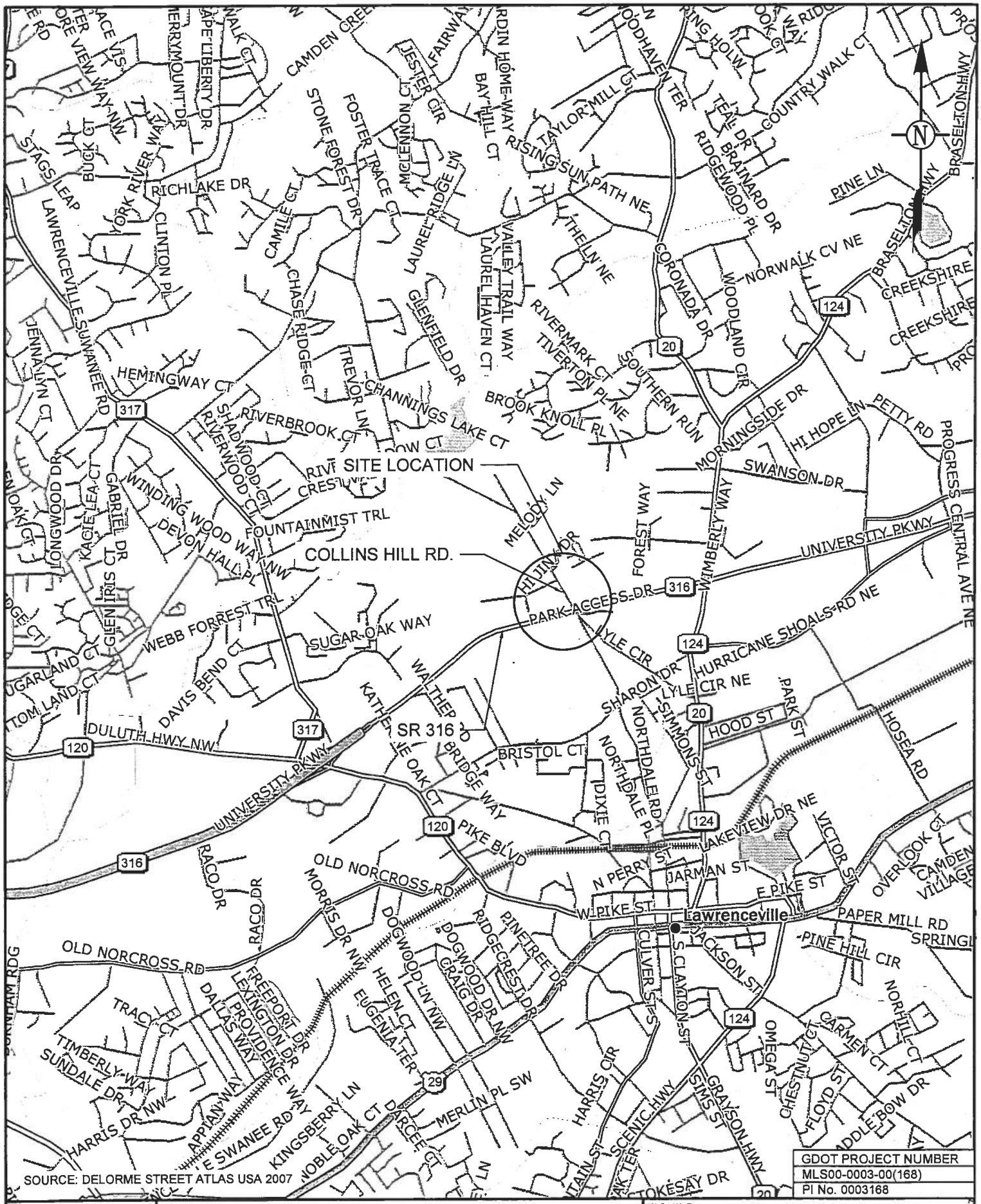
Wall No. 11: 4,000 psf

(iii) For the MSE walls (Wall Nos. 9, 11, 12, 13 and 15), if the design bearing pressure exceeds the corresponding recommended maximum allowable bearing pressure, the walls should be constructed in stages to minimize differential settlement of the walls. In the first stage, the wall should be constructed to half of its final height. A minimum 30-day waiting period should be allowed after the first stage before beginning of the second stage of construction. Settlement of the MSE walls should be monitored upon completion of the first stage of construction. The length of the waiting period may be increased or decreased based on the settlement monitoring data, at the discretion of the Engineer. After the waiting period, the MSE wall should be constructed to the final height.

(iv) The backfill materials and drainage measures for the walls should conform to GDOT standard specifications.

Prepared By	Murthy S. Kotha / Sujit K. Bhowmik, PhD, PE
Senior Review By	James L. Willmer, PE

FIGURES



GDOT PROJECT NUMBER
MLS00-0003-00(168)
PI No. 0003168

SCALE: 1" = 3000'	
DATE: 8/15/2008	
DRAWN BY: CBS	
REVIEWED BY: MK	

WILLMER ENGINEERING, INC. WE

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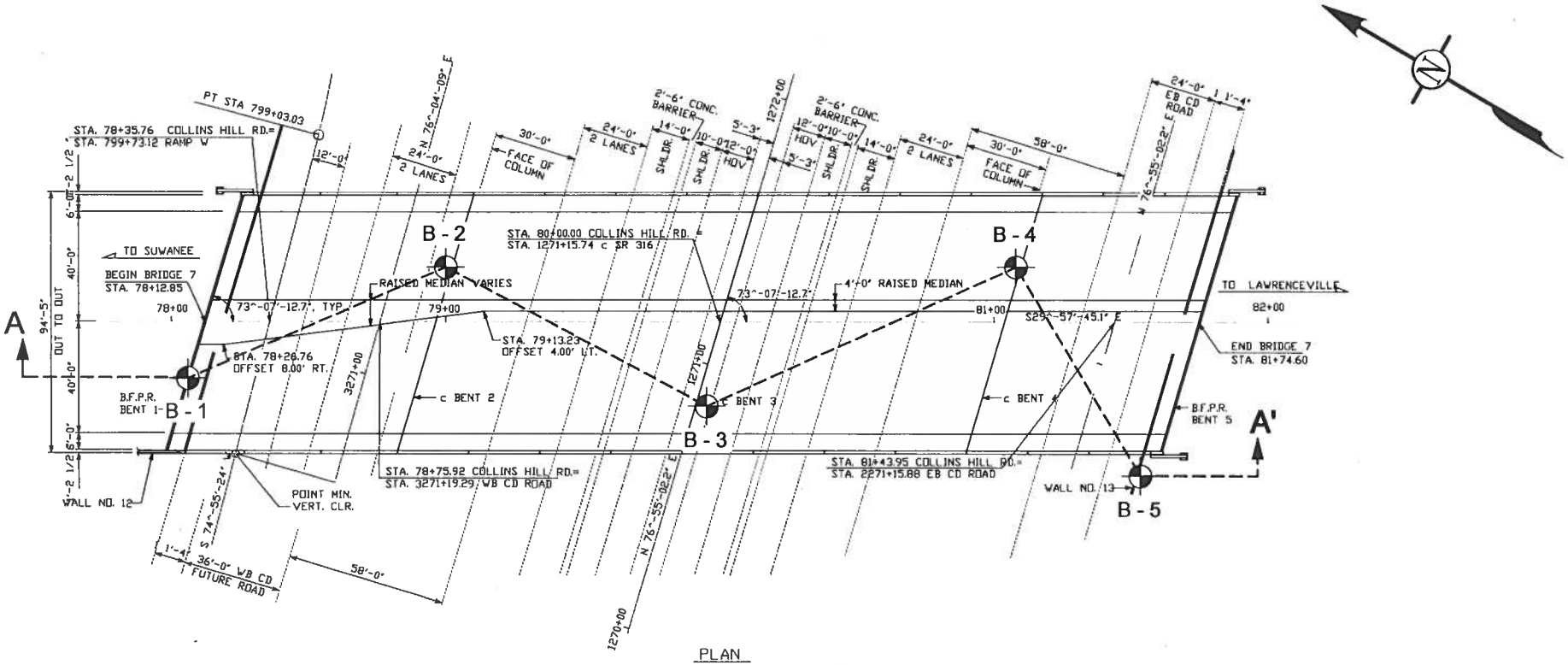
ENVIRONMENTAL SERVICES AND ENGINEERING
3772 PLEASANTDALE ROAD - SUITE 165
ATLANTA, GA 30340-4270

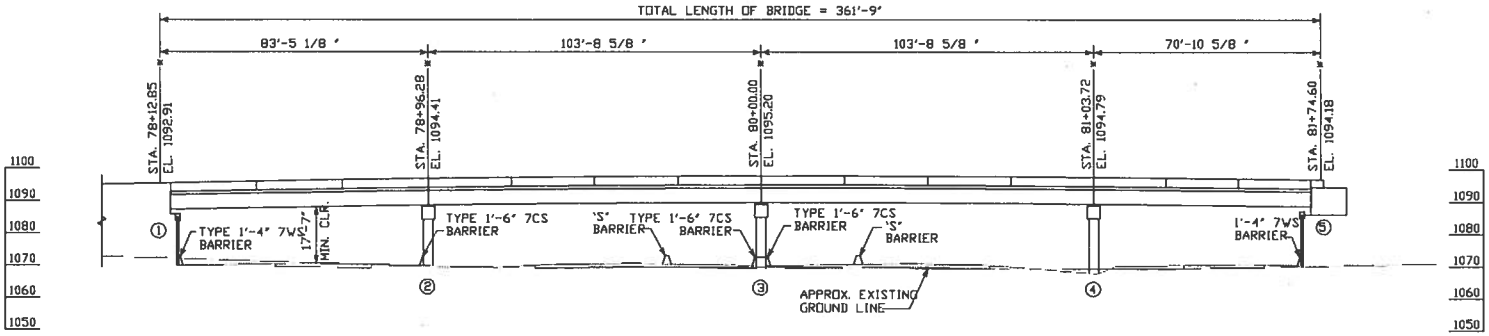
FIGURE 1

PROJECT LOCATION MAP
COLLINS HILL ROAD OVER SR 316
GWINETT COUNTY ,GEORGA
WILLMER PROJECT No. ATL-171-2867C

AutoCAD\171.GEO\17



PLAN



ELEVATION

LEGEND:

BORING LOCATION
B - 1

GDOT PROJECT NUMBER
MLS00-0003-00(168)
PI No. 0003168

SCALE: 1" = 60'	
DATE: 8/15/2008	
DRAWN BY: CBS	
REVIEWED BY: MK	

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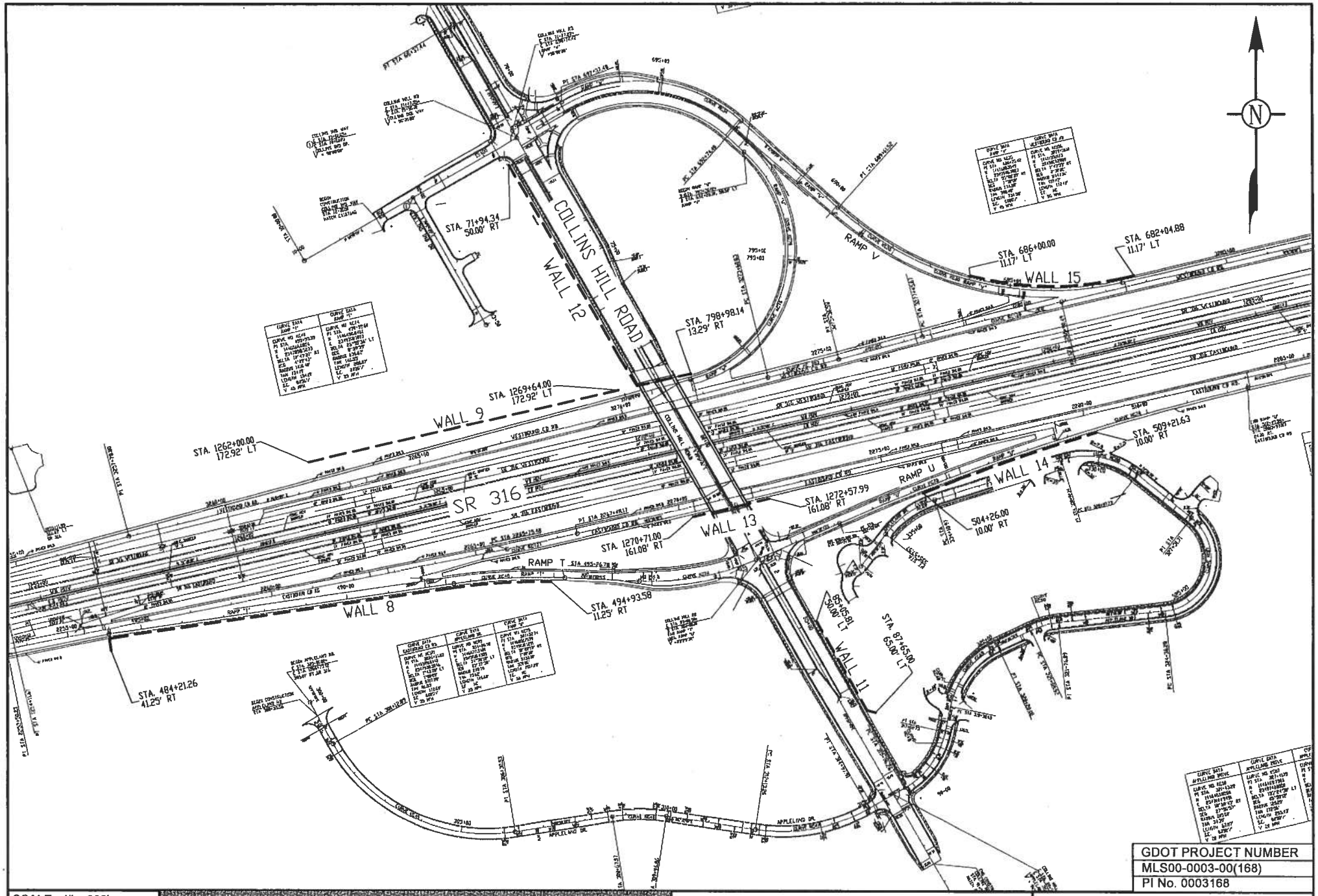
ATLANTA, GA 30340-4270

FIGURE 2A

BORING LOCATION PLAN - BRIDGE
COLLINS HILL ROAD OVER SR 316
GWINETT COUNTY ,GEORGA
WILLMER PROJECT No. ATL-171-2867C

I:\AutoCAD\171-GEO\171-2867\2867C\AutoCAD\FIGURE 2A - BRIDGE BORING LOCATION PLAN.dwg, WEL_11x8.5



GDOT PROJECT NUMBER
MLS00-0003-00(168)
PI No. 0003168

SCALE: 1" = 300'

DATE: 8/19/2008

DRAWN BY: CBS

REVIEWED BY: SB

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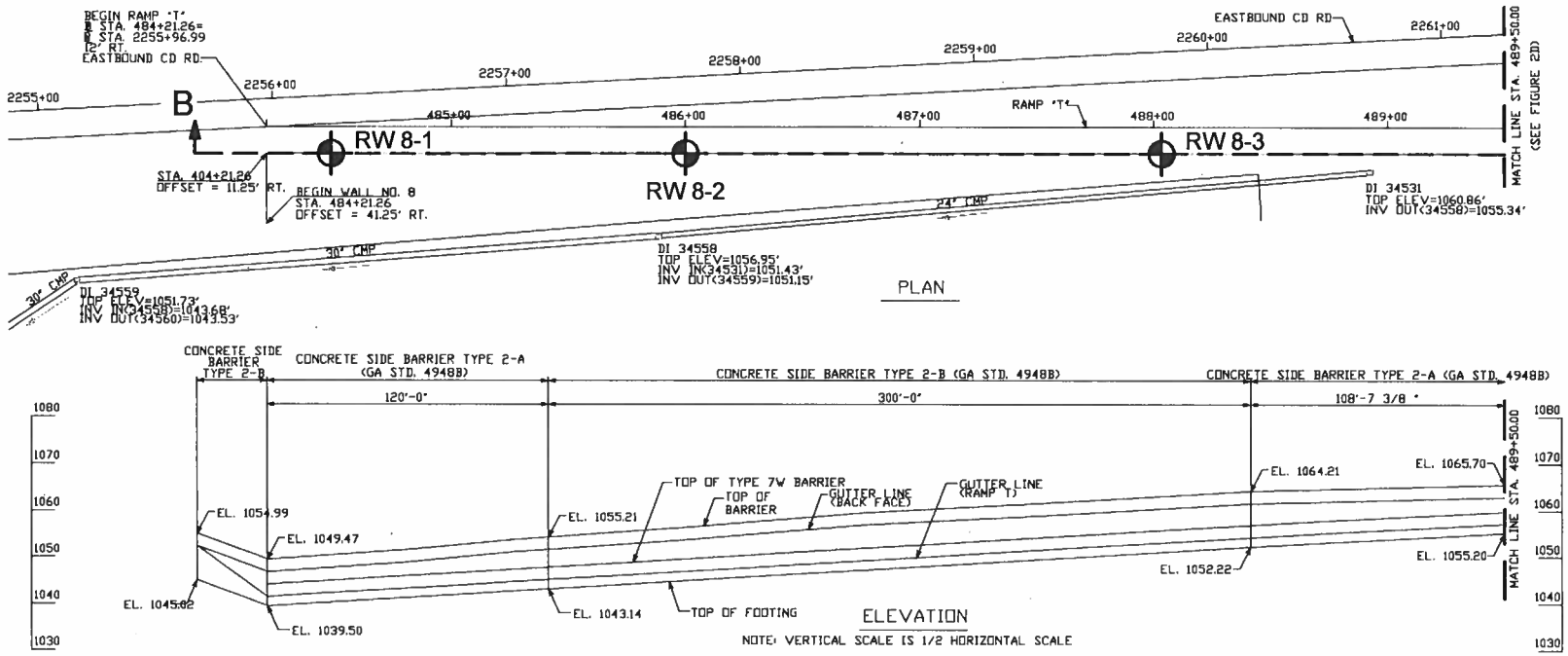
ATLANTA, GA 30340-4270

FIGURE 2B

RETAINING WALL LOCATION PLAN
COLLINS HILL ROAD OVER SR 316
GWINNET COUNTY, GEORGIA
WILLMER PROJECT No. ATL-171-2867C

I:\AutoCAD\171-GEO\171-2867\2867C\AutoCAD\FIGURE 2B - RETAINING WALL LOCATION PLAN.dwg, WEI_11x8.5



LEGEND:

BORING LOCATION
RW 8-1

GDOT PROJECT NUMBER
MLS00-0003-00(168)
PI No. 0003168

SCALE: 1" = 80'	
DATE: 8/15/2008	
DRAWN BY: CBS	
REVIEWED BY: MK	

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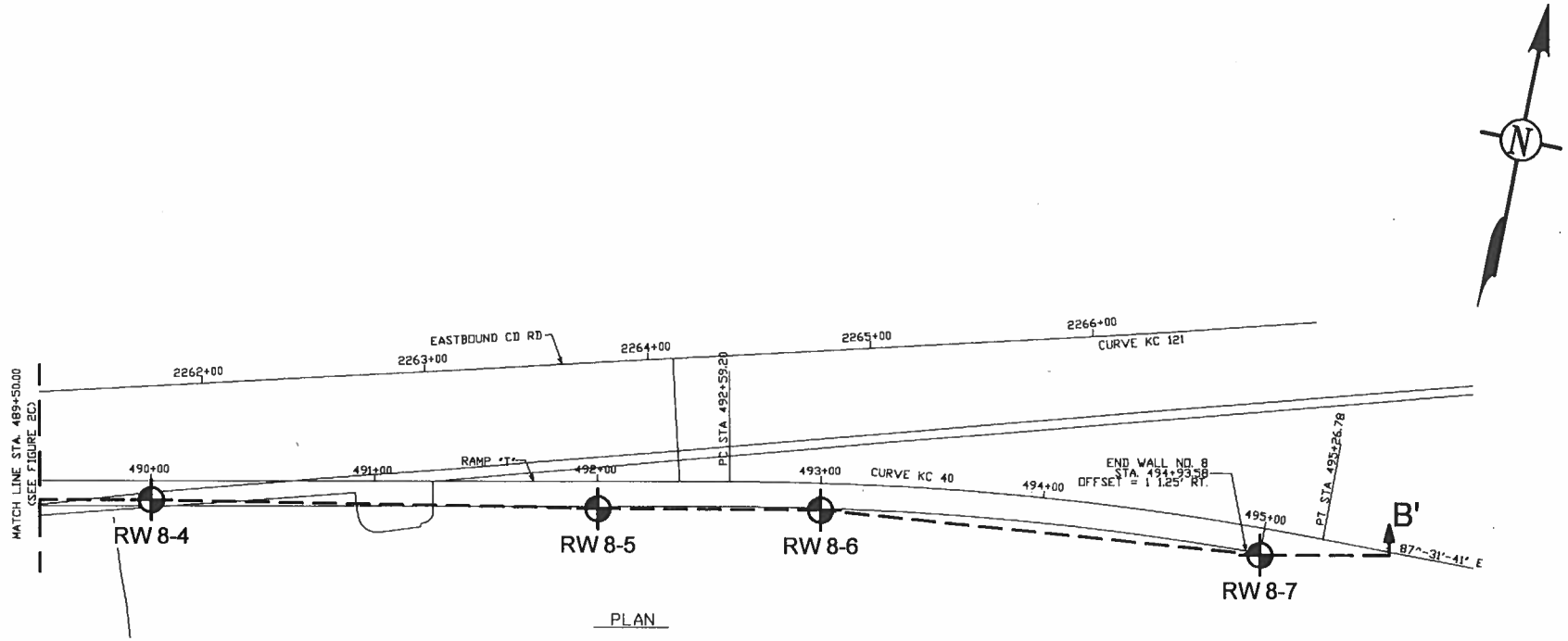
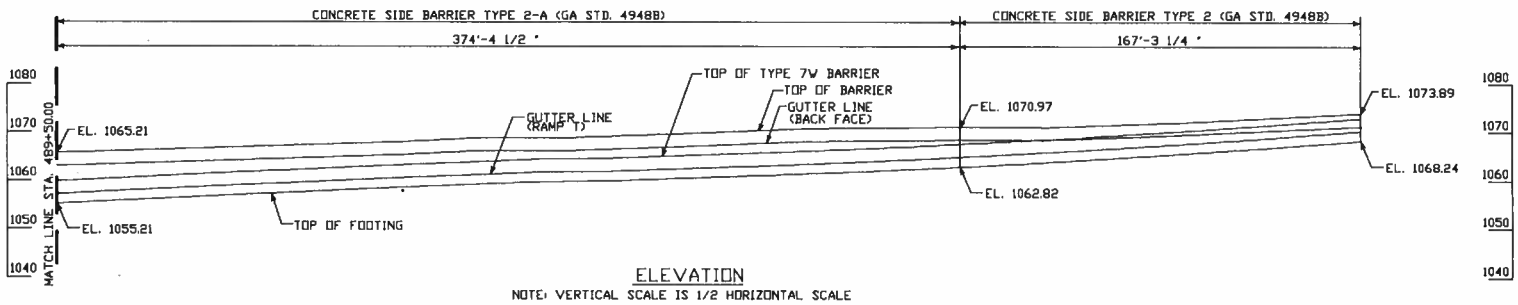
ENVIRONMENTAL SERVICES AND ENGINEERING
3772 PLEASANTDALE ROAD - SUITE 165
ATLANTA, GA 30340-4270

FIGURE 2C

BORING LOCATION PLAN - WALL 8
COLLINS HILL ROAD OVER SR 316
GWINNET COUNTY, GEORGIA
WILLMER PROJECT No. ATL-171-2867C

I:\AutoCAD\171-GEO\171-2867\2867C\AutoCAD\FIGURE 2C-2I - WALL DRAWINGS.dwg, WALL 8A





LEGEND:

BORING LOCATION
RW 8-4

GDOT PROJECT NUMBER
MLS00-0003-00(168)
PI No. 0003168

SCALE: 1" = 80'	
DATE: 8/15/2008	
DRAWN BY: CBS	
REVIEWED BY: MK	

WILLMER ENGINEERING INC.

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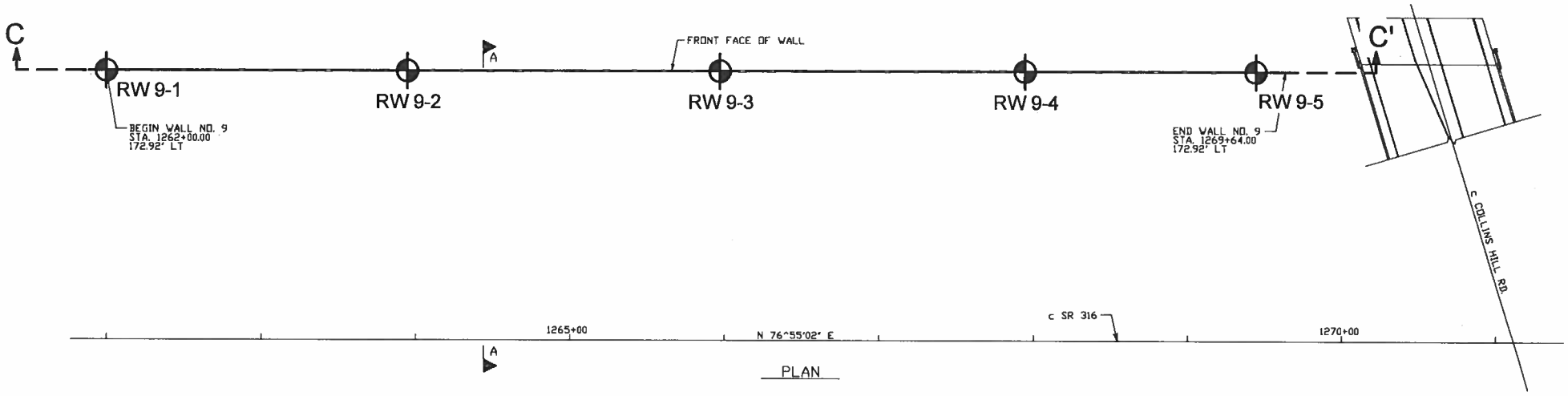
ATLANTA, GA 30340-4270

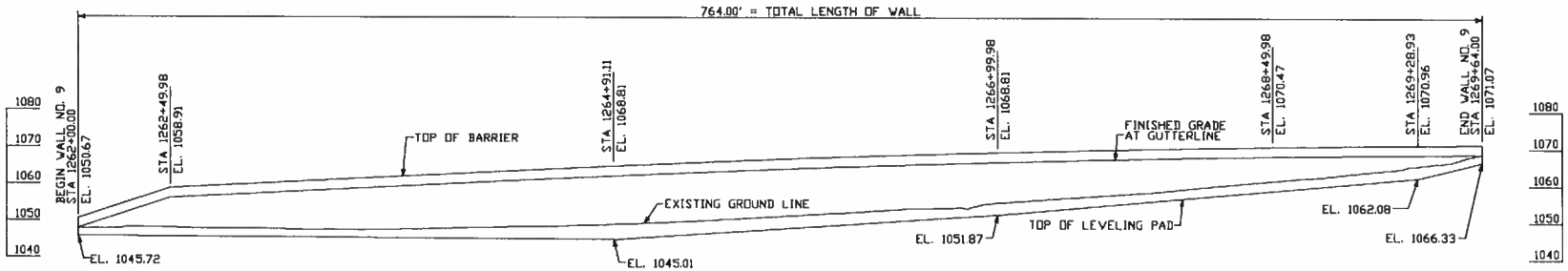
FIGURE 2D

BORING LOCATION PLAN - WALL 8
COLLINS HILL ROAD OVER SR 316
GWINNET COUNTY, GEORGIA
WILLMER PROJECT No. ATL-171-2867C

I:\AutoCAD\171-GEO\171-2867\2867C\AutoCAD\FIGURE 2C-2I - WALL DRAWINGS.dwg, WALL 8B

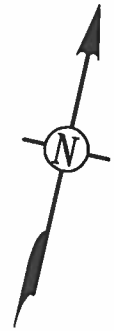


PLAN



ELEVATION

NOTE: VERTICAL SCALE IS 1/2 HORIZONTAL SCALE
BACK FACE OF WALL SHOWN



LEGEND:

BORING LOCATION
RW 9-1

GDOT PROJECT NUMBER
MLS00-0003-00(168)
PI No. 0003168

SCALE: 1" = 100'	
DATE: 8/15/2008	
DRAWN BY: CBS	
REVIEWED BY: MK	

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ENVIRONMENTAL SERVICES AND ENGINEERING
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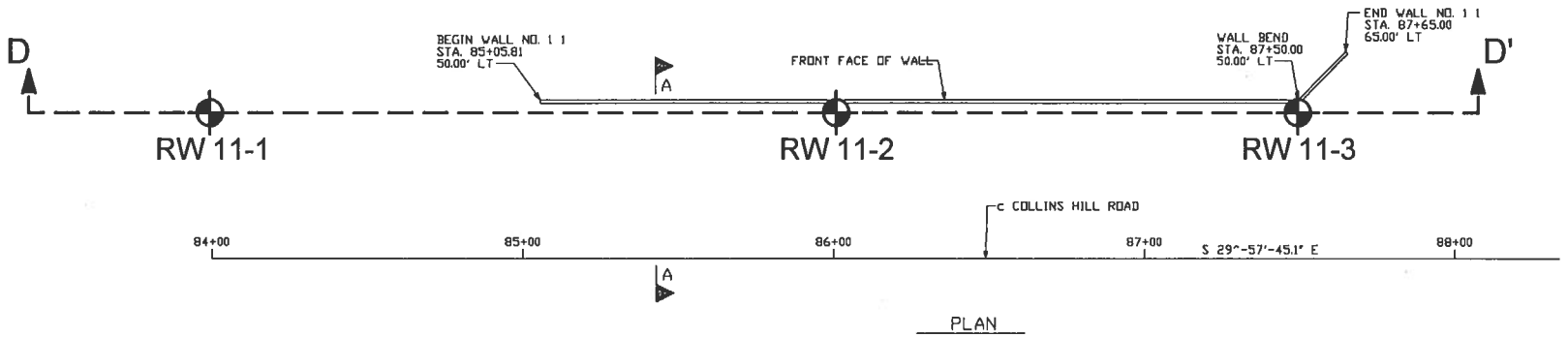
ATLANTA, GA 30340-4270

FIGURE 2E

BORING LOCATION PLAN - WALL 9
COLLINS HILL ROAD OVER SR 316
GWINNET COUNTY, GEORGIA
WILLMER PROJECT No. ATL-171-2867C

I:\AutoCAD\171-GEO\171-2867\2867C\AutoCAD\FIGURE 2C-2i - WALL DRAWINGS.dwg, WALL 9



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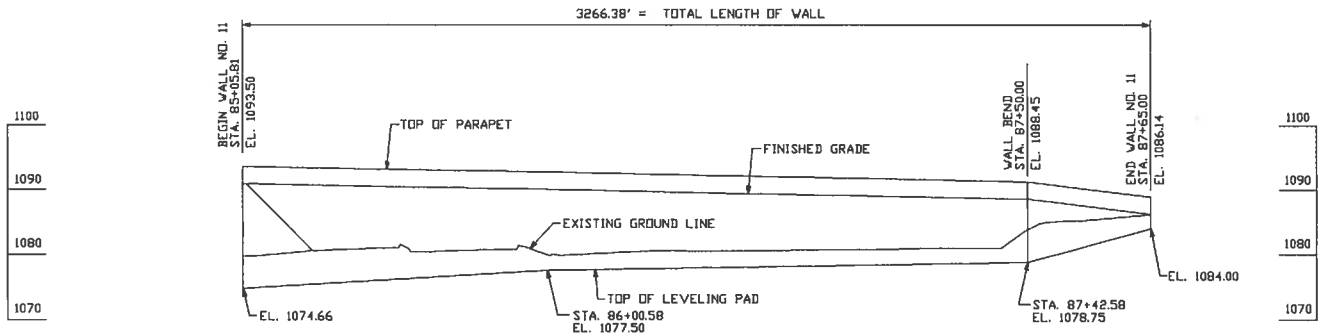

NOTE:
FENCE NOT SHOWN

ELEVATION

NOTE: VERTICAL SCALE IS 1/2 HORIZONTAL SCALE

LEGEND:

BORING LOCATION
RW 11-1

GDOT PROJECT NUMBER
MLS00-0003-00(168)
PI No. 0003168

SCALE: 1" = 60'	
DATE: 8/15/2008	
DRAWN BY: CBS	
REVIEWED BY: MK	

WILLMER ENGINEERING INC.

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ENVIRONMENTAL SERVICES AND ENGINEERING
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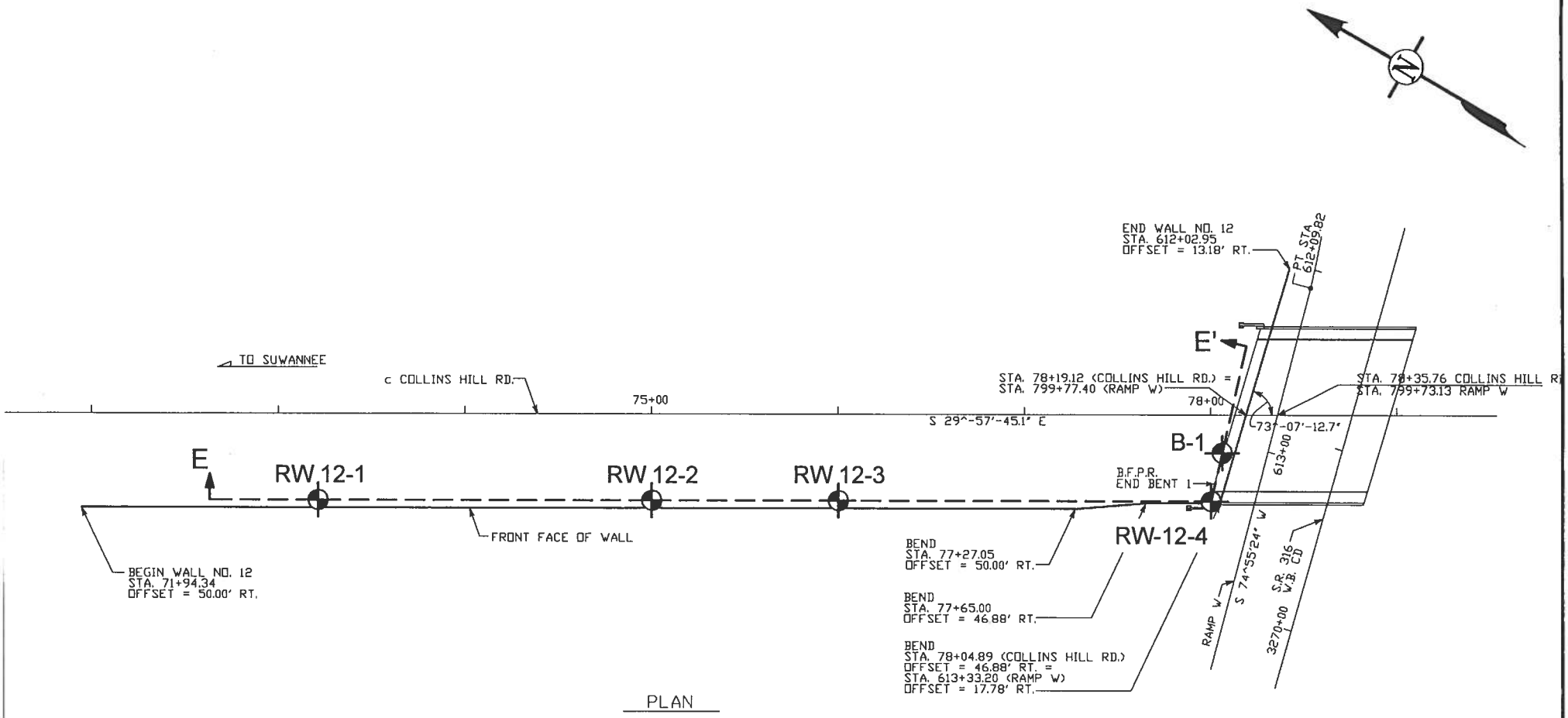
ATLANTA, GA 30340-4270

FIGURE 2F

BORING LOCATION PLAN - WALL 11
COLLINS HILL ROAD OVER SR 316
GWINNET COUNTY, GEORGIA
WILLMER PROJECT No. ATL-171-2867C

I:\AutoCAD\171-GEO\171-2867\2867C\AutoCAD\FIGURE 2C-2I - WALL DRAWINGS.dwg, WALL 11



PLAN

LEGEND:

BORING LOCATION
RW 12-1

GDOT PROJECT NUMBER
MLS00-0003-00(168)
PI No. 0003168

SCALE: 1" = 80'	
DATE: 8/18/2008	
DRAWN BY: CBS	
REVIEWED BY: MK	

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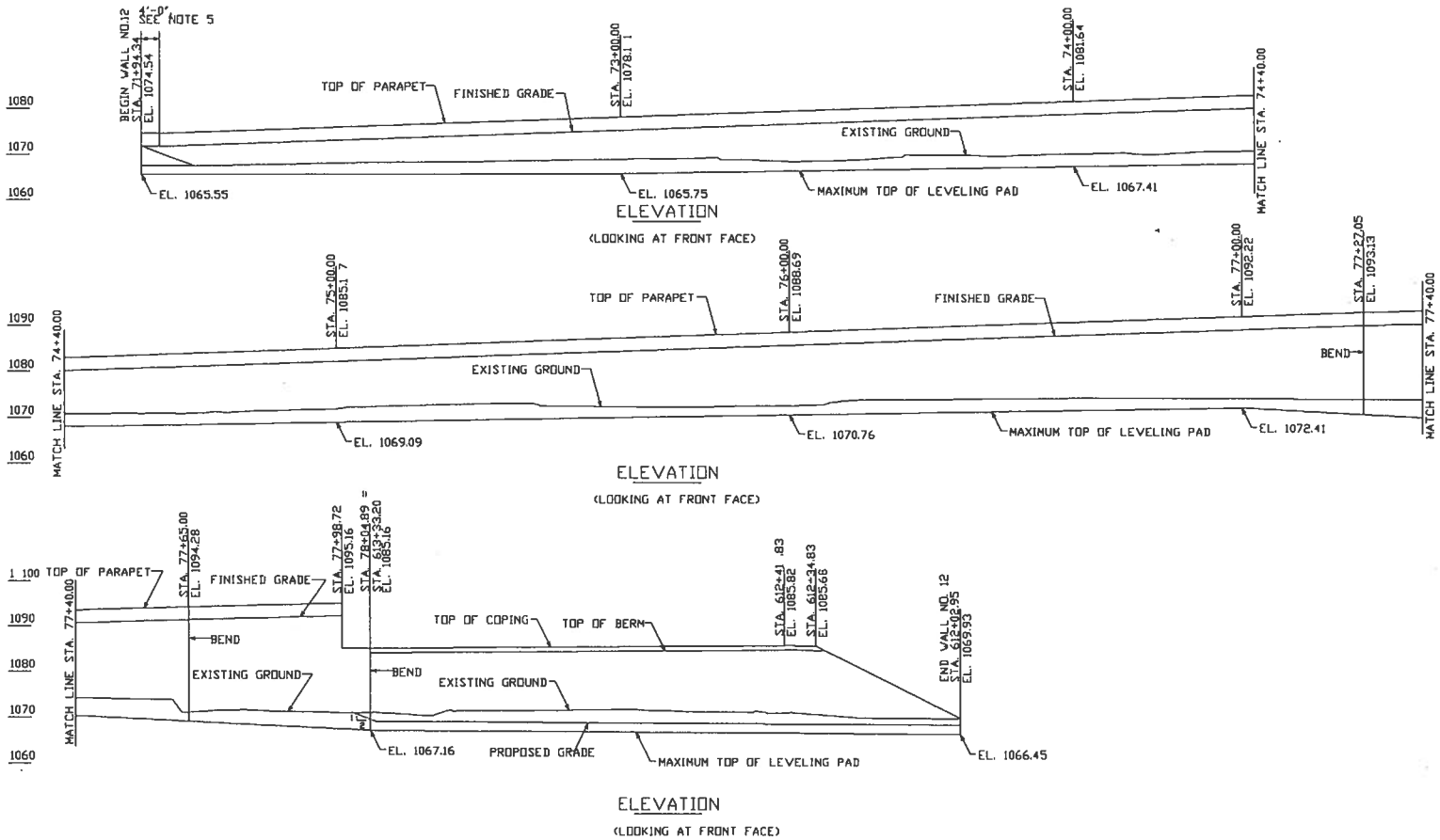
GEOTECHNICAL ENGINEERING ¤ CONSTRUCTION SERVICES
ENVIRONMENTAL SERVICES AND ENGINEERING
3772 PLEASANTDALE ROAD - SUITE 165
ATLANTA, GA 30340-4270

FIGURE 2G

BORING LOCATION PLAN - WALL 12
COLLINS HILL ROAD OVER SR 316
GWINNET COUNTY, GEORGIA
WILLMER PROJECT No. ATL-171-2867C

I:\AutoCAD\171-GEO\171-2867\2867C\AutoCAD\FIGURE 2C- 2I - WALL DRAWINGS.dwg, WALL 12 - PLAN



GDOT PROJECT NUMBER
MLS00-0003-00(168)
PI No. 0003168

SCALE: 1" = 40'

DATE: 8/15/2008

DRAWN BY: CBS

REVIEWED BY: MK

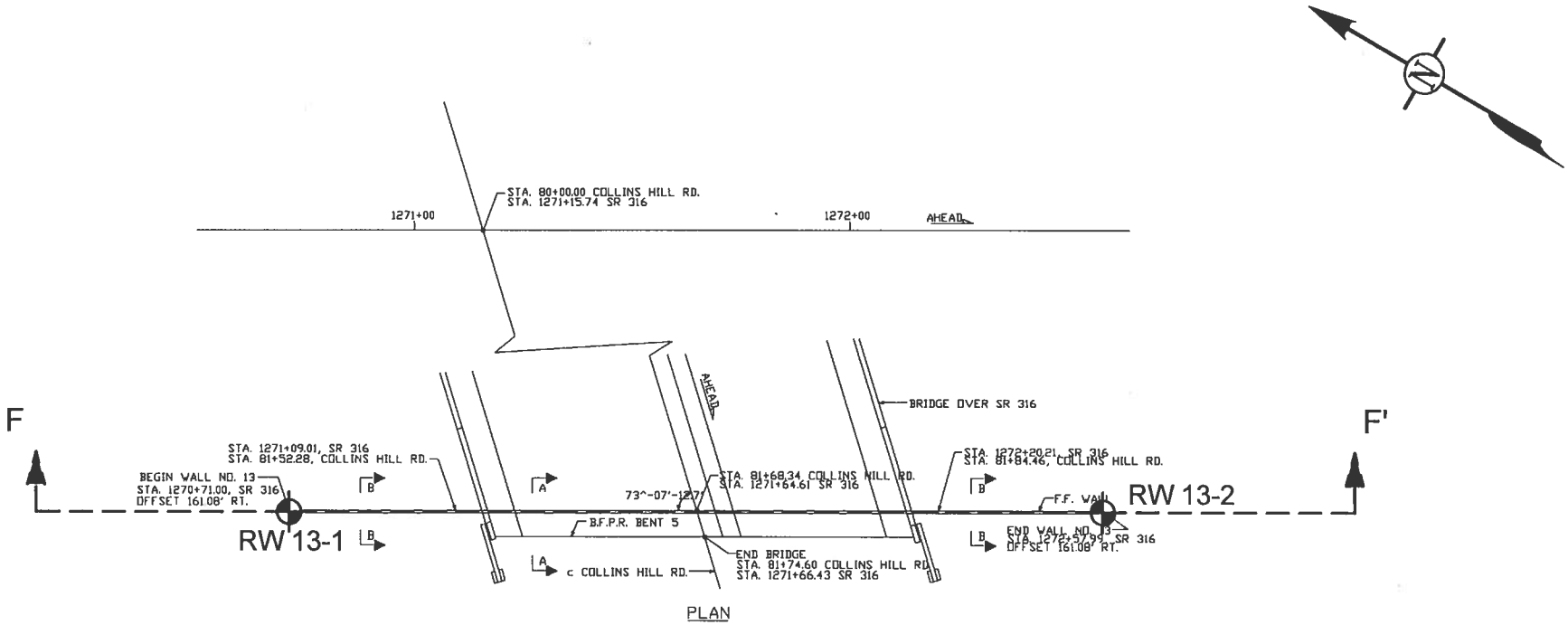
WILLMER ENGINEERING INC.

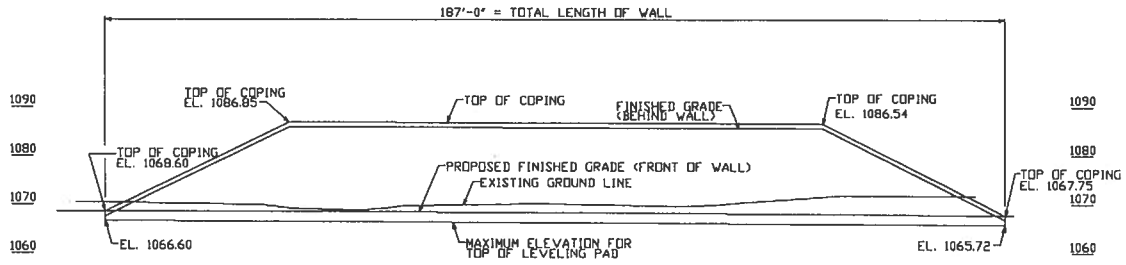
GEOTECHNICAL ENGINEERING ¤ CONSTRUCTION SERVICES
ENVIRONMENTAL SERVICES AND ENGINEERING
3772 PLEASANTDALE ROAD - SUITE 165
ATLANTA, GA 30340-4270

FIGURE 2H

RETAINING WALL PROFILE - WALL 12
COLLINS HILL ROAD OVER SR 316
GWINNET COUNTY, GEORGIA
WILLMER PROJECT No. ATL-171-2867C

I:\AutoCAD\171-GEO\171-2867\2867C\AutoCAD\FIGURE 2C- 2I - WALL DRAWINGS.dwg, WALL 12 - ELEV





ELEVATION

NOTE: VERTICAL SCALE IS 1/2 HORIZONTAL SCALE
(LOOKING AT BACK FACE OF WALL)

LEGEND:

BORING LOCATION
RW 13-1

GDOT PROJECT NUMBER
MLS00-0003-00(168)
PI No. 0003168

SCALE: 1" = 40'

DATE: 8/18/2008
DRAWN BY: CBS
REVIEWED BY: MK

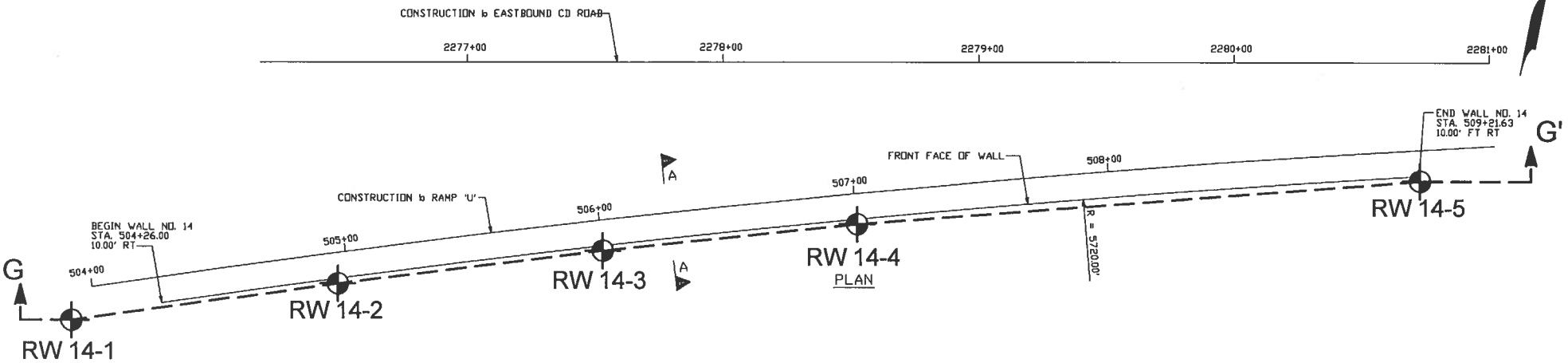
WILLMER ENGINEERING INC.

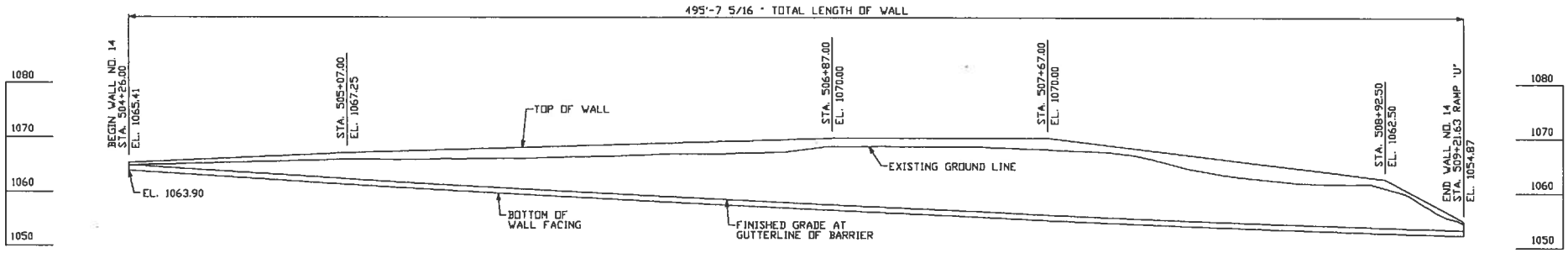
GEOTECHNICAL ENGINEERING ▪ CONSTRUCTION SERVICES
ENVIRONMENTAL SERVICES AND ENGINEERING
3772 PLEASANTDALE ROAD - SUITE 165
ATLANTA, GA 30340-4270

FIGURE 2I

BORING LOCATION PLAN - WALL 13
COLLINS HILL ROAD OVER SR 316
GWINNET COUNTY, GEORGIA
WILLMER PROJECT No. ATL-171-2867C

I:\AutoCAD\171-GEO\171-2867\2867C\AutoCAD\FIGURE 2C-2I - WALL DRAWINGS.dwg, WALL 13





ELEVATION

NOTE: VERTICAL SCALE IS 1/2 HORIZONTAL SCALE

BACK FACE OF WALL SHOWN

LEGEND:

BORING LOCATION
RW 14-1

GDOT PROJECT NUMBER
MLS00-0003-00(168)
PI No. 0003168

SCALE: 1" = 60'

DATE: 8/18/2008

DRAWN BY: CBS

REVIEWED BY: MK

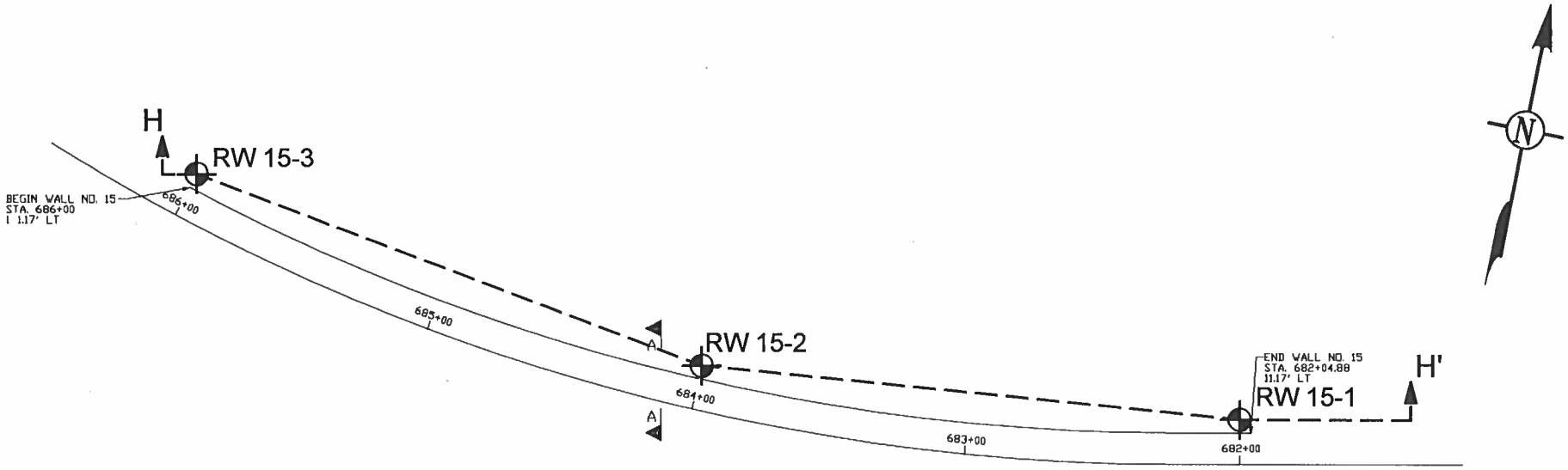
WILLMER ENGINEERING INC.

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

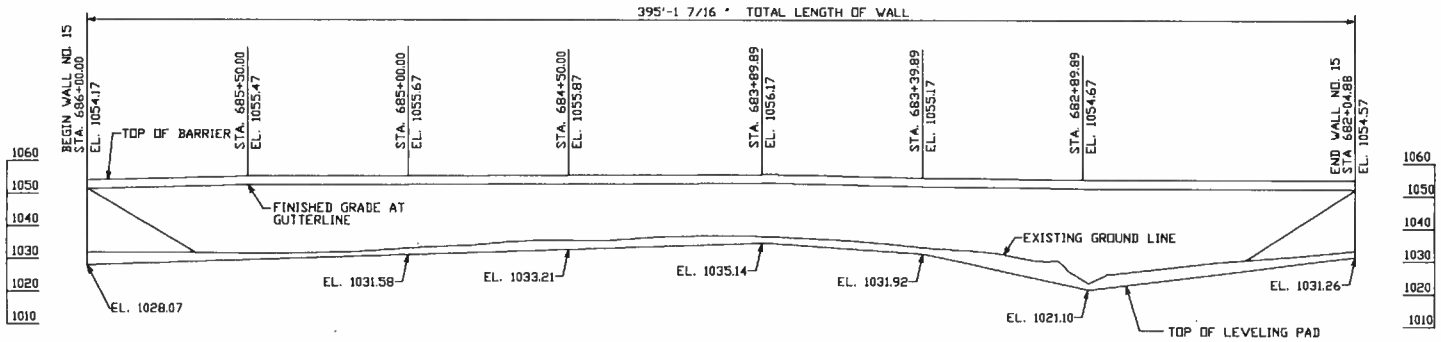
FIGURE 2J

BORING LOCATION PLAN - WALL 14
COLLINS HILL ROAD OVER SR 316
GWINNET COUNTY, GEORGIA
WILLMER PROJECT No. ATL-171-2867C

I:\AutoCAD\171-GEO\171-2867\2867C\AutoCAD\FIGURE 2C-2I - WALL DRAWINGS.dwg, WALL 14



PLAN



ELEVATION

NOTE: VERTICAL SCALE IS 1/2 HORIZONTAL SCALE

LEGEND:

BORING LOCATION
RW 15-1

GDOT PROJECT NUMBER
MLS00-0003-00(168)
PI No. 0003168

SCALE: 1" = 60'	
DATE: 10/9/2008	
DRAWN BY: CBS	
REVIEWED BY: MK	

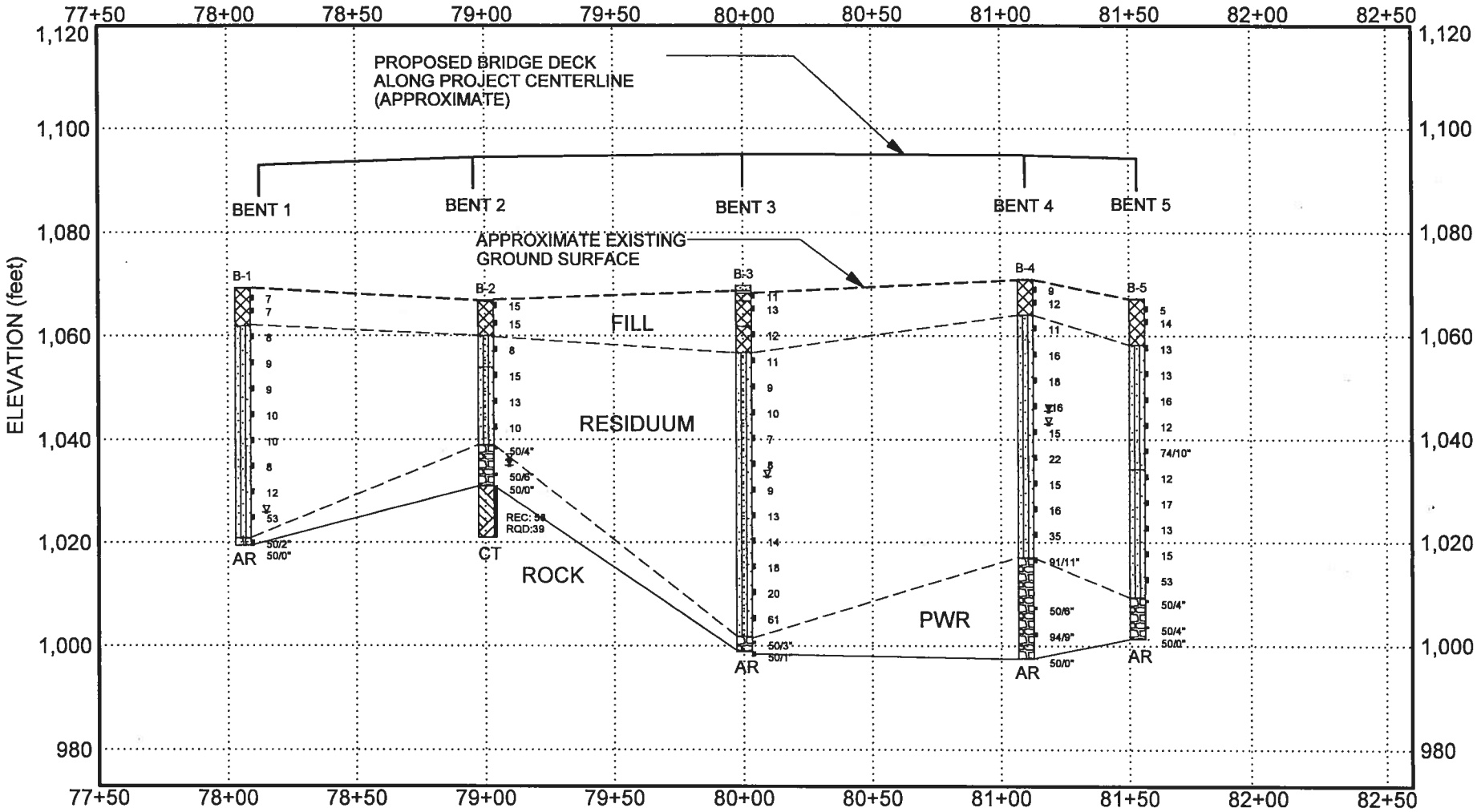
WILLMER ENGINEERING INC.

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

FIGURE 2K

BORING LOCATION PLAN - WALL 15
COLLINS HILL ROAD OVER SR 316
GWINNET COUNTY, GEORGIA
WILLMER PROJECT No. ATL-171-2867C

I:\AutoCAD\171-GEO\171-2867\2867C\AutoCAD\FIGURE 2C-2I - WALL DRAWINGS.dwg, WALL 15



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

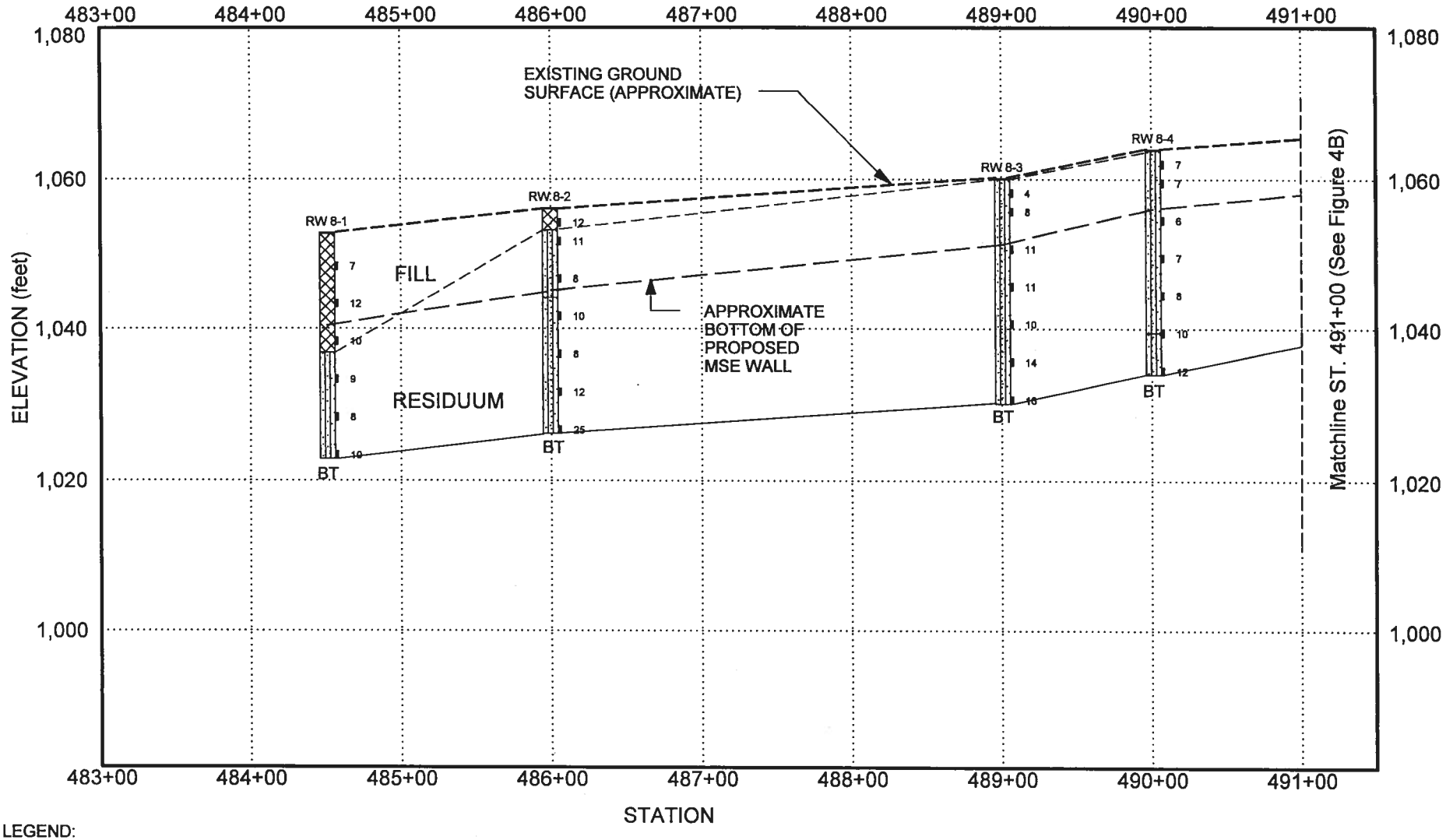
SCALE : 1 inch = 30 feet (vertical)
1 inch = 60 feet (horizontal)

GENERALIZED SUBSURFACE PROFILE

SECTION A-A'

Collins Hill Road over SR 316
GDOT Project No. MSL00-0003-00(168); PI No. 0003168
Gwinnett County, Georgia

PROJECT #	DATE	FIGURE
171-2867C	August 15, 2008	3



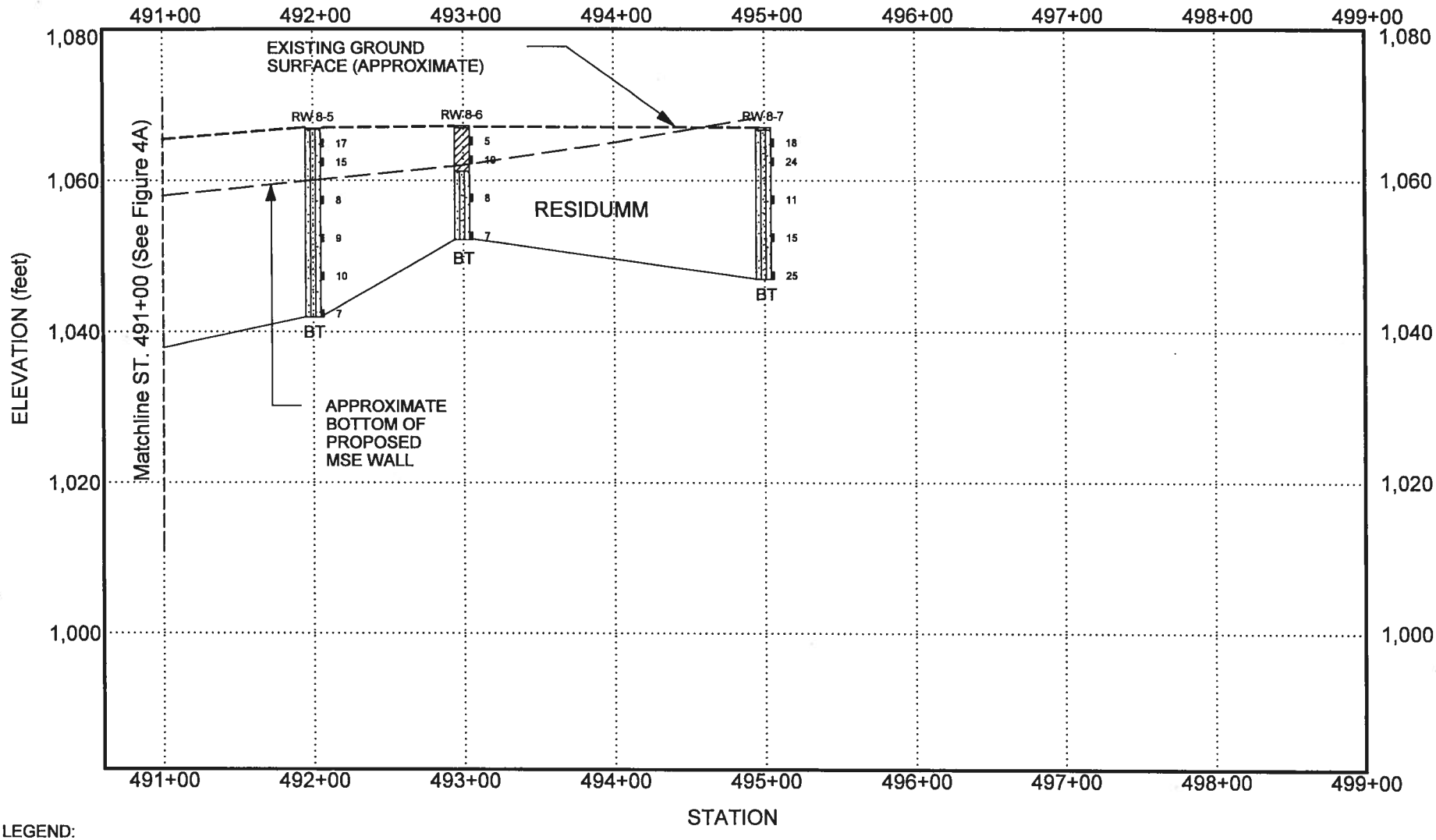
LEGEND:
- Groundwater Table @ 24 hours
- Groundwater Table @ Time of Boring
BT - Boring Terminated

SCALE : 1 inch = 20 feet (vertical)
1 inch = 100 feet (horizontal)

GENERALIZED SUBSURFACE PROFILE
SECTION B-B'

Wall No. 8 - Collins Hill Road over SR 316
GDOT Proj. No. MSL00-0003-00(168); PI No. 0003168
Gwinnett County, Georgia

PROJECT #	DATE	FIGURE
171-2867C	August 15, 2008	4A



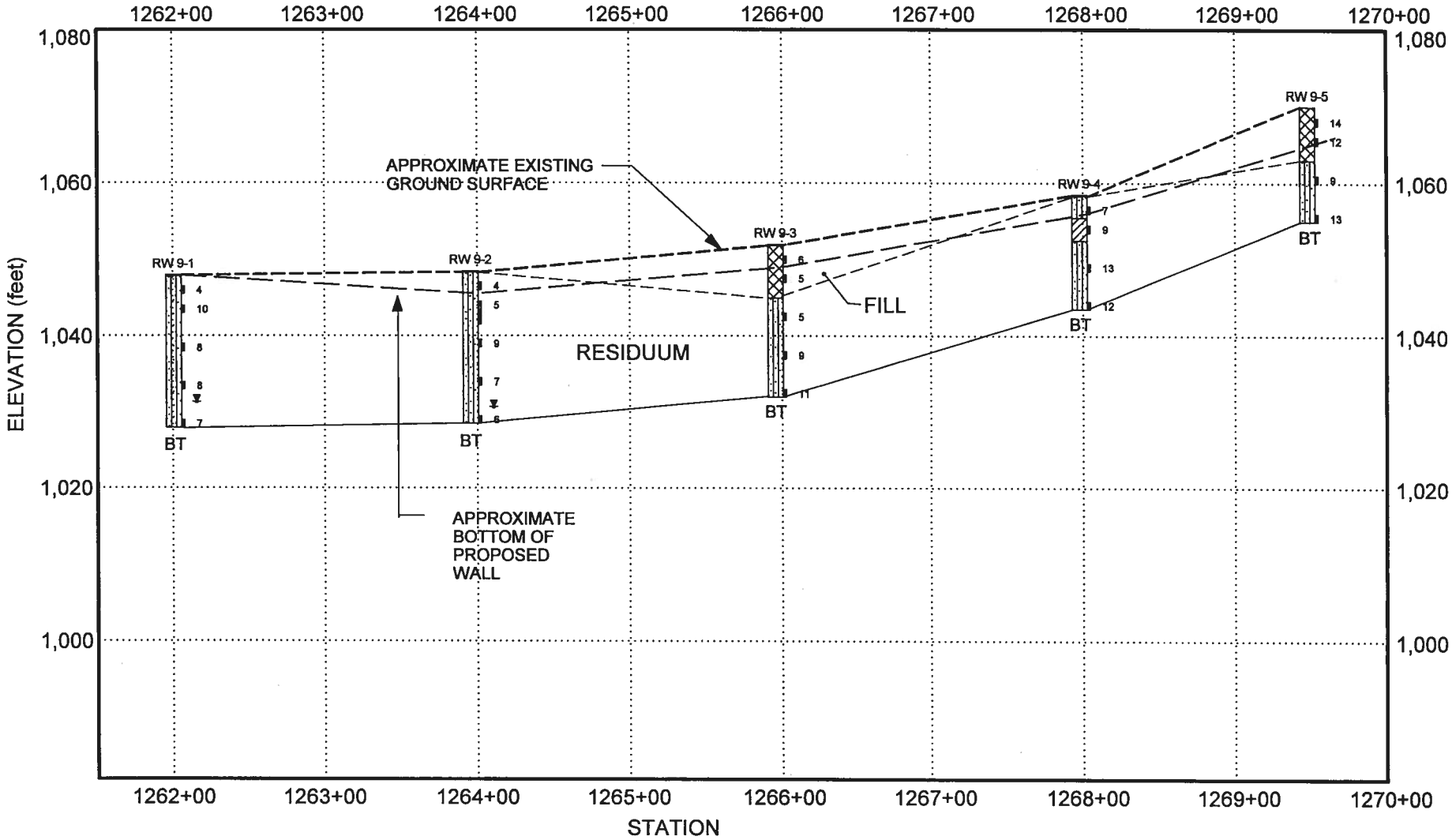
LEGEND:
- Groundwater Table @ 24 hours
- Groundwater Table @ Time of Boring
BT - Boring Terminated

SCALE : 1 inch = 20 feet (vertical)
1 inch = 100 feet (horizontal)

GENERALIZED SUBSURFACE PROFILE
SECTION B-B'

Wall No. 8 - Collins Hill Road over SR 316
GDOT Proj. No. MSL00-0003-00(168); PI No. 0003168
Gwinnett County, Georgia

PROJECT #	DATE	FIGURE
171-2867C	August 15, 2008	4B



LEGEND:
- Groundwater Table @ 24 hours
- Groundwater Table @ Time of Boring
BT - Boring Terminated

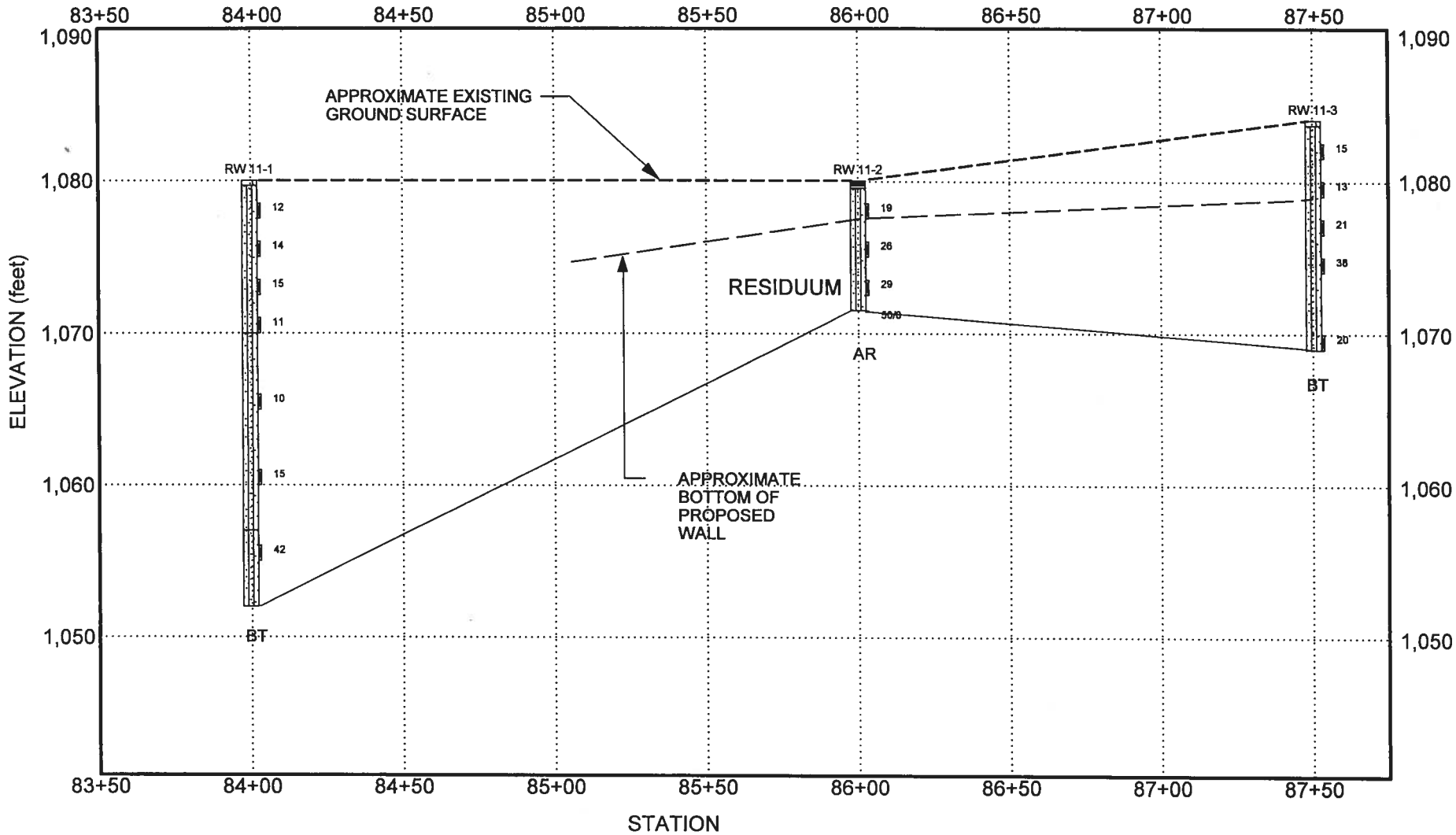
SCALE : 1 inch = 20 feet (vertical)
1 inch = 100 feet (horizontal)

GENERALIZED SUBSURFACE PROFILE

PROFILE C-C'

Wall No. 9 - Collins Hill Road over SR 316
GDOT Proj. No. MSL00-0003-00(168); PI No. 0003168
Gwinnett County, Georgia

PROJECT #	DATE	FIGURE
171-2867C	August 15, 2008	5



LEGEND:
- Groundwater Table @ 24 hours
- Groundwater Table @ Time of Boring
BT - Boring Terminated
AR - Auger Refusal

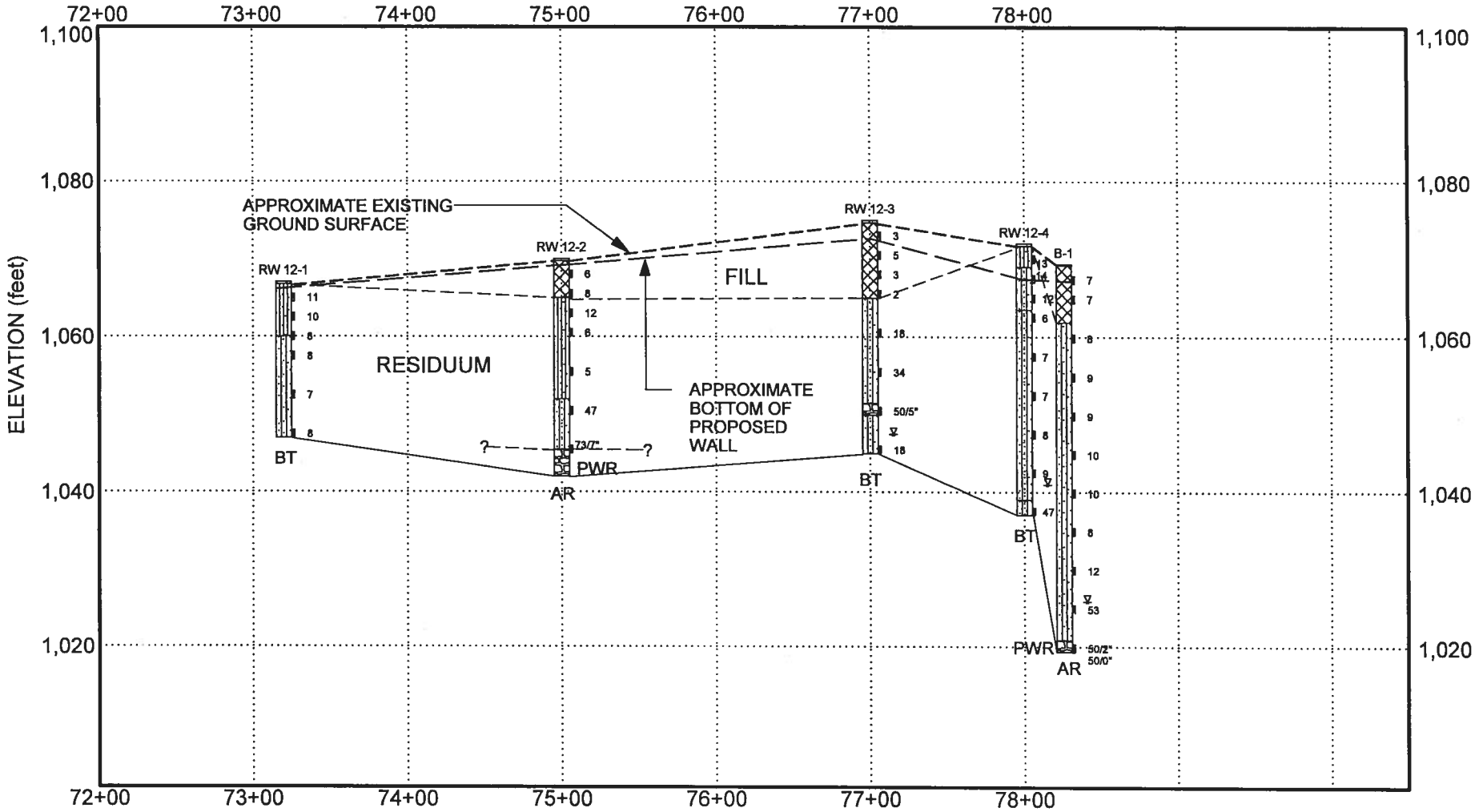
SCALE : 1 inch = 10 feet (vertical)
1 inch = 50 feet (horizontal)

GENERALIZED SUBSURFACE PROFILE

PROFILE D-D'

Wall No. 11 - Collins Hill Road over SR 316
GDOT Proj. No. MSL00-0003-00(168); PI No. 0003168
Gwinnett County, Georgia

PROJECT #	DATE	FIGURE
171-2867C	August 15, 2008	6



LEGEND:
- ▽ - Groundwater Table @ Time of Boring
- AR - Auger Refusal
- BT - Boring Terminated
- PWR - Partially Weathered Rock
- SCALE : 1 inch = 20 feet (vertical)
  1 inch = 100 feet (horizontal)

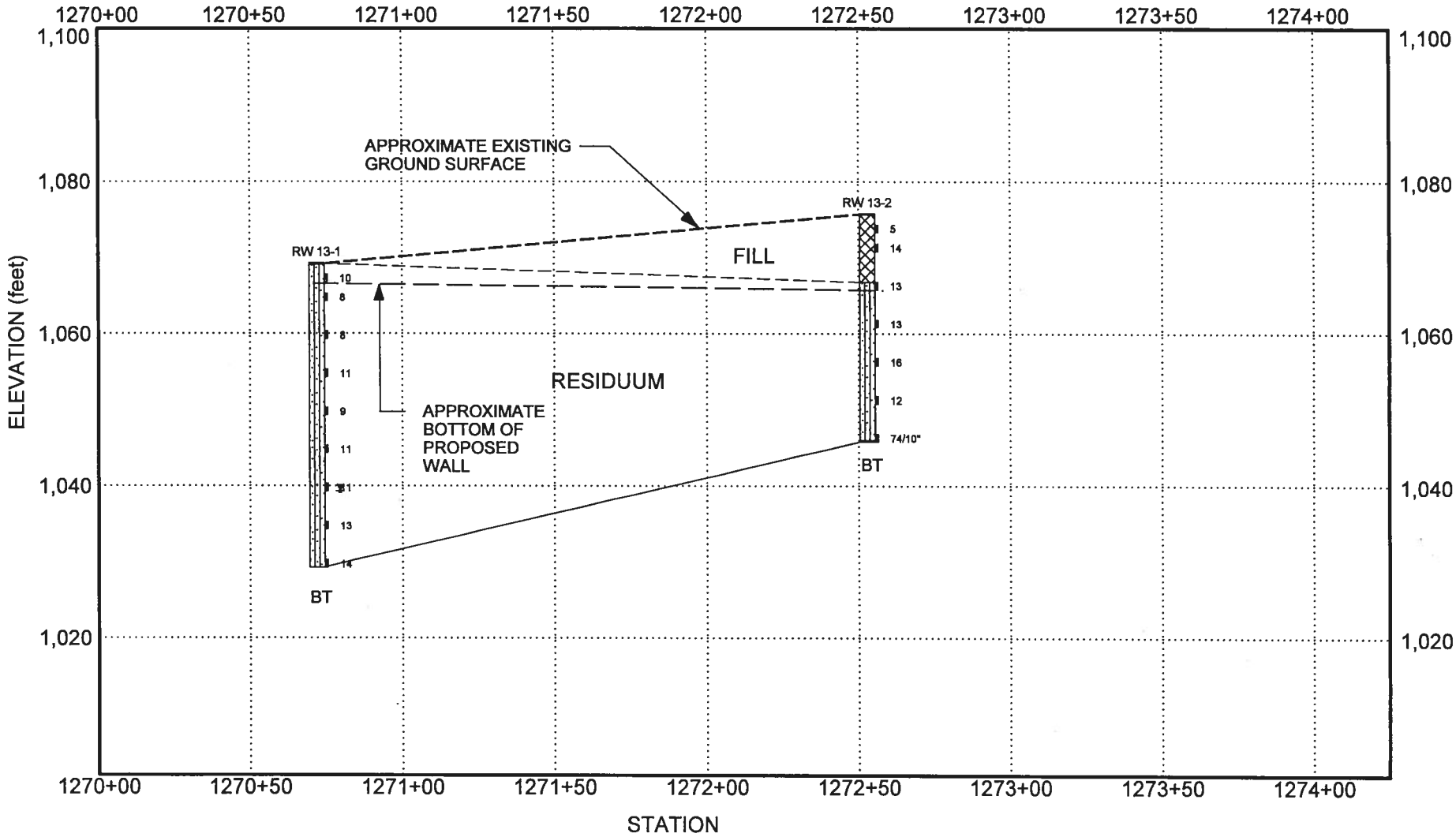
Note: Boring B-1 is located on the bridge bent at Station 78+06, 20' RT. On this profile B-1 is plotted at the actual distance from RW 12-4 for clarity.

GENERALIZED SUBSURFACE PROFILE

SECTION E-E'

Wall No. 12 - Collins Hill Road over SR 316
GDOT Project No. MSL00-0003-00(168); PI No. 0003168
Gwinnett County, Georgia

PROJECT #	DATE	FIGURE
171-2867C	August 15, 2008	7



LEGEND:
- Groundwater Table @ 24 hours
- Groundwater Table @ Time of Boring
BT - Boring Terminated

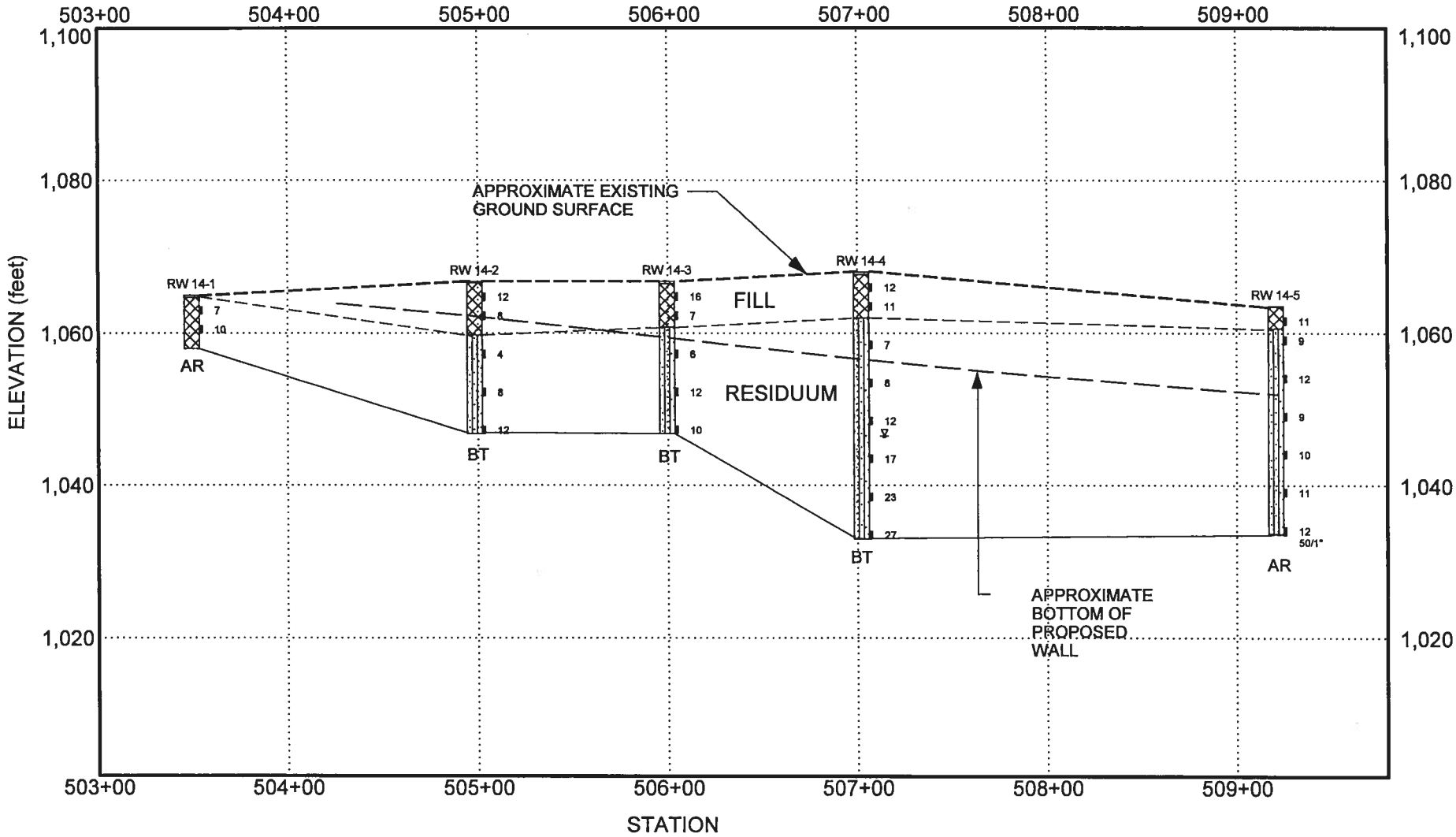
SCALE : 1 inch = 20 feet (vertical)
1 inch = 50 feet (horizontal)

GENERALIZED SUBSURFACE PROFILE

PROFILE F-F'

Wall No. 13 - Collins Hill Road over SR 316
GDOT Proj. No. MSL00-0003-00(168); PI No. 0003168
Gwinnett County, Georgia

PROJECT #	DATE	FIGURE
171-2867C	August 15, 2008	8



LEGEND:
- Groundwater Table @ 24 hours
- Groundwater Table @ Time of Boring
BT - Boring Terminated
AR - Auger Refusal

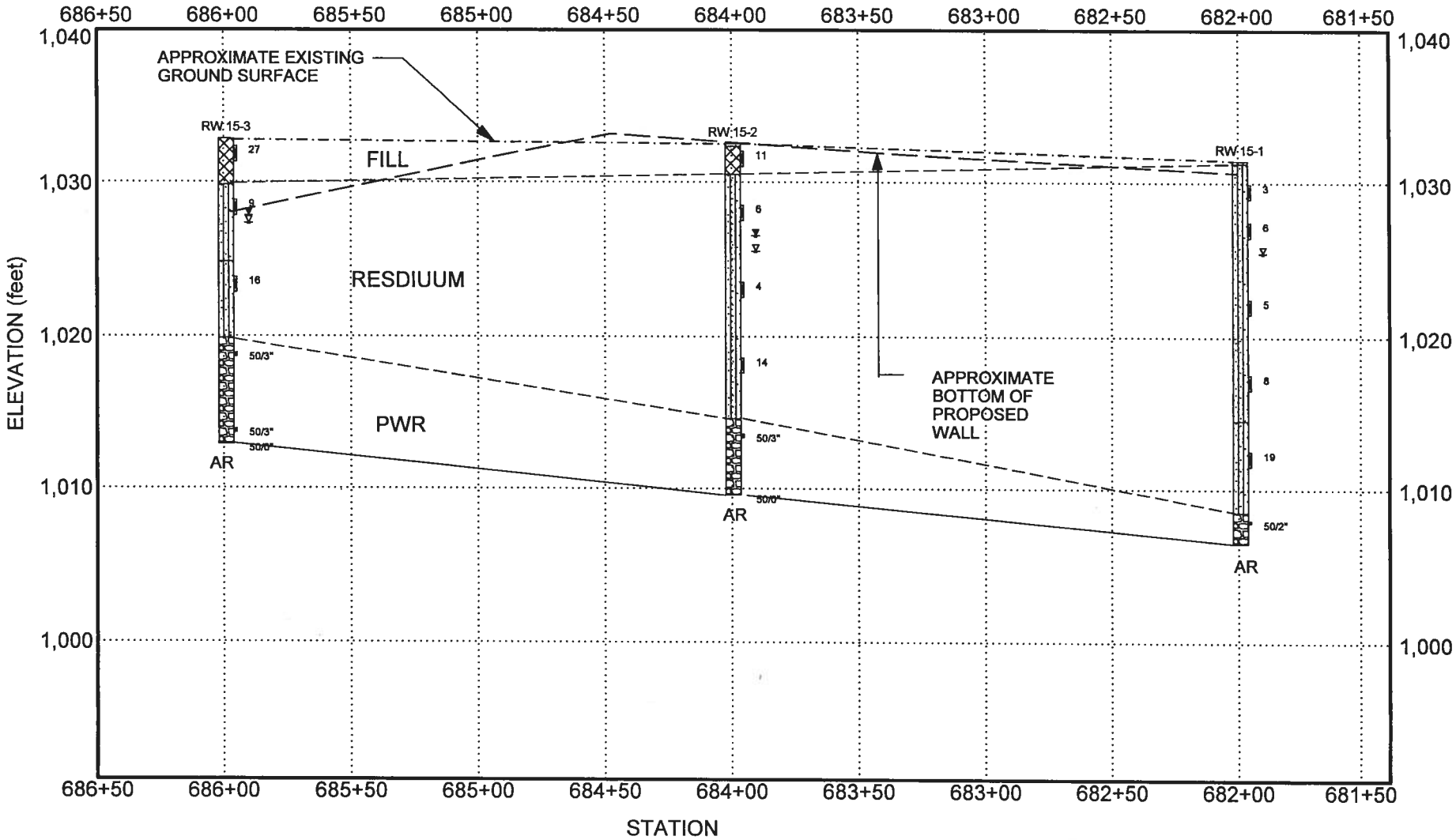
SCALE : 1 inch = 20 feet (vertical)
1 inch = 80 feet (horizontal)

GENERALIZED SUBSURFACE PROFILE

PROFILE G-G'

Wall No. 14 - Collins Hill Road over SR 316
GDOT Proj. No. MSL00-0003-00(168); PI No. 0003168
Gwinnett County, Georgia

PROJECT #	DATE	FIGURE
171-2867C	August 15, 2008	9



LEGEND:
- Groundwater Table @ 24 hours
- Groundwater Table @ Time of Boring
AR - Auger Refusal
PWR - Partially Weathered Rock

SCALE : 1 inch = 10 feet (vertical)
1 inch = 60 feet (horizontal)

GENERALIZED SUBSURFACE PROFILE

PROFILE H-H'

Wall No. 15 - Collins Hill Road over SR 316
GDOT Proj. No. MSL00-0003-00(168); PI No. 0003168
Gwinnett County, Georgia

PROJECT #	DATE	FIGURE
171-2867C	August 15, 2008	10

APPENDIX I

COLLINS HILL

WILLMER ENGINEERING INC. WE

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:

SILTS AND CLAYS

N (blows per foot)	Consistency
0 - 2	Very Soft
3 - 4	Soft
5 - 8	Firm
9 - 15	Stiff
16 - 30	Very Stiff
31 - 50	Hard
> 50	Very Hard

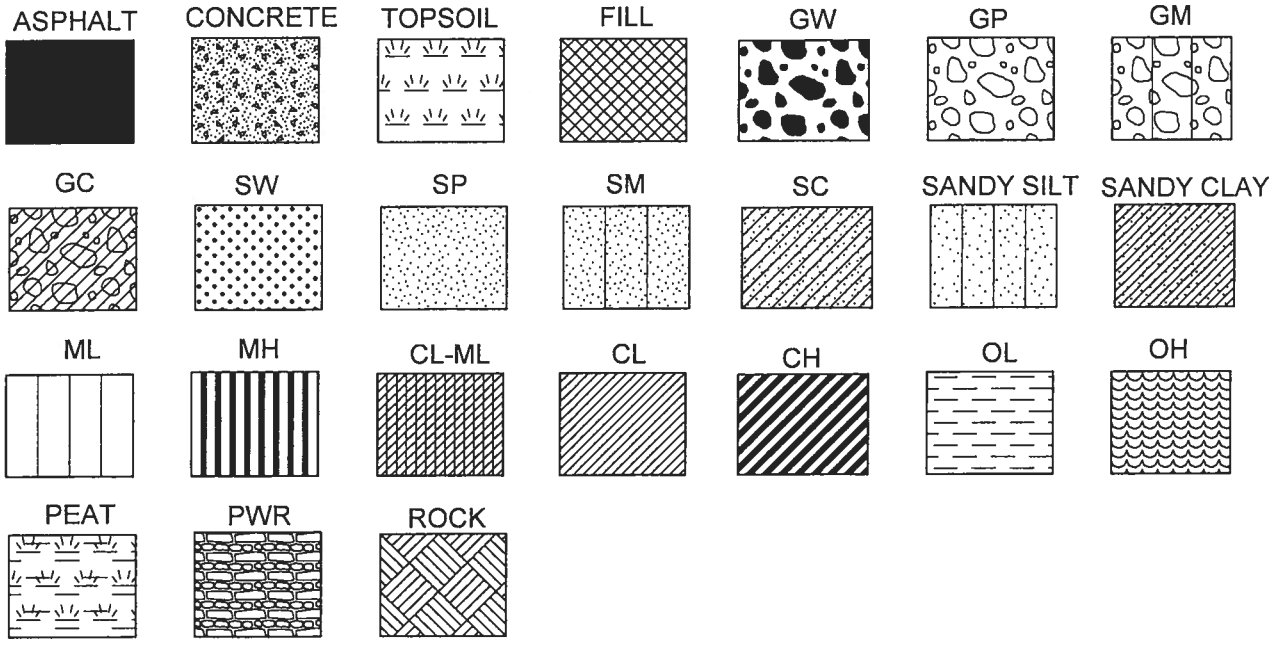
SANDS

N (blows per foot)	Relative Density
0 - 4	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
> 50	Very Dense

NOTES:

Groundwater Measurements:

- ▼ Water level at time of backfilling
- ▽ Water level at time of boring
- ⊠ Caved level at 24 hours



WILLMER ENGINEERING INC. WE

Willmer Engineering Inc.
3772 Pleasantdale Road, Suite 165
Atlanta, Georgia 30340

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 RETAINED #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 PASSING #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 SMALLER THAN #200 SIEVE SIZE	SILTS AND CLAYS LIQUID LIMIT LESS 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 GREATER 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

WILLMER ENGINEERING INC. WE

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.

WILLMER ENGINEERING INC.

Project: **Collins Hill Road over SR 316**	**HOLE No. B-1**
Location: **Gwinnett County, Georgia**	Sheet 1 of 1
Project Number: **171-2867C; GDOT Proj. No. MSL00-0003-00(168); PI No. 0003168**	Location: **BENT - 1**

Azimuth: Angle from Horizontal: **90** Surface Elevation (ft): **1069.38** Station: **ST. 78+06, 20' Rt. of CL**

Drilling Equipment: **CME 550** Drilling Method: **HSA Auto Hammer**

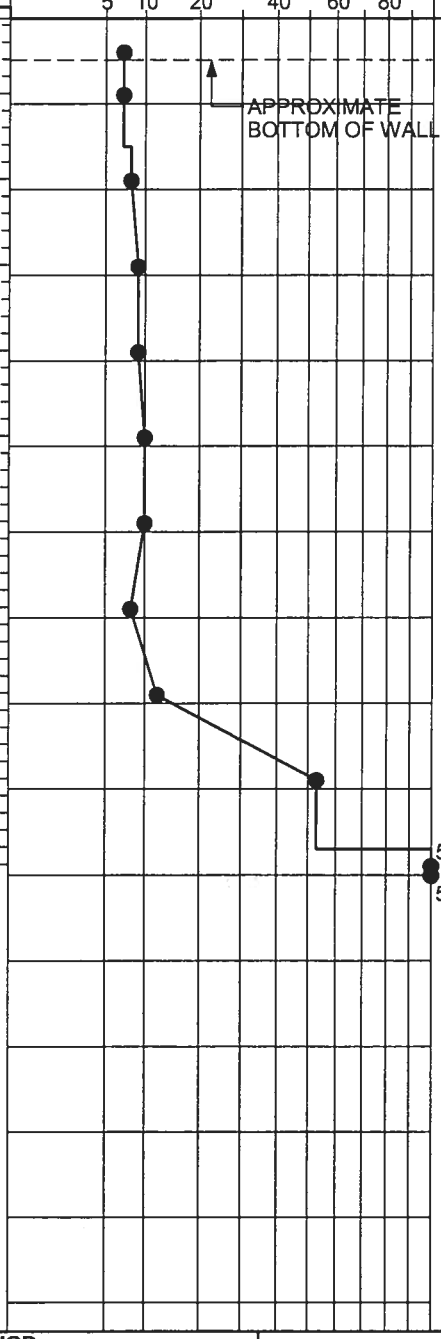
Core Boxes: **NA** Samples: **12** Overburden (ft): **50** Rock (ft): **NA** Total Depth (ft): **50.0**

Logged By: **DK** Date Drilled: **4/25/08**

VERTICAL DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION	ELEVATION (feet)	N-VALUE
					TOPSOIL = 2 inches — FILL	1069.4	
		SS			FILL: Loose reddish brown silty medium to fine **SAND**		7
5		SS				1065	7
					RESIDUUM: Loose to very dense reddish brown and tan to brown, gray and tan silty medium to fine **SAND** (micaceous) — SM		
10		SS				1060	8
15		SS				1055	9
20		SS				1050	9
25		SS				1045	10
30		SS				1040	10
35		SS				1035	8
40		SS				1030	12
45		SS				1025	53
50		SS			PARTIALLY WEATHERED ROCK: Sampled as very dense reddish brown and gray silty medium to fine **SAND** (micaceous) — PWR	1020	50/2"
		SS					50/0"

Auger refusal encountered at 50 feet below the exisiting ground surface.

Groundwater was encountered at 43.5 feet below the existing ground at the time of boring.



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**

SPTN 171-2867C.GPJ 8/5/08

WILLMER ENGINEERING INC. | WE

Project: **Collins Hill Road over SR 316**	**HOLE No. B-2**
Location: **Gwinnett County, Georgia**	Sheet 1 of 1
Project Number: **171-2867C; GDOT Proj. No. MSL00-0003-00(168); PI No. 0003168**	Location: **BENT - 2**

Azimuth: Angle from Horizontal: **90** Surface Elevation (ft): **1066.96** Station: **ST.79+00, 20' Lt. of CL**

Drilling Equipment: **CME 55** Drilling Method: **HSA/RC Auto Hammer**

Core Boxes: **1** Samples: **9** Overburden (ft): **36** Rock (ft): **10** Total Depth (ft): **46.0**

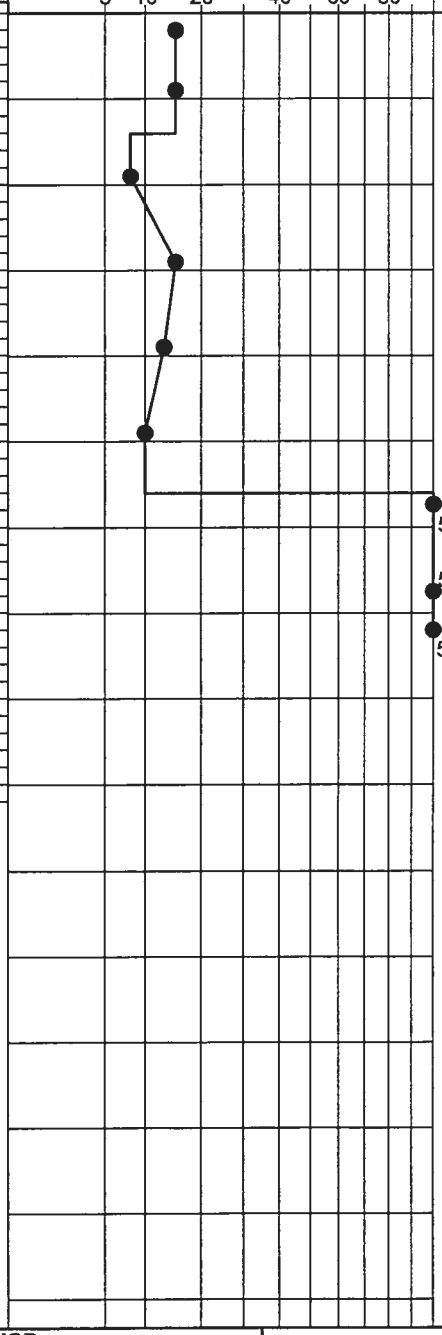
Logged By: **PT** Date Drilled: **4/29/08**

VERTICAL DEPTH (ft)	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION		ELEVATION (feet)
	SS			TOPSOIL = 3 inches	FILL	1067.0
	SS			FILL : Medium dense reddish brown clayey medium to fine **SAND**		1065
5						
	SS			RESIDUUM : Loose reddish brown silty medium to fine **SAND**	SM	1060
10						1055
15	SS			Loose and medium dense tan and gray silty medium to fine **SAND**	SM	1050
20	SS					1045
25	SS					1040
30	SS			PARTIALLY WEATHERED ROCK : Sampled as very dense reddish brown, gray and tan silty medium to fine **SAND** with rock fragments	PWR	1035
35	SS					
	SS			ROCK CORE : Hard to soft gray and black **AMPHIBOLITE/MICA SCHIST** with soil seams		1030
40	NQ	58	39			1025
45						

Auger refusal encountered at 36 feet below the exisiting ground surface.

Coring terminated at 46 feet below the existing ground surface.

Groundwater was encountered at 31 feet below the existing ground surface at the time of boring and at 24 hours after boring completion.



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-2**

WILLMER ENGINEERING INC. | WE

Project: **Collins Hill Road over SR 316**	**HOLE No. B-3**
Location: **Gwinnett County, Georgia**	Sheet 1 of 1
Project Number: **171-2867C; GDOT Proj. No. MSL00-0003-00(168); PI No. 0003168**	Location: **BENT - 3**

Azimuth: | Angle from Horizontal: **90** | Surface Elevation (ft): **1069.81** | Station: **ST.79+95, 30' Rt. of CL**

Drilling Equipment: **CME 55** | Drilling Method: **HSA Auto Hammer**

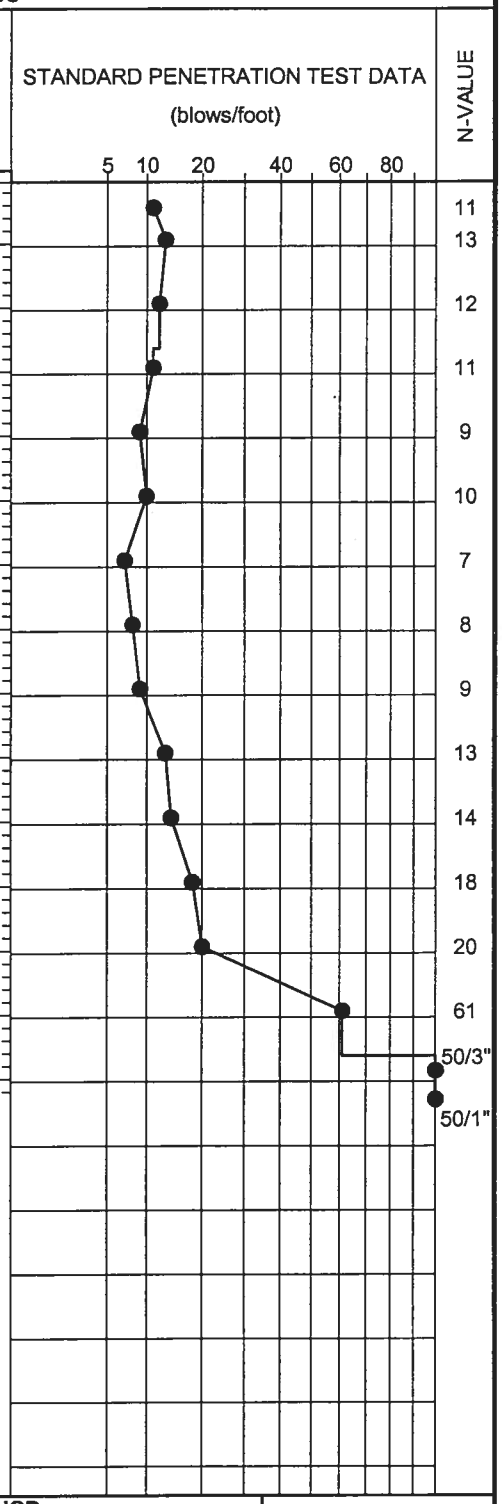
Core Boxes: **NA** | Samples: **16** | Overburden (ft): **70** | Rock (ft): **NA** | Total Depth (ft): **71.0**

Logged By: **PT** | Date Drilled: **5/16/08**

VERTICAL DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION		ELEVATION (feet)
		SS			CONCRETE = 12 inches	GAB	1069.8
		SS			GRADED AGGREGATE BASE = 6 inches	FILL	
5		SS			FILL: Medium dense reddish brown silty medium to fine **SAND** (slightly micaceous)	FILL	1065
10		SS				FILL	1060
15		SS			Stiff brown medium to fine sandy **SILT** with trace organic odour and rock fragments	SM	1055
20		SS			Medium dense brown and tan silty medium to fine **SAND** with quartz fragments		1050
25		SS			RESIDUUM: Loose to very dense reddish brown, gray and tan silty medium to fine **SAND** (slightly micaceous)		1045
30		SS					1040
35		SS					1035
40		SS					1030
45		SS					1025
50		SS					1020
55		SS					1015
60		SS					1010
65		SS					1005
70		SS			PARTIALLY WEATHERED ROCK : Sampled as very dense reddish brown, gray and tan silty medium to fine **SAND**	PWR	1000
		SS					

Auger refusal encountered at 71 feet below the exisiting ground surface.

Groundwater was encountered at 37 feet below the existing ground at the time of boring.



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-3**

SPTN 171-2867C.GPJ 8/5/08

WILLMER ENGINEERING INC. | WE

Project: **Collins Hill Road over SR 316**	**HOLE No. B-4**
Location: **Gwinnett County, Georgia**	Sheet 1 of 1
Project Number: **171-2867C; GDOT Proj. No. MSL00-0003-00(168); PI No. 0003168**	Location: **BENT - 4**

Azimuth: | Angle from Horizontal: **90** | Surface Elevation (ft): **1071.07** | Station: **ST.81+08, 20' Lt. of CL**

Drilling Equipment: **CME 550** | Drilling Method: **HSA/RW Auto Hammer**

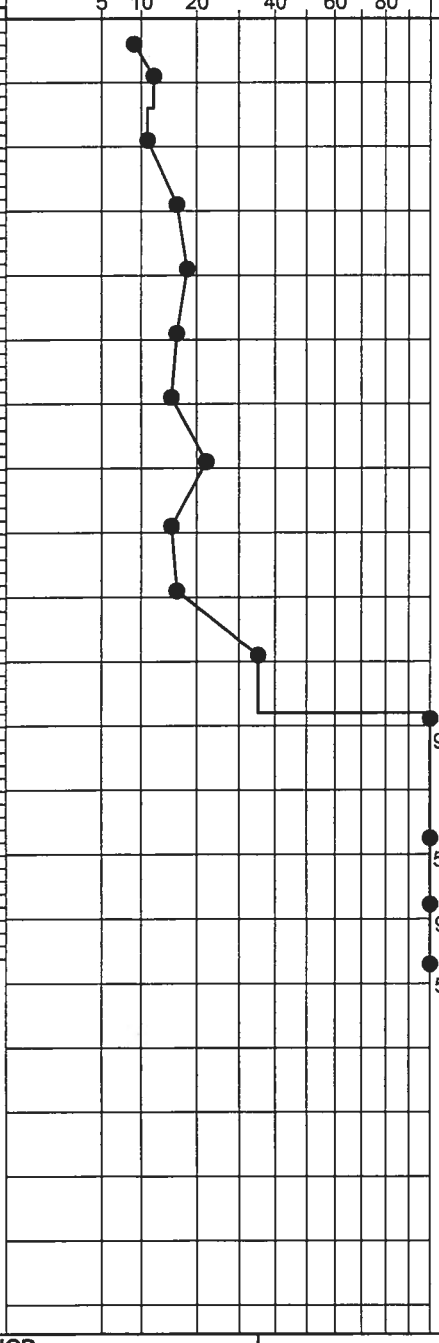
Core Boxes: **NA** | Samples: **15** | Overburden (ft): **73.5** | Rock (ft): **NA** | Total Depth (ft): **73.5**

Logged By: **DK** | Date Drilled: **4/24/08**

VERTICAL DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION	ELEVATION (feet)
		SS			TOPSOIL = 2 inches — FILL	1071.1
5		SS			FILL: Loose to medium dense reddish brown silty medium to fine **SAND**	1070
10		SS			RESIDUUM: Medium dense to dense brown, white and tan silty medium to fine **SAND** (micaceous) — SM	1065
15		SS				1060
20		SS				1055
25		SS				1050
30		SS				1045
35		SS				1040
40		SS				1035
45		SS				1030
50		SS				1025
55		SS			PARTIALLY WEATHERED ROCK: Sampled as very dense brown and tan silty medium to fine **SAND** (micaceous) — PWR	1020
60						1015
65		SS				1010
70		SS				1005
		SS			Auger refusal encountered at 73.5 feet below the exisiting ground surface.	1000

Groundwater was encountered at 28 feet below the existing ground surface at the time of boring and at 25.5 feet at 6 days after boring completion.

STANDARD PENETRATION TEST DATA (blows/foot)



N-VALUE

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**

PTN 171-2867C.GPJ 8/5/08

WILLMER ENGINEERING INC. WE

Project: **Collins Hill Road over SR 316**	**HOLE No. B-5**
Location: **Gwinnett County, Georgia**	Sheet 1 of 1
Project Number: **171-2867C; GDOT Proj. No. MSL00-0003-00(168); PI No. 0003168**	Location: **BENT - 5**

Azimuth: Angle from Horizontal: **90** Surface Elevation (ft): **1067.14** Station: **ST.81+53, 55' Rt. of CL.**

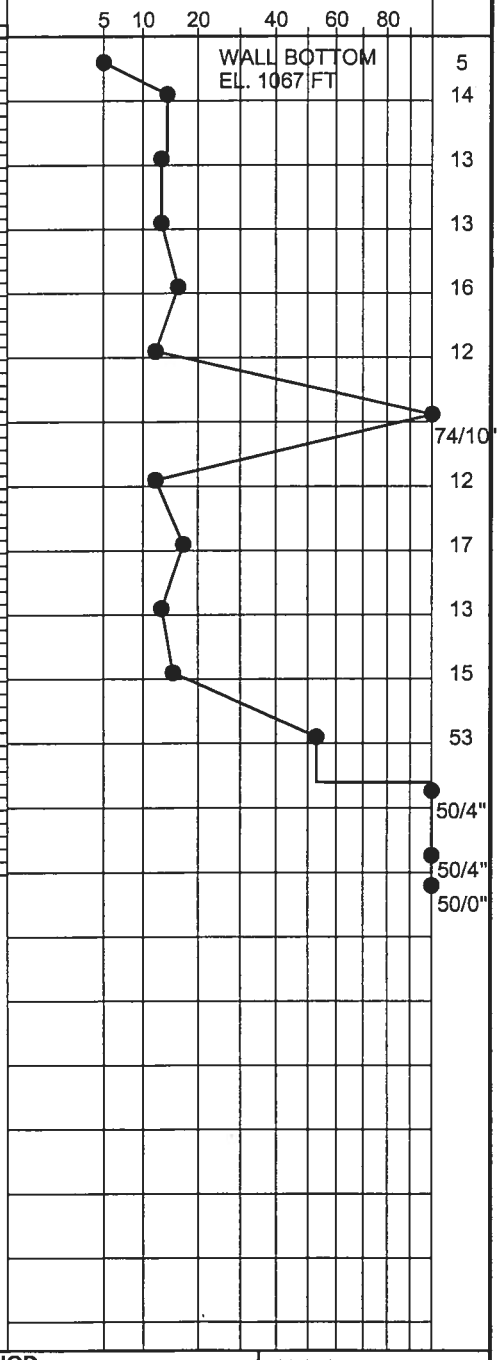
Drilling Equipment: **CME 550** Drilling Method: **HSA/RW Auto Hammer**

Core Boxes: **NA** Samples: **14** Overburden (ft): **66** Rock (ft): **NA** Total Depth (ft): **66.0**

Logged By: **DK** Date Drilled: **4/24/08**

VERTICAL DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION	ELEVATION (feet)	N-VALUE
		SS			TOPSOIL = 2 inches — FILL	1067.1	
5		SS			FILL: Loose to medium dense red silty medium to fine **SAND**	1065	5, 14
10		SS			RESIDUUM: Medium dense to very dense brown, gray and tan silty medium to fine **SAND**with rock fragments (micaceous) — SM	1060	13
15		SS				1055	13
20		SS				1050	16
25		SS				1045	12
30		SS				1040	74/10"
35		SS			Medium dense tan and brown silty medium to fine **SAND** (micaceous) — SM	1035	12
40		SS				1030	17
45		SS				1025	13
50		SS				1020	15
55		SS				1015	53
60		SS			PARTIALLY WEATHERED ROCK: Sampled as very dense gray and tan silty medium to fine **SAND** (micaceous) — PWR	1010	50/4"
65		SS				1005	50/4", 50/0"

STANDARD PENETRATION TEST DATA (blows/foot)



Auger refusal encountered at 66 feet below the exisiting ground surface.

Ground water was not encountered at the time of boring completion

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-5**

PTN 171-2867C.GPJ 8/5/08

WILLMER ENGINEERING INC. | WE

Project: **Collins Hill Road over SR 316** Location: **Gwinnett County, Georgia** Project Number: **171-2867C; GDOT Proj. No. MSL00-0003-00(168); PI No. 0003168**	**HOLE No. RW 8-1** Sheet 1 of 1 Location: **Wall No. 8**

Azimuth: | Angle from Horizontal: **90** | Surface Elevation (ft): **1052.83** | Station: **ST. 484+50, 12' Rt. of CL**

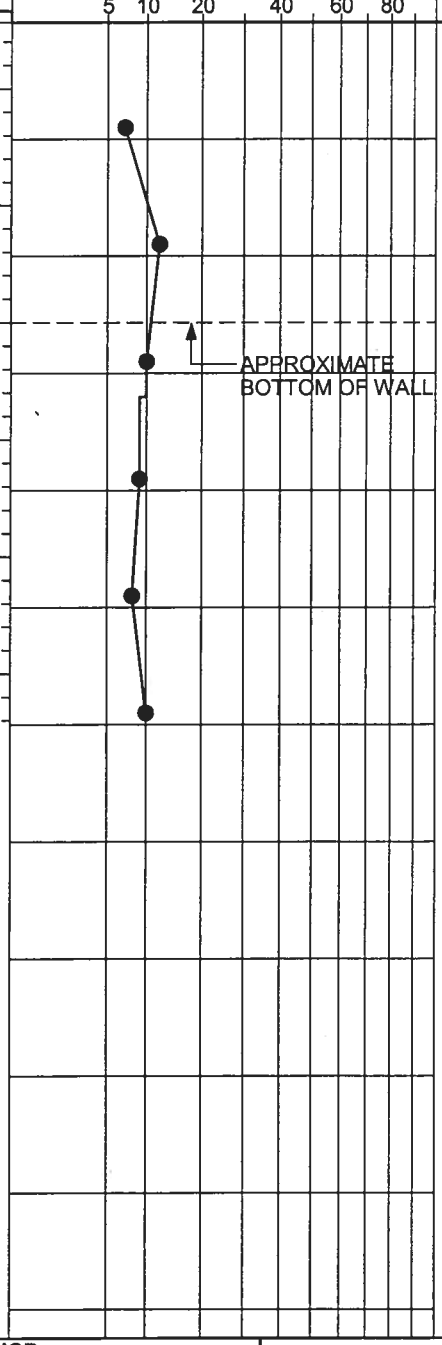
Drilling Equipment: **CME 550** | Drilling Method: **HSA Auto Hammer**

Core Boxes: **NA** | Samples: **6** | Overburden (ft): **NA** | Rock (ft): **NA** | Total Depth (ft): **30.0**

Logged By: **DK** | Date Drilled: **4/22/08**

VERTICAL DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION	ELEVATION (feet)
					TOPSOIL= 2 inches — FILL	1052.8
5		SS			FILL: Loose and medium dense red silty medium to fine **SAND**	1050
10		SS				1045
15		SS				1040
20		SS			RESIDUUM: Loose reddish brown, tan, and black silty medium to fine **SAND** (micaceous) — SM	1035
25		SS				1030
30		SS			Boring terminated at 30 feet below the existing ground surface. Groundwater was not encountered at the time of boring.	1025

STANDARD PENETRATION TEST DATA (blows/foot)



N-VALUE: 7, 12, 10, 9, 8, 10

SAMPLER TYPE

SS - Split Spoon
ST - Shelby Tube
NO - 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. **RW 8-1**

WILLMER ENGINEERING INC. | WE

Project: **Collins Hill Road over SR 316** Location: **Gwinnett County, Georgia** Project Number: **171-2867C; GDOT Proj. No. MSL00-0003-00(168); PI No. 0003168**	**HOLE No. RW 8-2** Sheet 1 of 1 Location: **Wall No. 8**

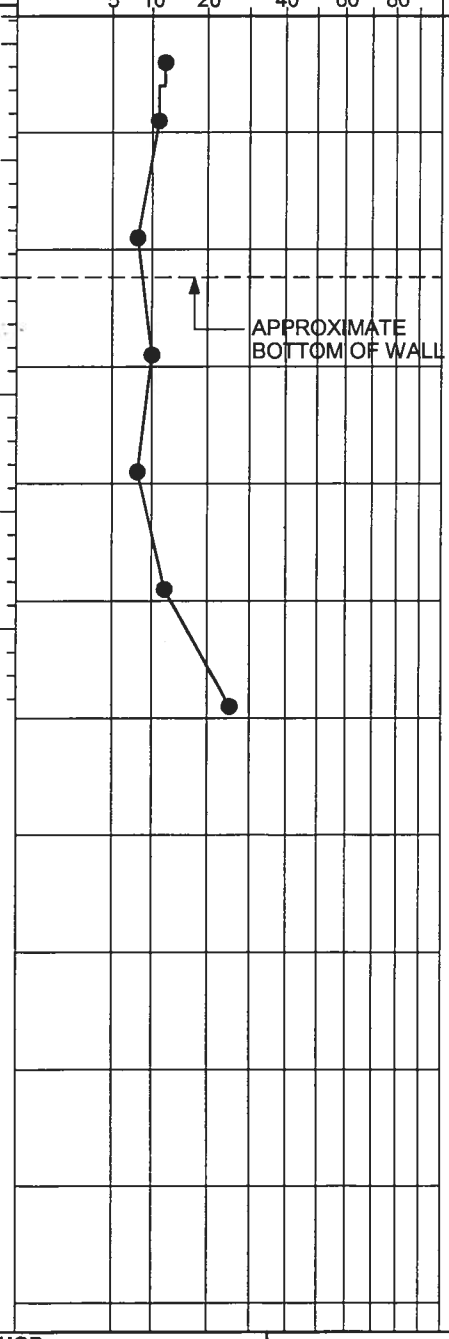
Azimuth: | Angle from Horizontal: **90** | Surface Elevation (ft): **1056.18** | Station: **ST. 486+00, 12' Rt. of CL**

Drilling Equipment: **CME 550** | Drilling Method: **HSA Auto Hammer**

Core Boxes: **NA** | Samples: **7** | Overburden (ft): **NA** | Rock (ft): **NA** | Total Depth (ft): **30.0**

Logged By: **DK** | Date Drilled: **4/22/08**

VERTICAL DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION	ELEVATION (feet)	N-VALUE
		SS			TOPSOIL = 2 inches — FILL	1056.2	
		SS			FILL: Stiff red medium to fine sandy **SILT** (micaceous) — SM	1055	12
5		SS			RESIDUUM: Medium dense to loose reddish brown silty fine **SAND** (micaceous)	1050	11
10		SS				1045	8
					Loose to medium dense reddish brown and tan silty medium to fine **SAND** (micaceous) — SM		
15		SS				1040	10
20		SS				1035	8
25		SS				1030	12
30		SS			Boring terminated at 30 feet below the existing ground surface. Groundwater was not encountered at the time of boring.		25



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. **RW 8-2**

SPTN 171-2867C.GPJ 8/5/08

WILLMER ENGINEERING INC. | WE

Project: **Collins Hill Road over SR 316** Location: **Gwinnett County, Georgia** Project Number: **171-2867C; GDOT Proj. No. MSL00-0003-00(168); PI No. 0003168**	**HOLE No. RW 8-3** Sheet 1 of 1 Location: **Wall No. 8**

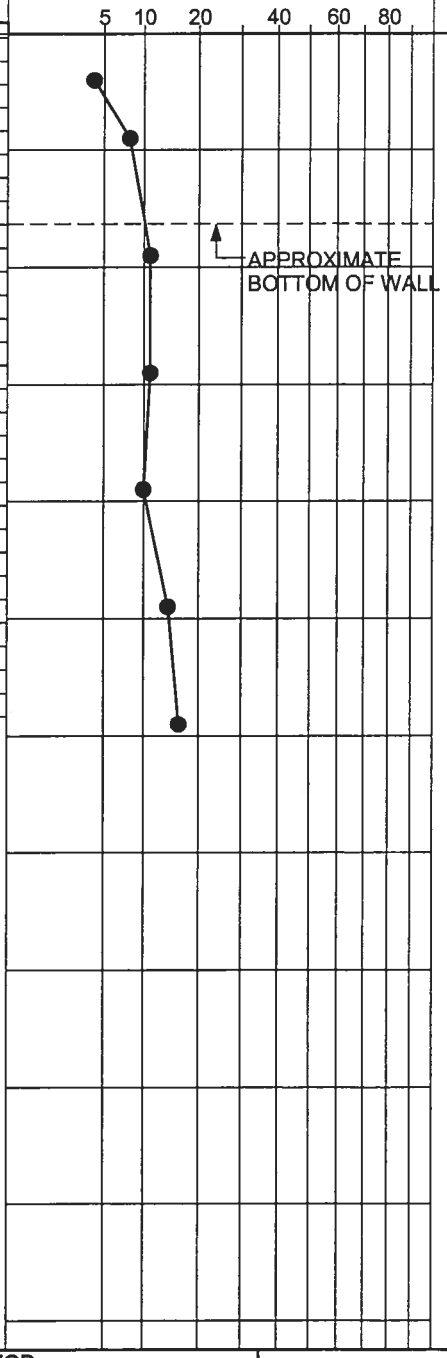
Azimuth: | Angle from Horizontal: **90** | Surface Elevation (ft): **1060.17** | Station: **ST. 488+05, 12' Rt. of CL**

Drilling Equipment: **CME 550** | Drilling Method: **HSA Auto Hammer**

Core Boxes: **NA** | Samples: **7** | Overburden (ft): **NA** | Rock (ft): **NA** | Total Depth (ft): **30.0**

Logged By: **DK** | Date Drilled: **4/22/08**

VERTICAL DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION	ELEVATION (feet)	STANDARD PENETRATION TEST DATA (blows/foot)	N-VALUE
					TOPSOIL = 2 inches SM	1060.2		
		SS			RESIDUUM: Very loose, loose and medium dense reddish brown , black and tan silty medium to fine **SAND** (micaceous)			4
5		SS				1055		8
10		SS				1050	APPROXIMATE BOTTOM OF WALL	11
15		SS				1045		11
20		SS				1040		10
25		SS				1035		14
30		SS						16
					Boring terminated at 30 feet below the existing ground surface.			
					Groundwater was not encountered at the time of boring.			



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. **RW 8-3**

WILLMER ENGINEERING INC. | WE

Project: **Collins Hill Road over SR 316** Location: **Gwinnett County, Georgia** Project Number: **171-2867C; GDOT Proj. No. MSL00-0003-00(168); PI No. 0003168**	**HOLE No. RW 8-4** Sheet 1 of 1 Location: **Wall No. 8**

Azimuth: | Angle from Horizontal: **90** | Surface Elevation (ft): **1064.00** | Station: **ST. 490+00, 12' Rt. of CL**

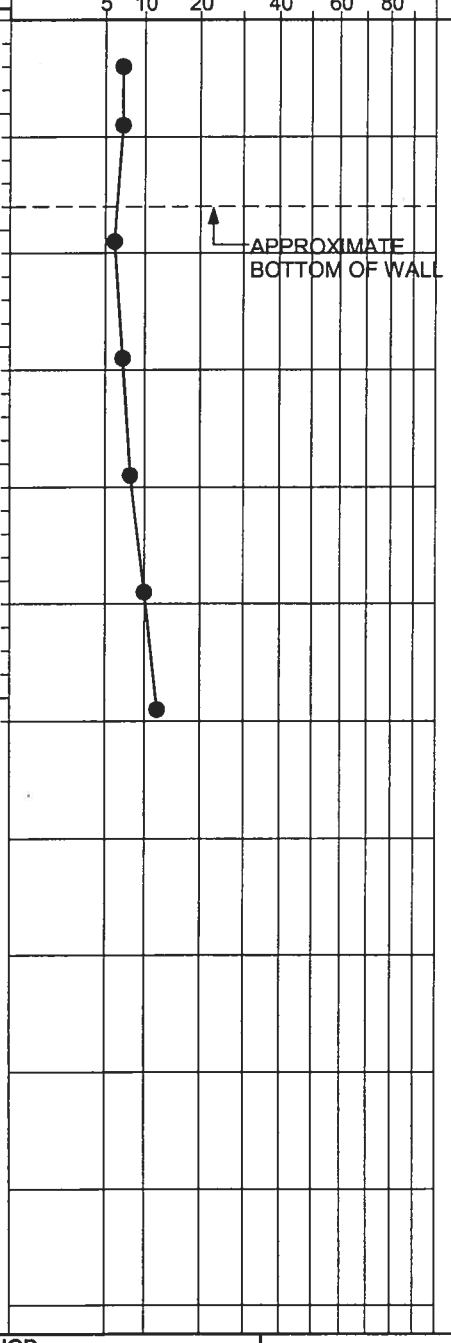
Drilling Equipment: **CME 550** | Drilling Method: **HSA Auto Hammer**

Core Boxes: **NA** | Samples: **7** | Overburden (ft): **NA** | Rock (ft): **NA** | Total Depth (ft): **30.0**

Logged By: **DK** | Date Drilled: **4/22/08**

VERTICAL DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION		ELEVATION (feet)	N-VALUE
					ASPHALT = 1 inch	GAB	1064.0	
					GRADED AGGREGATE BASE = 1 inch	SM		
		SS			RESIDUUM: Loose tan and reddish brown silty medium to fine **SAND** (slightly micaceous)			7
5		SS					1060	7
							1055	6
10		SS						
							1050	7
15		SS						
							1045	8
20		SS						
							1040	10
25		SS			Loose to medium dense brown, black and tan silty medium to fine **SAND**	SM		
							1035	12
30		SS			Boring terminated at 30 feet below the existing ground surface.			

Groundwater was not encountered at the time of boring.



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. **RW 8-4**

PTN 171-2867C.GPJ 8/5/08

WILLMER ENGINEERING INC. | WE

Project: **Collins Hill Road over SR 316** Location: **Gwinnett County, Georgia** Project Number: **171-2867C; GDOT Proj. No. MSL00-0003-00(168); PI No. 0003168**	**HOLE No. RW 8-5** Sheet 1 of 1 Location: **Wall No. 8**

Azimuth: | Angle from Horizontal: **90** | Surface Elevation (ft): **1066.86** | Station: **ST. 492+00, 12' Rt. of CL**

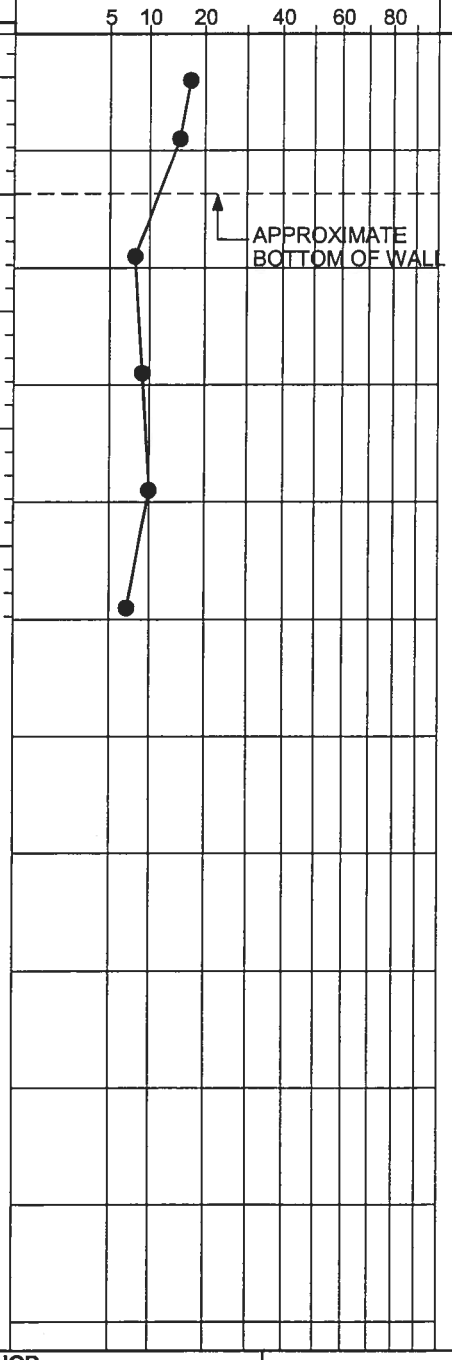
Drilling Equipment: **CME 550** | Drilling Method: **HSA Auto Hammer**

Core Boxes: **NA** | Samples: **6** | Overburden (ft): **NA** | Rock (ft): **NA** | Total Depth (ft): **25.0**

Logged By: **DK** | Date Drilled: **4/22/08**

VERTICAL DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION	ELEVATION (feet)
					ASPHALT = 1 inch	1066.9
					GRADED AGGREGATE BASE = 1 inch	GAB
		SS			RESIDUUM: Loose reddish brown to brown, black and tan silty medium to fine **SAND** (micaceous)	SM
		SS				1065
5		SS				
						1060
10		SS				
						1055
15		SS				
						1050
20		SS				
						1045
25		SS				
					Boring terminated at 25 feet below the existing ground surface.	
					Groundwater was not encountered at the time of boring.	

STANDARD PENETRATION TEST DATA (blows/foot)



N-VALUE: 17, 15, 8, 9, 10, 7

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. **RW 8-5**

WILLMER ENGINEERING INC.

Project: **Collins Hill Road over SR 316**	**HOLE No. RW 8-6**
Location: **Gwinnett County, Georgia**	Sheet 1 of 1
Project Number: **171-2867C; GDOT Proj. No. MSL00-0003-00(168); PI No. 0003168**	Location: **Wall No. 8**

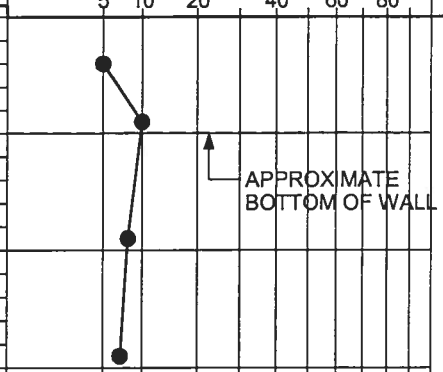
Azimuth: Angle from Horizontal: **90** Surface Elevation (ft): **1067.00** Station: **ST. 493+00, 12' Rt. of CL**

Drilling Equipment: **Geoprobe 6620DT** Drilling Method: **HSA Auto Hammer**

Core Boxes: **NA** Samples: **4** Overburden (ft): **NA** Rock (ft): **NA** Total Depth (ft): **15.0**

Logged By: **EB** Date Drilled:

VERTICAL DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION	ELEVATION (feet)	STANDARD PENETRATION TEST DATA (blows/foot)	N-VALUE
					Topsoil = 3 inches **CL**	1067.0		
		SS			RESIDUUM: Firm to stiff red-brown medium to fine sandy lean **CLAY**	1065		5
5		SS						10
					Loose red-brown silty medium to fine **SAND** (micaceous) **SM**	1060	APPROXIMATE BOTTOM OF WALL	
10		SS						8
						1055		
15		SS						7
					Boring terminated @ 15 feet below existing ground surface			
					Groundwater not encountered @ time of boring			



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. **RW 8-6**

WILLMER ENGINEERING INC. | WE

Project: **Collins Hill Road over SR 316** Location: **Gwinnett County, Georgia** Project Number: **171-2867C; GDOT Proj. No. MSL00-0003-00(168); PI No. 0003168**	**HOLE No. RW 8-7** Sheet 1 of 1 Location: **Wall No. 8**

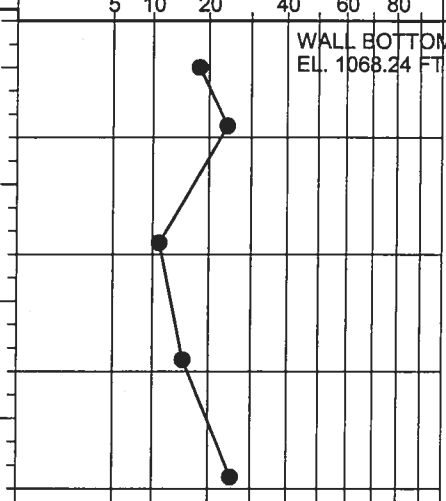
Azimuth: | Angle from Horizontal: **90** | Surface Elevation (ft): **1067.00** | Station: **ST. 495+00, 12' Rt. of CL**

Drilling Equipment: **GeoProbe 6620DT** | Drilling Method: **HSA Auto Hammer**

Core Boxes: **NA** | Samples: **5** | Overburden (ft): **NA** | Rock (ft): **NA** | Total Depth (ft): **20.0**

Logged By: **EB** | Date Drilled: **5/25/06**

VERTICAL DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION	ELEVATION (feet)	STANDARD PENETRATION TEST DATA (blows/foot)	N-VALUE
					Topsoil = 3 inches SM	1067.0		
		SS			RESIDUUM: Medium dense red-brown, tan and black silty medium to fine **SAND**	1065	WALL BOTTOM EL. 1068.24 FT	18
5		SS						24
						1060		
10		SS						11
						1055		
15		SS						15
						1050		
20		SS						25
					Boring terminated @ 20 feet below existing ground surface Groundwater not encountered @ time of boring			



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. **RW 8-7**

PTN 171-2867C.GPJ 8/5/08

WILLMER ENGINEERING INC. | WE

Project: **Collins Hill Road over SR 316** Location: **Gwinnett County, Georgia** Project Number: **171-2867C; GDOT Proj. No. MSL00-0003-00(168); PI No. 0003168**	**HOLE No. RW 9-1** Sheet 1 of 1 Location: **Wall No. 9**

Azimuth: | Angle from Horizontal: **90** | Surface Elevation (ft): **1048.00** | Station: **ST. 1262+00, 168.00 Lt. of CL**

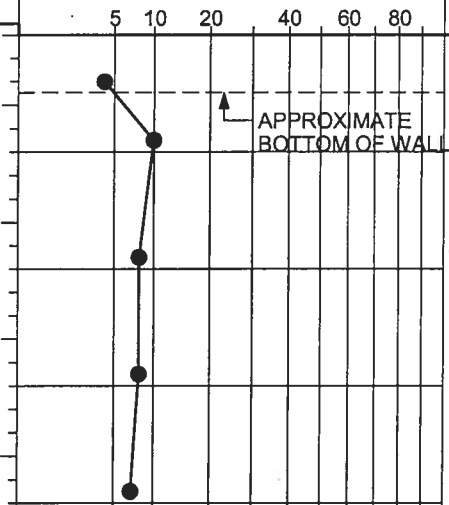
Drilling Equipment: **CME 550** | Drilling Method: **HSA Auto Hammer**

Core Boxes: **NA** | Samples: **5** | Overburden (ft): **NA** | Rock (ft): **NA** | Total Depth (ft): **20.0**

Logged By: **DK** | Date Drilled: **4/21/08**

VERTICAL DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION	ELEVATION (feet)
					TOPSOIL = 2 inches **SM**	1048.0
		SS			RESIDUUM: Very loose to loose reddish brown , black and tan silty medium to fine **SAND** (micaceous)	
5		SS				1045
						1040
10		SS				
						1035
15		SS				
						1030
20		SS			Boring terminated at 20 feet below the existing ground surface. Groundwater was not encountered at the time of boring and was encountered at 16.5 feet below the existing ground at 24 hours after boring completion.	

STANDARD PENETRATION TEST DATA (blows/foot)



N-VALUE: 4, 10, 8, 8, 7

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. **RW 9-1**

WILLMER ENGINEERING INC. | WE

Project: **Collins Hill Road over SR 316** Location: **Gwinnett County, Georgia** Project Number: **171-2867C; GDOT Proj. No. MSL00-0003-00(168); PI No. 0003168**	**HOLE No. RW 9-2** Sheet 1 of 1 Location: **Wall No. 9**

Azimuth: | Angle from Horizontal: **90** | Surface Elevation (ft): **1048.00** | Station: **ST. 1263+95, 168.00 Lt. of CL**

Drilling Equipment: **CME 550** | Drilling Method: **HSA Auto Hammer**

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

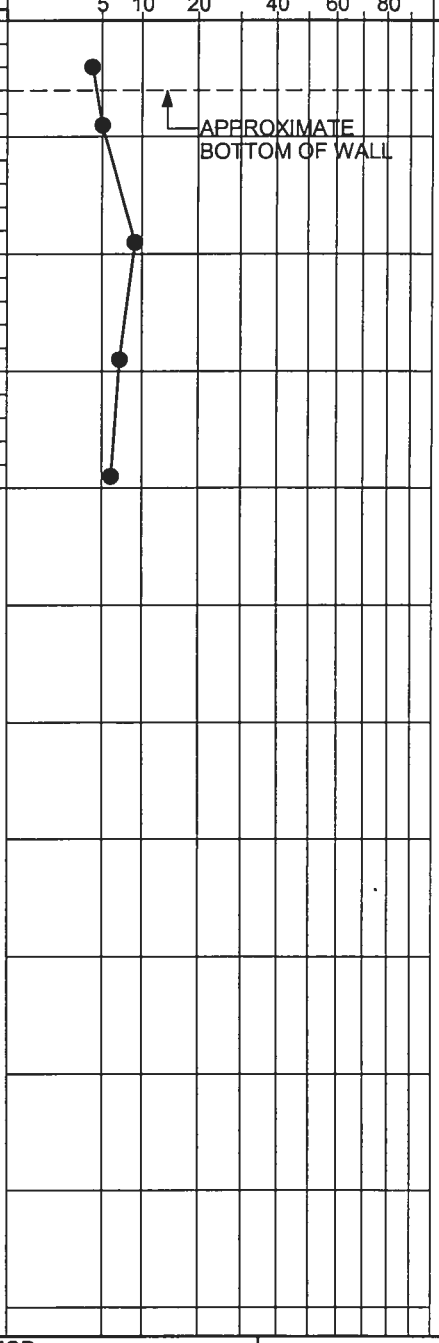
Logged By: **DK** | Date Drilled: **4/21/08**

VERTICAL DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION	ELEVATION (feet)	N-VALUE
					TOPSOIL = 2 inches — SM	1048.0	
		SS			RESIDUUM: Very loose to loose reddish brown and tan silty medium to fine **SAND** (micaceous)	1045	4
5		SS					5
		ST					
10		SS				1040	9
15		SS				1035	7
						1030	
20		SS					6

Boring terminated at 20 feet below the existing ground surface.

Groundwater was not encountered at the time of boring and was encountered at 18 feet below the existing ground at 24 hours after boring completion.

STANDARD PENETRATION TEST DATA (blows/foot)



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. **RW 9-2**

WILLMER ENGINEERING INC. WE

Project: **Collins Hill Road over SR 316** Location: **Gwinnett County, Georgia** Project Number: **171-2867C; GDOT Proj. No. MSL00-0003-00(168); PI No. 0003168**	**HOLE No. RW 9-3** Sheet 1 of 1 Location: **Wall No. 9**

Azimuth: Angle from Horizontal: **90** Surface Elevation (ft): **1052.00** Station: **ST. 1265+95, 168.00 Lt. of CL**

Drilling Equipment: **CME 550** Drilling Method: **HSA Auto Hammer**

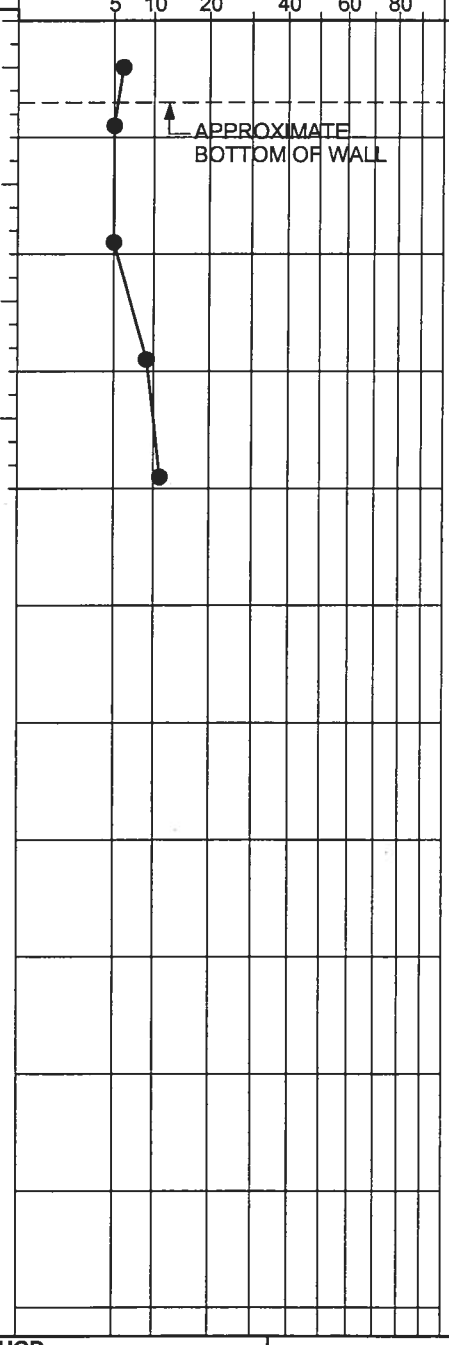
Core Boxes: **NA** Samples: **5** Overburden (ft): **NA** Rock (ft): **NA** Total Depth (ft): **20.0**

Logged By: **DK** Date Drilled: **4/21/08**

VERTICAL DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION	ELEVATION (feet)	N-VALUE
					TOPSOIL = 2 inches — FILL	1052.0	
		SS			FILL: Loose reddish brown silty with medium to fine **SAND** (micaceous)	1050	6
5		SS					5
					RESIDUUM: Loose to medium dense tan and brown silty medium to fine **SAND** (micaceous) — SM	1045	
10		SS					5
						1040	
15		SS					9
						1035	
20		SS					11

Boring terminated at 20 feet below the existing ground surface.

Groundwater was not encountered at the time of boring.



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. **RW 9-3**

WILLMER ENGINEERING INC. | WE

Project: **Collins Hill Road over SR 316** Location: **Gwinnett County, Georgia** Project Number: **171-2867C; GDOT Proj. No. MSL00-0003-00(168); PI No. 0003168**	**HOLE No. RW 9-4** Sheet 1 of 1 Location: **Wall No. 9**

Azimuth: | Angle from Horizontal: **90** | Surface Elevation (ft): **1058.79** | Station: **ST. 1267+95, 168.00 Lt. of CL**

Drilling Equipment: **CME 550** | Drilling Method: **HSA Auto Hammer**

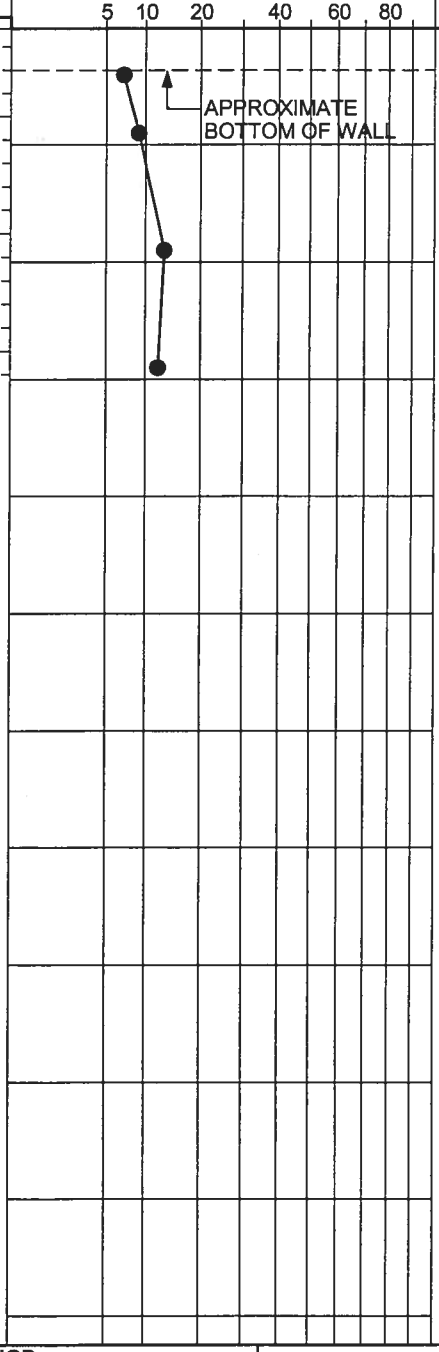
Core Boxes: **NA** | Samples: **4** | Overburden (ft): **NA** | Rock (ft): **NA** | Total Depth (ft): **15.0**

Logged By: **DK** | Date Drilled: **4/21/08**

VERTICAL DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION		ELEVATION (feet)	STANDARD PENETRATION TEST DATA (blows/foot)	N-VALUE
					TOPSOIL = 2 inches	SM	1058.8		
		SS			RESIDUUM: Loose reddish brown silty medium to fine **SAND** (slightly micaceous)	CL			7
5		SS			Stiff reddish brown medium to fine sandy **SILT** (slightly micaceous)	SM	1055	APPROXIMATE BOTTOM OF WALL	9
10		SS			Medium dense red and yellowish brown and black silty medium to fine **SAND**		1050		13
15		SS					1045		12

Boring terminated at 15 feet below the existing ground surface.

Groundwater was not encountered at the time of boring.



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. **RW 9-4**

WILLMER ENGINEERING INC. | WE

Project: **Collins Hill Road over SR 316** Location: **Gwinnett County, Georgia** Project Number: **171-2867C; GDOT Proj. No. MSL00-0003-00(168); PI No. 0003168**	**HOLE No. RW 9-5** Sheet 1 of 1 Location: **Wall No. 9**

Azimuth: | Angle from Horizontal: **90** | Surface Elevation (ft): **1069.00** | Station: **ST. 1269+45, 168.00 Lt. of CL**

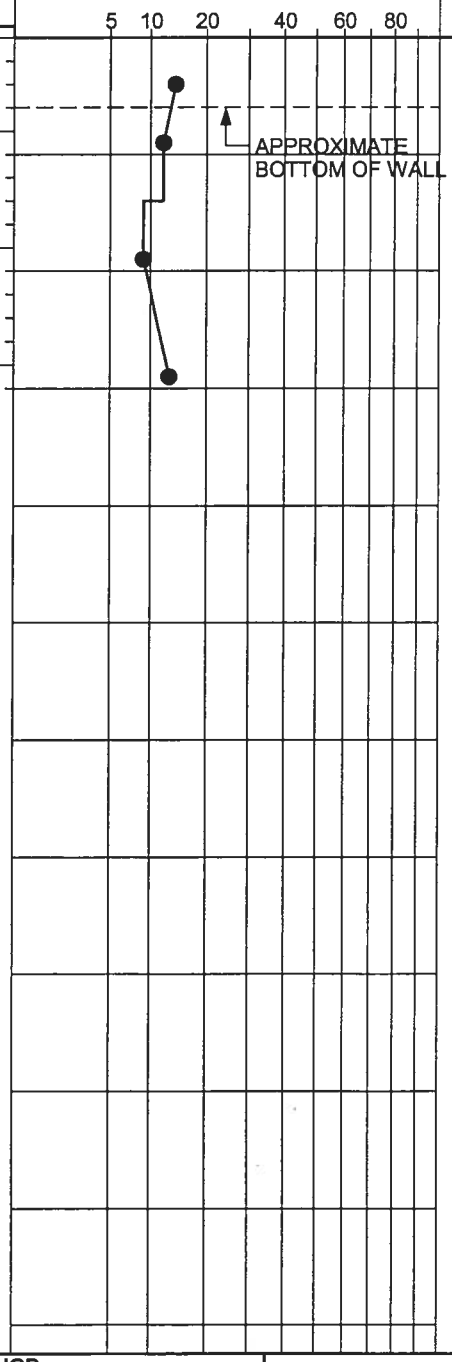
Drilling Equipment: **CME 550** | Drilling Method: **HSA Auto Hammer**

Core Boxes: **NA** | Samples: **4** | Overburden (ft): **NA** | Rock (ft): **NA** | Total Depth (ft): **15.0**

Logged By: **DK** | Date Drilled: **4/21/08**

VERTICAL DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION		ELEVATION (feet)	N-VALUE
		SS			FILL: Medium dense reddish brown silty medium to fine **SAND** (micaceous)	FILL	1069.0	14
5		SS					1065	12
10		SS			RESIDUUM: Medium dense reddish brown silty medium to fine **SAND** (micaceous)	SM	1060	9
15		SS			Boring terminated at 15 feet below the existing ground surface. Groundwater was not encountered at the time of boring.		1055	13

STANDARD PENETRATION TEST DATA (blows/foot)



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. **RW 9-5**

PTN 171-2867C.GPJ 8/5/08

WILLMER ENGINEERING INC. WE

Project: **Collins Hill Road over SR 316**	**HOLE No. RW 11-1**
Location: **Gwinnett County, Georgia**	Sheet 1 of 1
Project Number: **171-2867C; GDOT Proj. No. MSL00-0003-00(168); PI No. 0003168**	Location: **Wall No. 11**

Azimuth: -- Angle from Horizontal: **90** Surface Elevation (ft): **1080.00** Station: **84+00, 46 Ft. Left, Collins Hill Rd.**

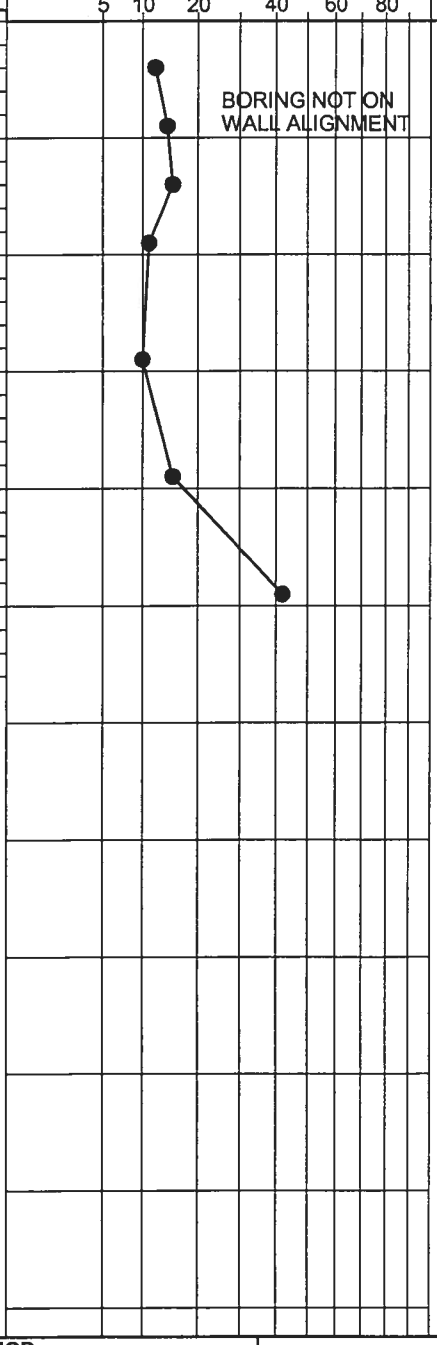
Drilling Equipment: **GeoProbe 6620DT** Drilling Method: **HSA**

Core Boxes: **NA** Samples: **7** Overburden (ft): **NA** Rock (ft): **NA** Total Depth (ft): **28.0**

Logged By: **PZ** Date Drilled: **12/12/05**

VERTICAL DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION	ELEVATION (feet)	N-VALUE
					TOPSOIL = 4 inches SM	1080.0	
		SS			RESIDUUM: Medium dense reddish brown silty medium to fine **SAND**		12
5		SS				1075	14
		SS					15
10		SS			Loose to medium dense tan silty medium to fine **SAND** (slightly micaceous) SM	1070	11
15		SS				1065	10
20		SS				1060	15
25		SS			Dense tan and white silty medium to fine **SAND** with rock fragments (slightly micaceous) SM	1055	42

STANDARD PENETRATION TEST DATA (blows/foot)



Boring terminated @ 28 feet below existing ground surface

Groundwater not encountered @ time of boring

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. **RW 11-1**

WILLMER ENGINEERING INC. WE

Project: **Collins Hill Road over SR 316** Location: **Gwinnett County, Georgia** Project Number: **171-2867C; GDOT Proj. No. MSL00-0003-00(168); PI No. 0003168**	**HOLE No. RW 11-2** Sheet 1 of 1 Location: **Wall No. 11**

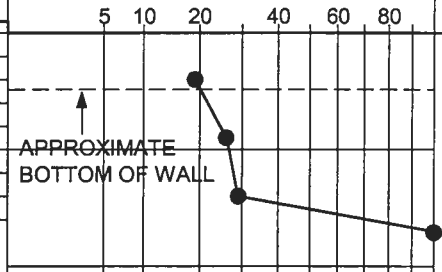
Azimuth: **--** Angle from Horizontal: **90** Surface Elevation (ft): **1080.00** Station: **86+00, 46 Ft. Left, Collins Hill Rd.**

Drilling Equipment: **GeoProbe 6620DT** Drilling Method: **HSA**

Core Boxes: **NA** Samples: **4** Overburden (ft): **NA** Rock (ft): **NA** Total Depth (ft): **8.5**

Logged By: **PZ** Date Drilled: **12/12/05**

VERTICAL DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION	ELEVATION (feet)	STANDARD PENETRATION TEST DATA (blows/foot)	N-VALUE
					ASPHALT = 4 inches	1080.0		
					GAB = 2 inches		GAB	
		SS			RESIDUUM: Medium dense orange, brown and tan silty medium to fine **SAND**		SM	19
5		SS				1075	APPROXIMATE BOTTOM OF WALL	26
		SS						29
		SS						50/0
					Boring encountered auger refusal @ 8.5 feet below existing ground surface			
					Groundwater not encountered @ time of boring			



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. **RW 11-2**

WILLMER ENGINEERING INC. WE

Project: **Collins Hill Road over SR 316** Location: **Gwinnett County, Georgia** Project Number: **171-2867C; GDOT Proj. No. MSL00-0003-00(168); PI No. 0003168**	**HOLE No. RW 11-3** Sheet 1 of 1 Location: **Wall No. 11**

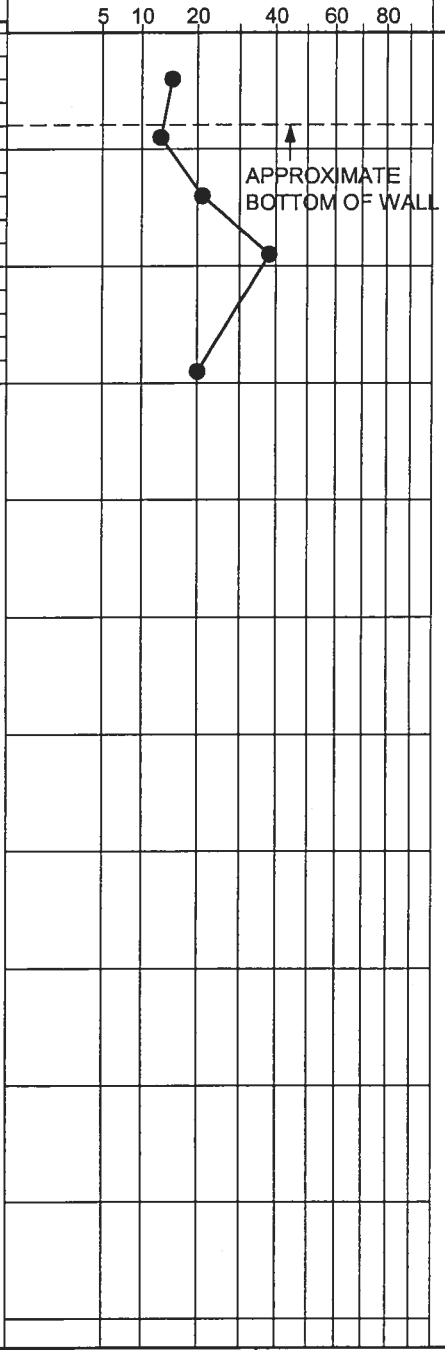
Azimuth: -- Angle from Horizontal: **90** Surface Elevation (ft): **1084.00** Station: **87+50, 46 Ft. Left, Collins Hill Rd.**

Drilling Equipment: **GeoProbe 6620DT** Drilling Method: **HSA**

Core Boxes: **NA** Samples: **5** Overburden (ft): **NA** Rock (ft): **NA** Total Depth (ft): **15.0**

Logged By: **PZ** Date Drilled: **12/12/05**

VERTICAL DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION	ELEVATION (feet)	STANDARD PENETRATION TEST DATA (blows/foot)	N-VALUE
					TOPSOIL = 4 inches SM	1084.0		
		SS			RESIDUUM: Medium dense to dense orange, brown and tan silty medium to fine **SAND**			15
5		SS				1080		13
		SS					APPROXIMATE BOTTOM OF WALL	21
10		SS				1075		38
15		SS				1070		20
					Boring terminated @ 15 feet below existing ground surface			
					Groundwater not encountered @ time of boring			



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. **RW 11-3**

PTN 171-2867C.GPJ 8/5/08

WILLMER ENGINEERING INC. | WE

Project: **Collins Hill Road over SR 316** Location: **Gwinnett County, Georgia** Project Number: **171-2867C; GDOT Proj. No. MSL00-0003-00(168); PI No. 0003168**	**HOLE No. RW 12-1** Sheet 1 of 1 Location: **Wall No. 12**

Azimuth: **--** Angle from Horizontal: **90** Surface Elevation (ft): **1067.00** Station: **73+20, 45 Ft. Right, Collins Hill Rd.**

Drilling Equipment: **GeoProbe 6620DT** Drilling Method: **HSA**

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

Logged By: **PZ** Date Drilled: **12/14/05**

VERTICAL DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION	ELEVATION (feet)	STANDARD PENETRATION TEST DATA (blows/foot)	N-VALUE
					TOPSOIL = 3 inches **ML**	1067.0		
		SS			RESIDUUM: Firm to stiff red to reddish brown medium to fine sandy **SILT**	1065	APPROXIMATE BOTTOM OF WALL	11
5		SS						10
		SS			Loose reddish purple and brown silty medium to fine **SAND** (micaceous) **SM**	1060		8
10		SS						8
						1055		
15		SS						7
						1050		
20		SS						8

Boring teminated @ 20 feet below existing ground surface

Groundwater not encountered @ time of boring

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. **RW 12-1**

WILLMER ENGINEERING INC. WE

Project: **Collins Hill Road over SR 316**	**HOLE No. RW 12-2**
Location: **Gwinnett County, Georgia**	Sheet 1 of 1
Project Number: **171-2867C; GDOT Proj. No. MSL00-0003-00(168); PI No. 0003168**	Location: **Wall No. 12**

Azimuth: -- Angle from Horizontal: **90** Surface Elevation (ft): **1070.00** Station: **75+00, 46 Ft. Right, Collins Hill Rd.**

Drilling Equipment: **GeoProbe 6620DT** Drilling Method: **HSA**

Core Boxes: **NA** Samples: **7** Overburden (ft): **NA** Rock (ft): **NA** Total Depth (ft): **28.0**

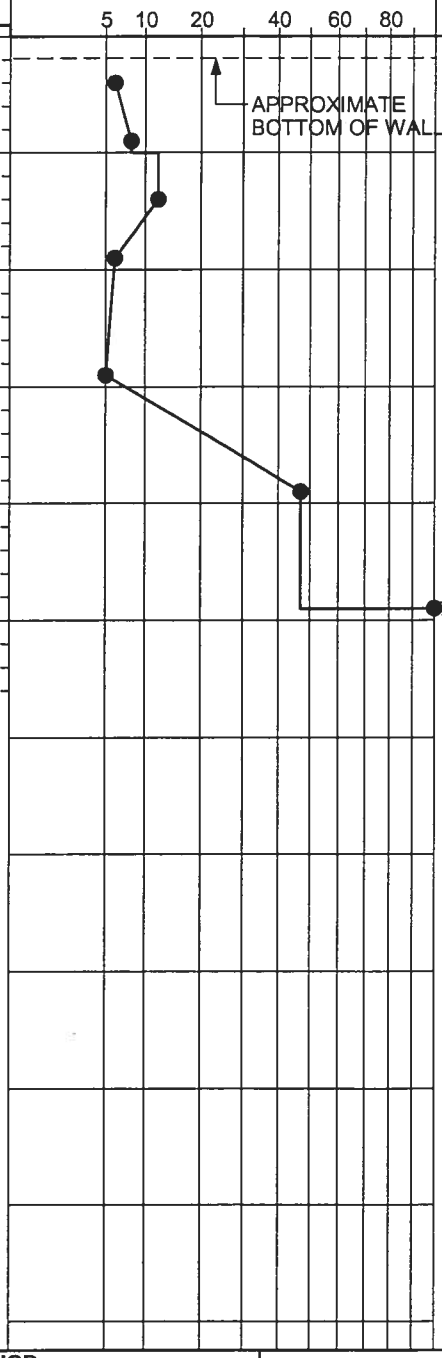
Logged By: **PZ** Date Drilled: **12/13/05**

VERTICAL DEPTH (ft)	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION		ELEVATION (feet)
				GRAVEL = 3 inches	FILL	1070.0
	SS			FILL: Firm reddish brown medium to fine sandy **SILT** with gravel		
	SS					
5				RESIDUUM: Firm to stiff reddish brown medium to fine sandy **SILT** (slightly micaceous)	ML	1065
	SS					
	SS					
10						1060
	SS					
15						1055
	SS			Dense tan and light brown silty medium to fine **SAND** with rock fragments	SM	
20						1050
	SS					
25				PARTIALLY WEATHERED ROCK: Sampled as light brown silty medium to fine **SAND** with rock fragments	PWR	1045

Boring encountered auger refusal @ 28 feet below existing ground surface

Groundwater not encountered @ time of boring

STANDARD PENETRATION TEST DATA (blows/foot)



N-VALUE

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. **RW 12-2**

PTN 171-2867C.GPJ 8/15/08

WILLMER ENGINEERING INC.

Project: **Collins Hill Road over SR 316**	**HOLE No. RW 12-3**
Location: **Gwinnett County, Georgia**	Sheet 1 of 1
Project Number: **171-2867C; GDOT Proj. No. MSL00-0003-00(168); PI No. 0003168**	Location: **Wall No. 12**

Azimuth: **--** Angle from Horizontal: **90** Surface Elevation (ft): **1075.00** Station: **77+00, 46 Ft. Right, Collins Hill Rd.**

Drilling Equipment: **GeoProbe 6620DT** Drilling Method: **HSA**

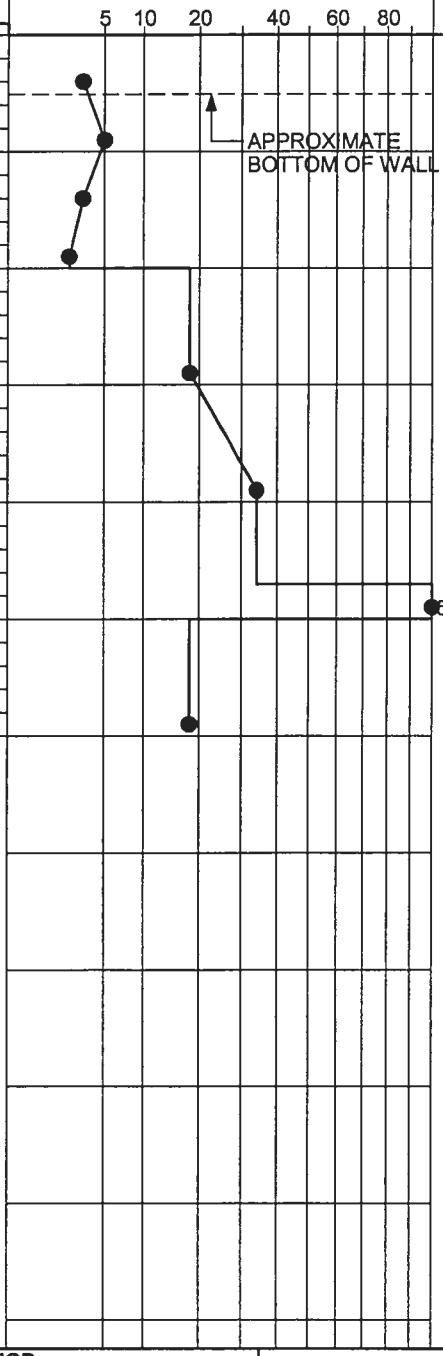
Core Boxes: **NA** Samples: **8** Overburden (ft): **NA** Rock (ft): **NA** Total Depth (ft): **30.0**

Logged By: **PZ** Date Drilled: **12/13/05**

VERTICAL DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION	ELEVATION (feet)	N-VALUE
					TOPSOIL = 4 inches — FILL	1075.0	
		SS			FILL: Very soft to firm reddish brown medium to fine sandy **SILT**		3
5		SS				1070	5
		SS					3
10		SS				1065	2
					RESIDUUM: Medium dense to dense tan and brown silty medium to fine **SAND** (slightly micaceous) — SM		
15		SS				1060	18
20		SS				1055	34
25		SS			PARTIALLY WEATHERED ROCK: Sampled as gray and black silty medium to fine **SAND** with rock fragments — PWR, SM	1050	50/5"
30		SS			RESIDUUM: Medium dense brown and dark gray silty medium to fine **SAND**	1045	18

Boring terminated @ 30 feet below existing ground surface

Groundwater encountered @ 27.5 feet below existing ground surface @ time of boring



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. **RW 12-3**

WILLMER ENGINEERING INC. WE

Project: **Collins Hill Road over SR 316**	**HOLE No. RW 12-4**
Location: **Gwinnett County, Georgia**	Sheet 1 of 1
Project Number: **171-2867C; GDOT Proj. No. MSL00-0003-00(168); PI No. 0003168**	Location: **Wall No. 12**

Azimuth: **--** Angle from Horizontal: **90** Surface Elevation (ft): **1072.00** Station: **78+00, 46 Ft. Right, Collins Hill Rd.**

Drilling Equipment: **GeoProbe 6620DT** Drilling Method: **HSA**

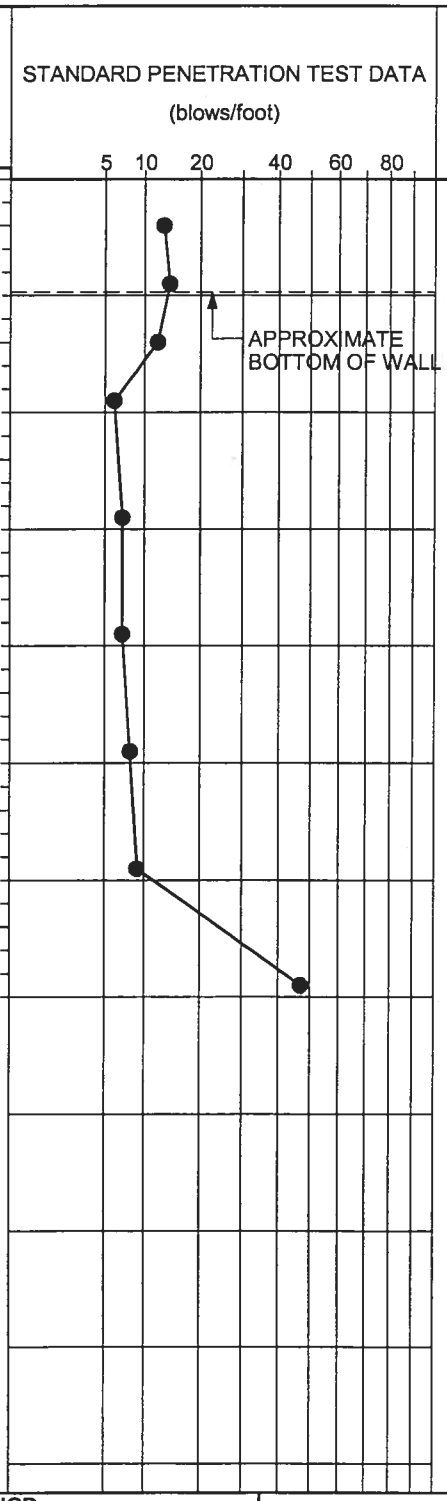
Core Boxes: **NA** Samples: **9** Overburden (ft): **NA** Rock (ft): **NA** Total Depth (ft): **35.0**

Logged By: **PZ** Date Drilled: **12/13/05**

VERTICAL DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION		ELEVATION (feet)	N-VALUE
					TOPSOIL = 4 inches	ML	1072.0	
		SS			RESIDUUM: Stiff red medium to fine sandy **SILT**	SM	1070	13
5		SS			Medium dense red and orange silty medium to fine **SAND**			14
		SS					1065	12
10		SS			Loose tan and light brown silty medium to fine **SAND** (slightly micaceous)	SM		6
							1060	
15		SS						7
							1055	
20		SS						7
							1050	
25		SS						8
							1045	
30		SS						9
							1040	
35		SS			Dense brown silty medium to fine **SAND** (micaceous)	SM		47

Boring terminated @ 35 feet below existing ground surface

Groundwater encountered @ 31 feet below existing ground surface @ time of boring



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. **RW 12-4**

PTN 171-2867C.GPJ 8/15/08

WILLMER ENGINEERING INC.

Project: **Collins Hill Road over SR 316**	**HOLE No. RW 13-1**
Location: **Gwinnett County, Georgia**	Sheet 1 of 1
Project Number: **171-2867C; GDOT Proj. No. MSL00-0003-00(168); PI No. 0003168**	Location: **Wall No. 13**

Azimuth: Angle from Horizontal: **90** Surface Elevation (ft): **1069.29** Station: **ST. 1270+71, 161' Rt. of CL**

Drilling Equipment: **CME 550** Drilling Method: **HSA Auto Hammer**

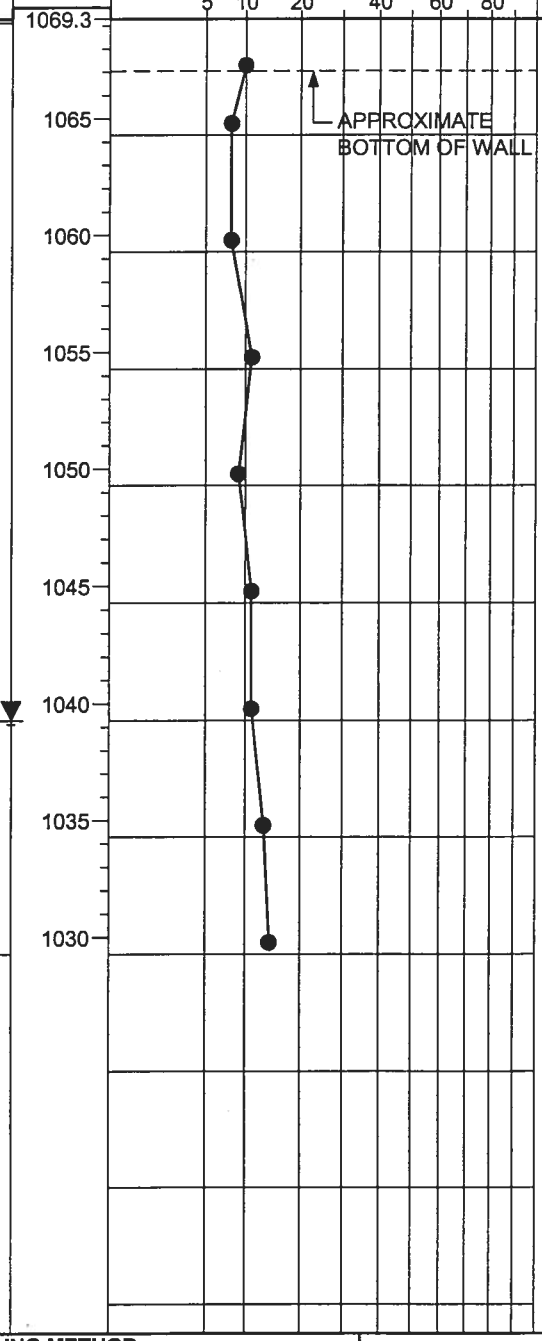
Core Boxes: **NA** Samples: **9** Overburden (ft): **NA** Rock (ft): **NA** Total Depth (ft): **40.0**

Logged By: **DK** Date Drilled: **4/22/08**

VERTICAL DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION	ELEVATION (feet)	STANDARD PENETRATION TEST DATA (blows/foot)	N-VALUE
					TOPSOIL = 2 inches SM	1069.3		
		SS			RESIDUUM: Loose and medium dense reddish brown, white and tan silty medium to fine **SAND** (micaceous)			10
5		SS				1065	APPROXIMATE BOTTOM OF WALL	8
10		SS				1060		8
15		SS				1055		11
20		SS				1050		9
25		SS				1045		11
30		SS				1040		11
35		SS				1035		13
40		SS				1030		14

Boring terminated at 40 feet below the existing ground surface.

Groundwater was not encountered at the time of boring and groundwater was encountered at 30 feet below the existing ground surface at 8 days after broing completion



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. **RW 13-1**

WILLMER ENGINEERING INC. | WE

Project: **Collins Hill Road over SR 316**	**HOLE No. RW 13-2**
Location: **Gwinnett County, Georgia**	Sheet 1 of 1
Project Number: **171-2867C; GDOT Proj. No. MSL00-0003-00(168); PI No. 0003168**	Location: **Wall No. 13**

Azimuth: Angle from Horizontal: **90** Surface Elevation (ft): **1075.80** Station: **ST. 1272+58, 161' Rt. of CL**

Drilling Equipment: **CME 550** Drilling Method: **HSA Auto Hammer**

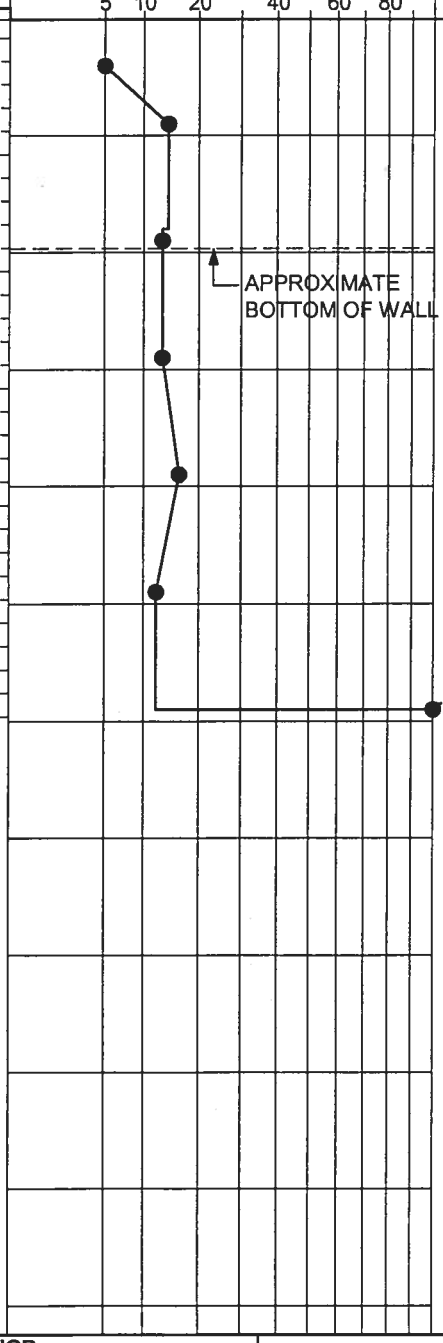
Core Boxes: **NA** Samples: **7** Overburden (ft): **NA** Rock (ft): **NA** Total Depth (ft): **30.0**

Logged By: **DK** Date Drilled: **4/23/08**

VERTICAL DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION	ELEVATION (feet)
					TOPSOIL = 2 inches — FILL	1075.8
		SS			FILL: Loose to medium dense red silty medium to fine **SAND**	1075
5		SS				1070
10		SS			RESIDUUM: Medium dense to very dense BROWN, GRAY AND TAN silty medium to fine **SAND** (micaceous) — SM	1065
15		SS				1060
20		SS				1055
25		SS				1050
30		SS			Sampled as very dense gray and tan silty medium to fine **SAND** (micaceous) — PWR	

Boring terminated at 30 feet below the existing ground surface.

Groundwater was not encountered at the time of boring.



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. **RW 13-2**

WILLMER ENGINEERING INC. WE

Project: **Collins Hill Road over SR 316**	**HOLE No. RW 14-1**
Location: **Gwinnett County, Georgia**	Sheet 1 of 1
Project Number: **171-2867C; GDOT Proj. No. MSL00-0003-00(168); PI No. 0003168**	Location: **Wall No. 14**

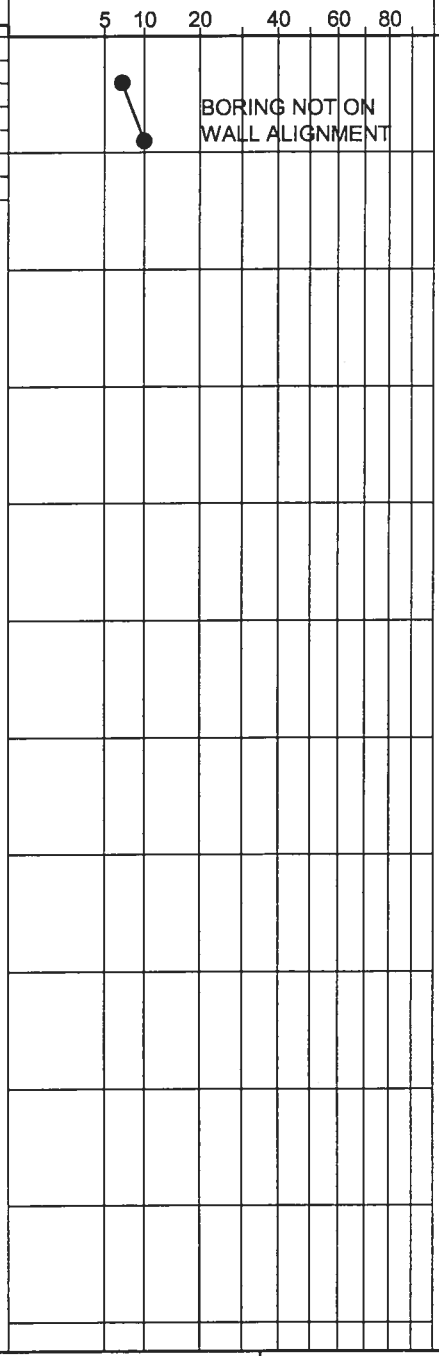
Azimuth: Angle from Horizontal: **90** Surface Elevation (ft): **1065.00** Station: **ST. 503+50, 12' Rt. of CL**

Drilling Equipment: **GeoProbe 6620DT** Drilling Method: **HSA**

Core Boxes: **NA** Samples: **2** Overburden (ft): **NA** Rock (ft): **NA** Total Depth (ft): **7.0**

Logged By: **EB** Date Drilled: **5/30/06**

VERTICAL DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION	ELEVATION (feet)	STANDARD PENETRATION TEST DATA (blows/foot)	N-VALUE
					Topsoil = 3 inches FILL	1065.0		
		SS			FILL: Loose red-brown silty medium to fine **SAND**			7
5		SS				1060	BORING NOT ON WALL ALIGNMENT	10
					Boring encountered auger refusal @ 7 feet below existing ground surface			
					Boring was offset 10 feet and encountered auger refusal @ 7 feet below existing ground surface			
					Groundwater not encountered @ time of boring			



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. **RW 14-1**

PTN 171-2867C.GPJ 8/5/08

WILLMER ENGINEERING INC. WE

Project: **Collins Hill Road over SR 316**	**HOLE No. RW 14-2**
Location: **Gwinnett County, Georgia**	Sheet 1 of 1
Project Number: **171-2867C; GDOT Proj. No. MSL00-0003-00(168); PI No. 0003168**	Location: **Wall No. 14**

Azimuth: Angle from Horizontal: **90** Surface Elevation (ft): **1066.78** Station: **ST. 504+97, 12' Rt. of CL**

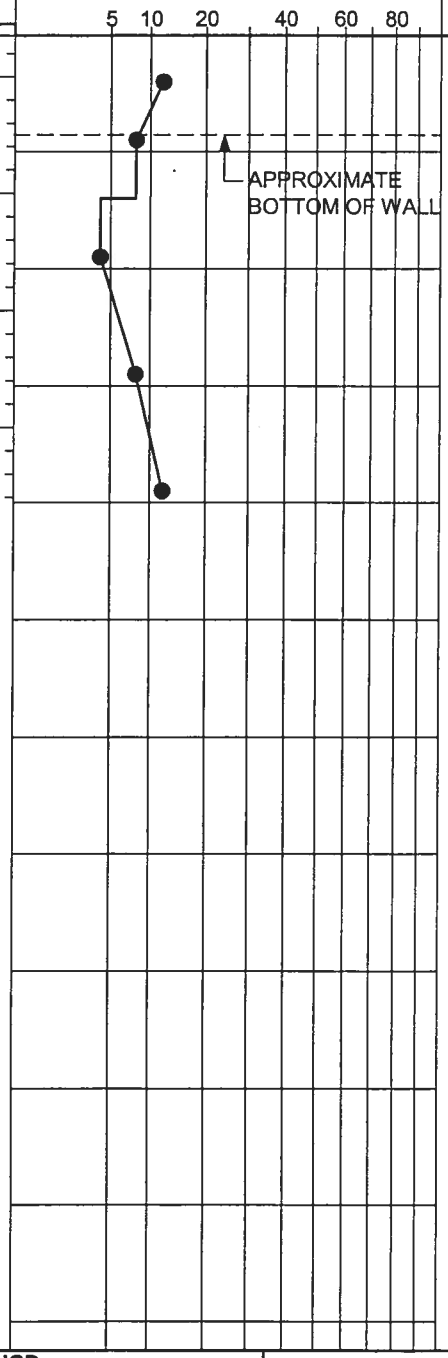
Drilling Equipment: **CME 550** Drilling Method: **HSA Auto Hammer**

Core Boxes: **NA** Samples: **5** Overburden (ft): **NA** Rock (ft): **NA** Total Depth (ft): **20.0**

Logged By: **DK** Date Drilled: **4/23/08**

VERTICAL DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION	ELEVATION (feet)	N-VALUE
					TOPSOIL = 2 inches — FILL	1066.8	
		SS			FILL: Loose and medium dense brown medium to fine **SAND**	1065	12
5		SS					8
					RESIDUUM: Very loose to medium dense brown and tan silty medium to fine **SAND** — SM	1060	
10		SS					4
						1055	
15		SS					8
						1050	
20		SS					12
					Boring terminated at 20 feet below the existing ground surface.		
					Groundwater was not encountered at the time of boring.		

STANDARD PENETRATION TEST DATA (blows/foot)



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. **RW 14-2**

WILLMER ENGINEERING INC. WE

Project: **Collins Hill Road over SR 316**	**HOLE No. RW 14-3**
Location: **Gwinnett County, Georgia**	Sheet 1 of 1
Project Number: **171-2867C; GDOT Proj. No. MSL00-0003-00(168); PI No. 0003168**	Location: **Wall No. 14**

Azimuth: Angle from Horizontal: **90** Surface Elevation (ft): **1067.00** Station: **ST. 506+00, 12' Rt. of CL**

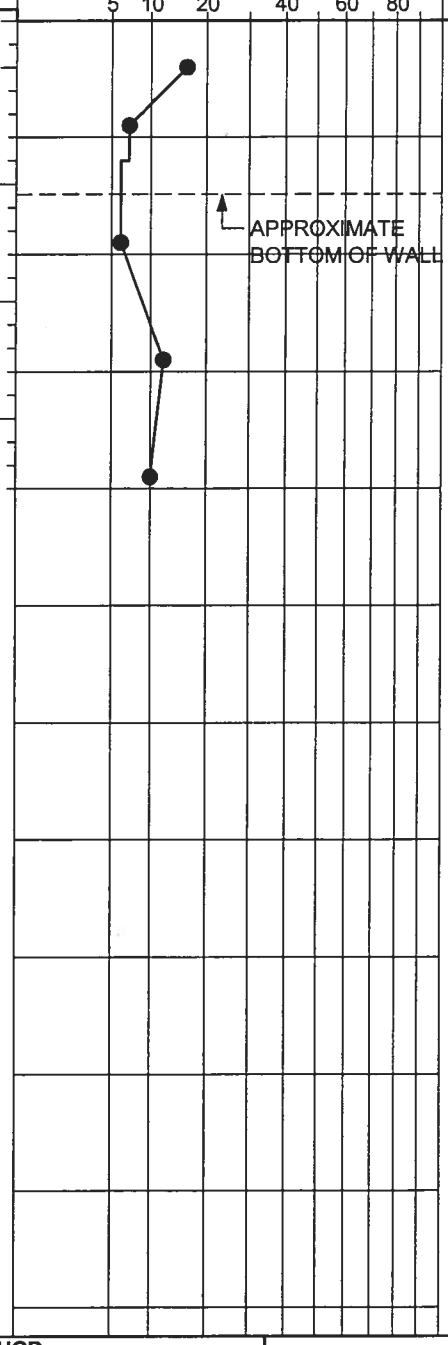
Drilling Equipment: **GeoProbe 6620DT** Drilling Method: **HSA**

Core Boxes: **NA** Samples: **5** Overburden (ft): **NA** Rock (ft): **NA** Total Depth (ft): **20.0**

Logged By: **EB** Date Drilled: **5/30/06**

VERTICAL DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION	ELEVATION (feet)	N-VALUE
					Topsoil = 3 inches — FILL	1067.0	
		SS			FILL: Medium dense to loose brown and tan clayey medium to fine **SAND** with rock fragments	1065	16
5		SS					7
					RESIDUUM: Loose to medium dense gray, white and brown silty medium to fine **SAND** (micaceous) — SM	1060	
10		SS					6
						1055	
15		SS					12
						1050	
20		SS					10
					Boring terminated @ 20 feet below existing ground surface		
					Groundwater not encountered @ time of boring		

STANDARD PENETRATION TEST DATA (blows/foot)



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. **RW 14-3**

WILLMER ENGINEERING INC. WE

Project: **Collins Hill Road over SR 316**	**HOLE No. RW 14-4**
Location: **Gwinnett County, Georgia**	Sheet 1 of 1
Project Number: **171-2867C; GDOT Proj. No. MSL00-0003-00(168); PI No. 0003168**	Location: **Wall No. 14**

Azimuth: Angle from Horizontal: **90** Surface Elevation (ft): **1068.00** Station: **ST. 507+00, 12' Rt. of CL**

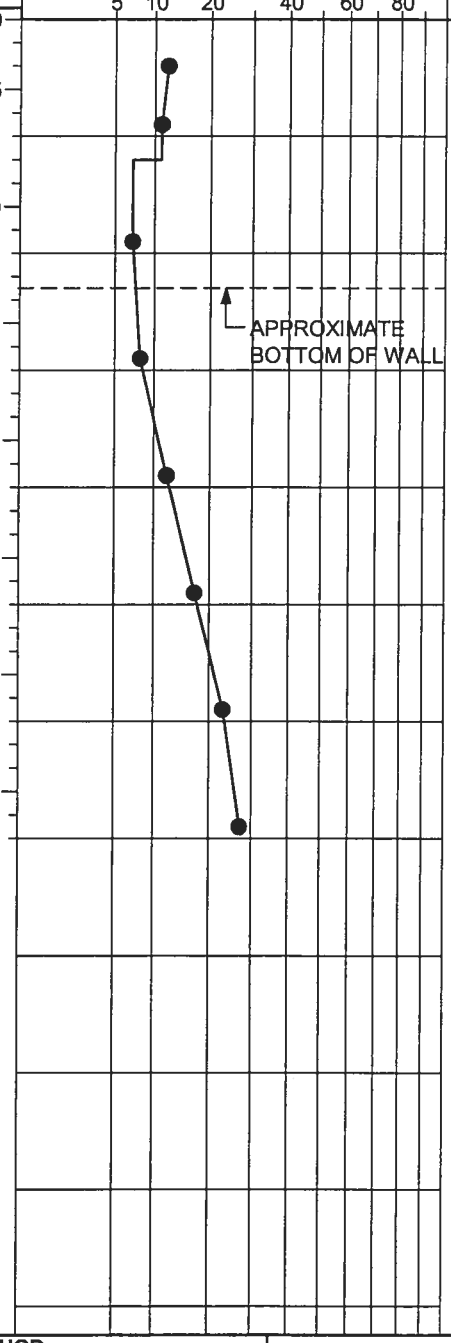
Drilling Equipment: **Geoprobe 6620DT** Drilling Method: **HSA**

Core Boxes: **NA** Samples: **8** Overburden (ft): **NA** Rock (ft): **NA** Total Depth (ft): **35.0**

Logged By: **EB** Date Drilled:

VERTICAL DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION	ELEVATION (feet)	N-VALUE
					Topsoil = 3 inches — FILL	1068.0	
		SS			FILL: Medium dense to loose brown and tan clayey medium to fine **SAND** with rock fragments	1065	12
5		SS					11
					RESIDUUM: Loose to medium dense gray, white and brown silty medium to fine **SAND** (micaceous) — SM	1060	
10		SS					7
15		SS				1055	8
20		SS				1050	12
25		SS				1045	17
30		SS				1040	23
35		SS				1035	27

STANDARD PENETRATION TEST DATA (blows/foot)



Boring terminated @ 35 feet below existing ground surface

Groundwater encountered @ 21.5 feet below existing ground surface @ time of boring

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. **RW 14-4**

WILLMER ENGINEERING INC. WE

Project: **Collins Hill Road over SR 316**	**HOLE No. RW 14-5**
Location: **Gwinnett County, Georgia**	Sheet 1 of 1
Project Number: **171-2867C; GDOT Proj. No. MSL00-0003-00(168); PI No. 0003168**	Location: **Wall No. 14**

Azimuth: Angle from Horizontal: **90** Surface Elevation (ft): **1063.81** Station: **ST. 509+20, 12' Rt. of CL**

Drilling Equipment: **CME 550** Drilling Method: **HSA Auto Hammer**

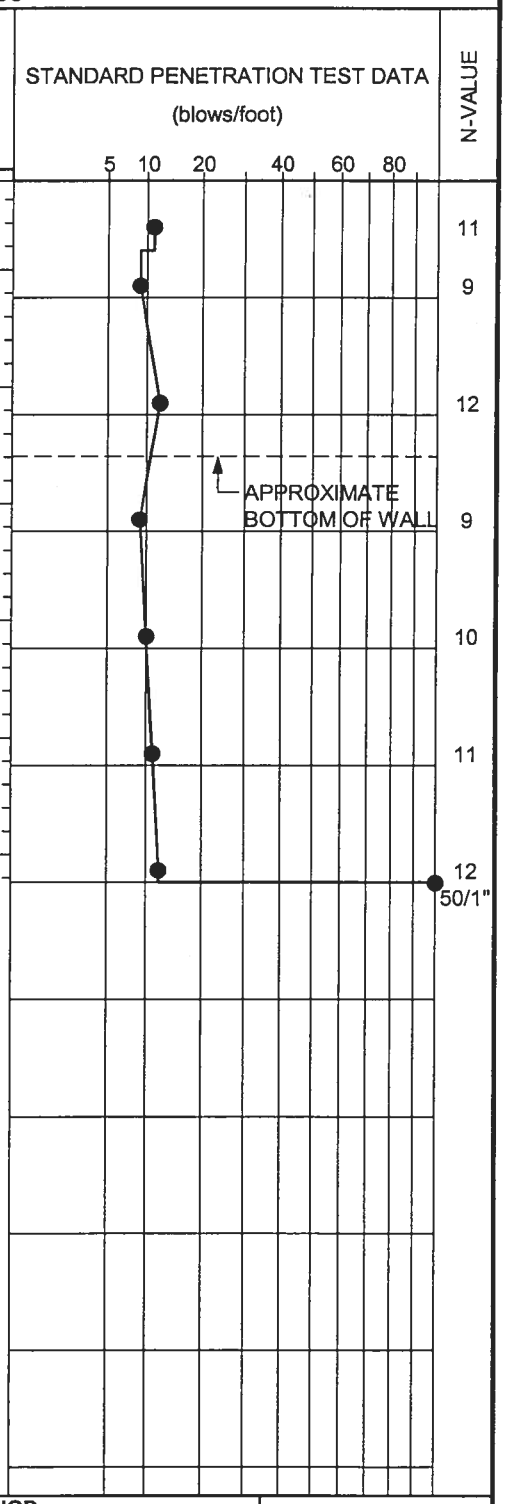
Core Boxes: **NA** Samples: **8** Overburden (ft): **30** Rock (ft): **NA** Total Depth (ft): **30.0**

Logged By: **DK** Date Drilled: **4/23/08**

VERTICAL DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION	ELEVATION (feet)	N-VALUE
					TOPSOIL = 2 inches — FILL	1063.8	
		SS			FILL: Medium dense brown and tan silty medium to fine **SAND** — SM		11
5		SS			RESIDUUM: Loose and medium dense brown, black, and tan silty medium to fine **SAND** (micaceous)	1060	9
10		SS				1055	12
15		SS				1050	9
20		SS				1045	10
25		SS				1040	11
30		SS				1035	12
		SS			PARTIALLY WEATHERED ROCK: Sampled as very dense brown, white and black silty medium to fine **SAND** (micaceous) — PWR		50/1"

Auger refusal encountered at 30 feet below the exisiting ground surface.

Groundwater was not encountered at the time of boring.



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. **RW 14-5**

WILLMER ENGINEERING INC. WE

Project: **Collins Hill Road over SR 316**	**HOLE No. RW 15-1**
Location: **Gwinnett County, Georgia**	Sheet 1 of 1
Project Number: **171-2867C; GDOT Proj. No. MSL00-0003-00(168); PI No. 0003168**	Location: **Wall No. 15**

Azimuth: Angle from Horizontal: **90** Surface Elevation (ft): **1030.00** Station: **ST. 682+00, 16' Lt. of CL**

Drilling Equipment: **GeoProbe 6620DT** Drilling Method: **HSA Auto Hammer**

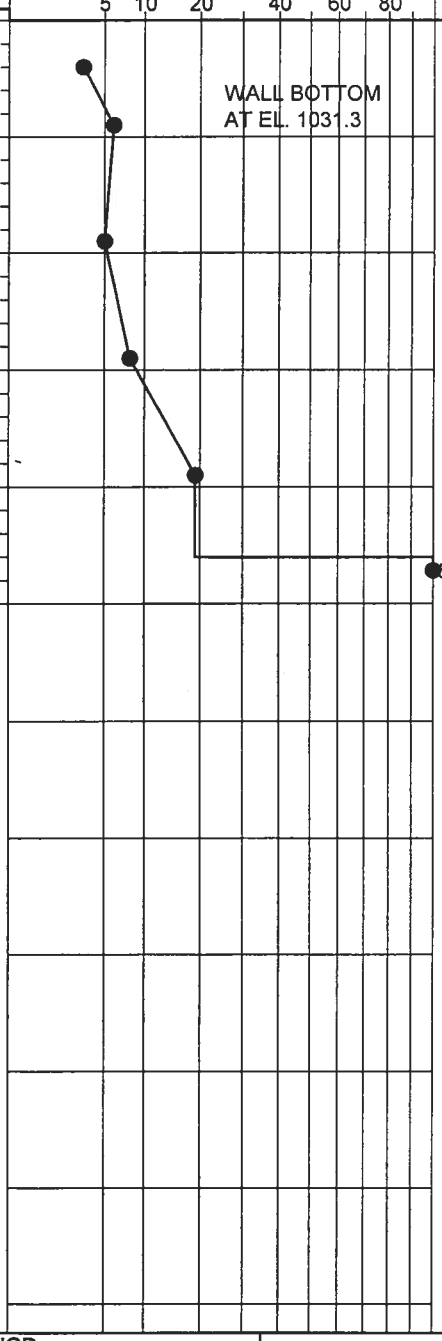
Core Boxes: **NA** Samples: **6** Overburden (ft): **25** Rock (ft): **NA** Total Depth (ft): **25.0**

Logged By: **EO** Date Drilled: **6/4/08**

VERTICAL DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION		ELEVATION (feet)	N-VALUE
		SS			TOPSOIL = 2 inches	SM	1030.0	
		SS			RESIDUUM: Very loose to loose tan and brown silty medium to fine **SAND**			3
5		SS					1025	6
10		SS					1020	5
15		SS					1015	8
					Medium dense tan and brown silty medium to fine **SAND** with quartz fragments	SM		
20		SS					1010	19
25		SS			PARTIALLY WEATHERED ROCK: Sampled as very dense tan and brown silty coarse **SAND**	PWR	1005	50/2"

Auger refusal encountered at 25 feet below the existing ground surface.
Groundwater encountered at 6 feet belox existing ground surface at the time of boring.

STANDARD PENETRATION TEST DATA (blows/foot)



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. **RW 15-1**

WILLMER ENGINEERING INC.

Project: **Collins Hill Road over SR 316**	**HOLE No. RW 15-2**
Location: **Gwinnett County, Georgia**	Sheet 1 of 1
Project Number: **171-2867C; GDOT Proj. No. MSL00-0003-00(168); PI No. 0003168**	Location: **Wall No. 15**

Azimuth: Angle from Horizontal: **90** Surface Elevation (ft): **1032.58** Station: **ST. 684+00, 16' Lt. of CL**

Drilling Equipment: **CME 55** Drilling Method: **HSA Auto Hammer**

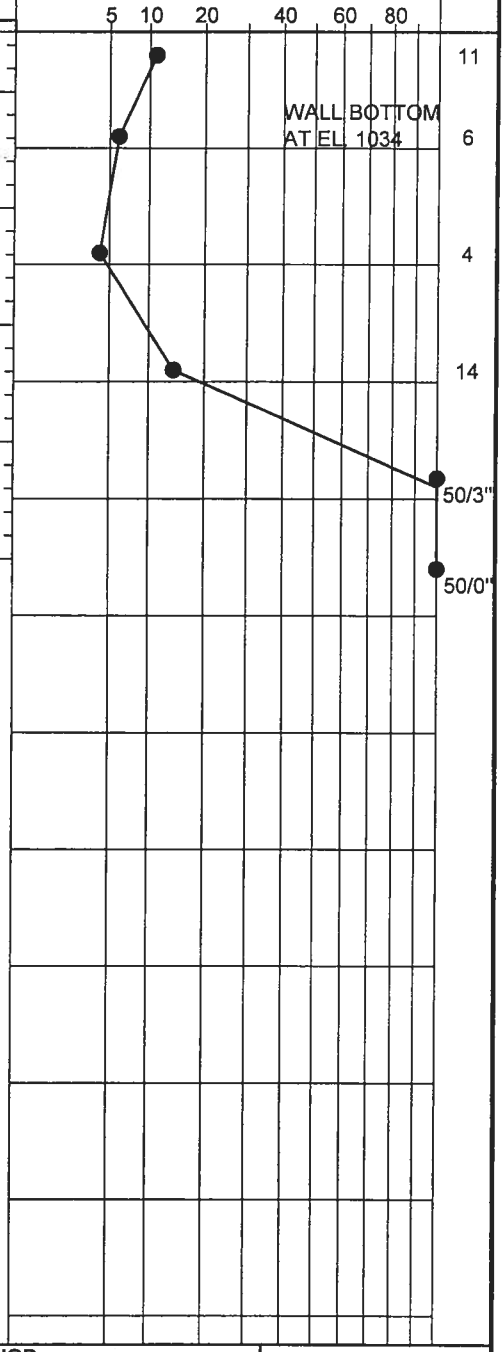
Core Boxes: **NA** Samples: **6** Overburden (ft): **23** Rock (ft): **NA** Total Depth (ft): **23.0**

Logged By: **PT** Date Drilled: **4/29/08**

VERTICAL DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION		ELEVATION (feet)	N-VALUE
		SS			TOPSOIL = 2 inches	FILL	1032.6	11
					FILL : Stiff tan and gray medium to fine sandy **SILT** with rock fragments	SM	1030	
5		SS			RESIDUUM : Loose to medium dense tan and gray silty medium to fine **SAND** (micaceous)		1025	6
10		SS					1020	4
15		SS					1015	14
20		SS			PARTIALLY WEATHERED ROCK : Sampled as very dense gray, orange and brown silty medium to fine **SAND** with rock fragments	PWR	1010	50/3"
		SS						50/0"

Auger refusal encountered at 23 feet below the exisiting ground surface.

Groundwater was encountered at 7 feet below the existing ground at the time of boring completion and at 6 feet 24 hours after boring completion.



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. **RW 15-2**

PTN 171-2867C.GPJ 8/5/08

WILLMER ENGINEERING INC. WE

Project: **Collins Hill Road over SR 316**	**HOLE No. RW 15-3**
Location: **Gwinnett County, Georgia**	Sheet 1 of 1
Project Number: **171-2867C; GDOT Proj. No. MSL00-0003-00(168); PI No. 0003168**	Location: **Wall No. 15**

Azimuth: Angle from Horizontal: **90** Surface Elevation (ft): **1032.69** Station: **ST 686+00, 16' Lt. of CL**

Drilling Equipment: **CME 55** Drilling Method: **HSA Auto Hammer**

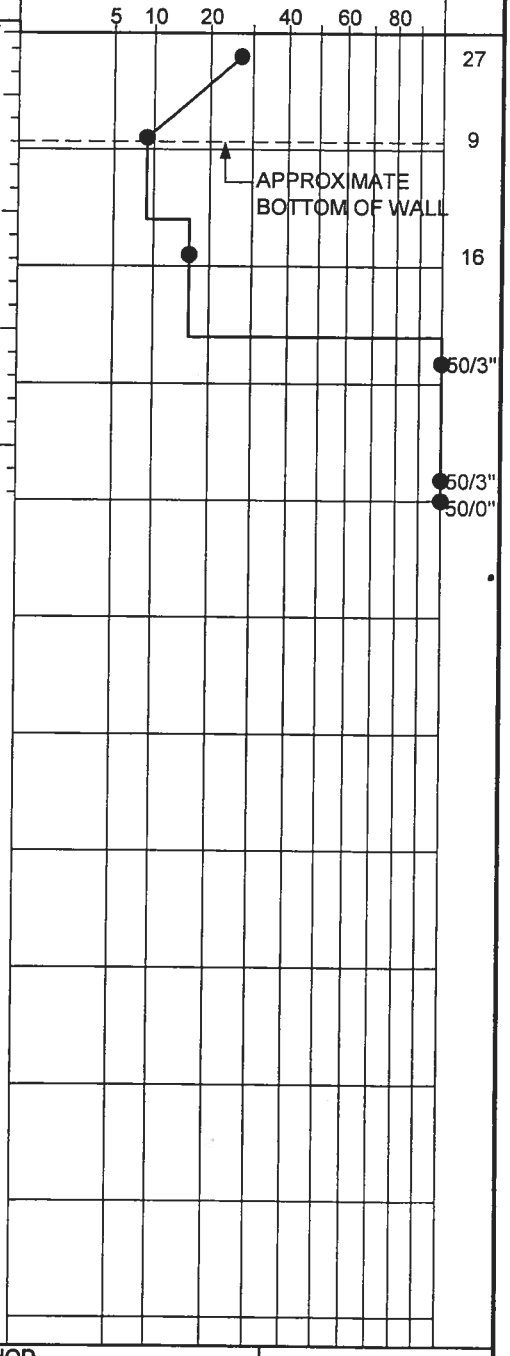
Core Boxes: **NA** Samples: **6** Overburden (ft): **20** Rock (ft): **NA** Total Depth (ft): **20.0**

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

VERTICAL DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION		ELEVATION (feet)	N-VALUE
		SS			FILL: Medium dense brown silty medium to fine **SAND** with organic odour	FILL	1032.7	27
5		SS			Loose gray silty coarse to fine **SAND** with organic odour		1030	9
10		SS			RESIDUUM : Medium dense gray silty medium to fine **SAND** (micaceous)	SM	1025	16
15		SS			PARTIALLY WEATHERED ROCK : Sampled as very dense orange-brown silty medium to fine **SAND**	PWR	1020	50/3"
20		SS					1015	50/3"
		SS						50/0"

Auger refusal encountered at 20 feet below the exisiting ground surface.

Groundwater was encountered at 5.5 feet below the existing ground at the time of boring completion and at 5 feet 24 hours after boring completion.



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

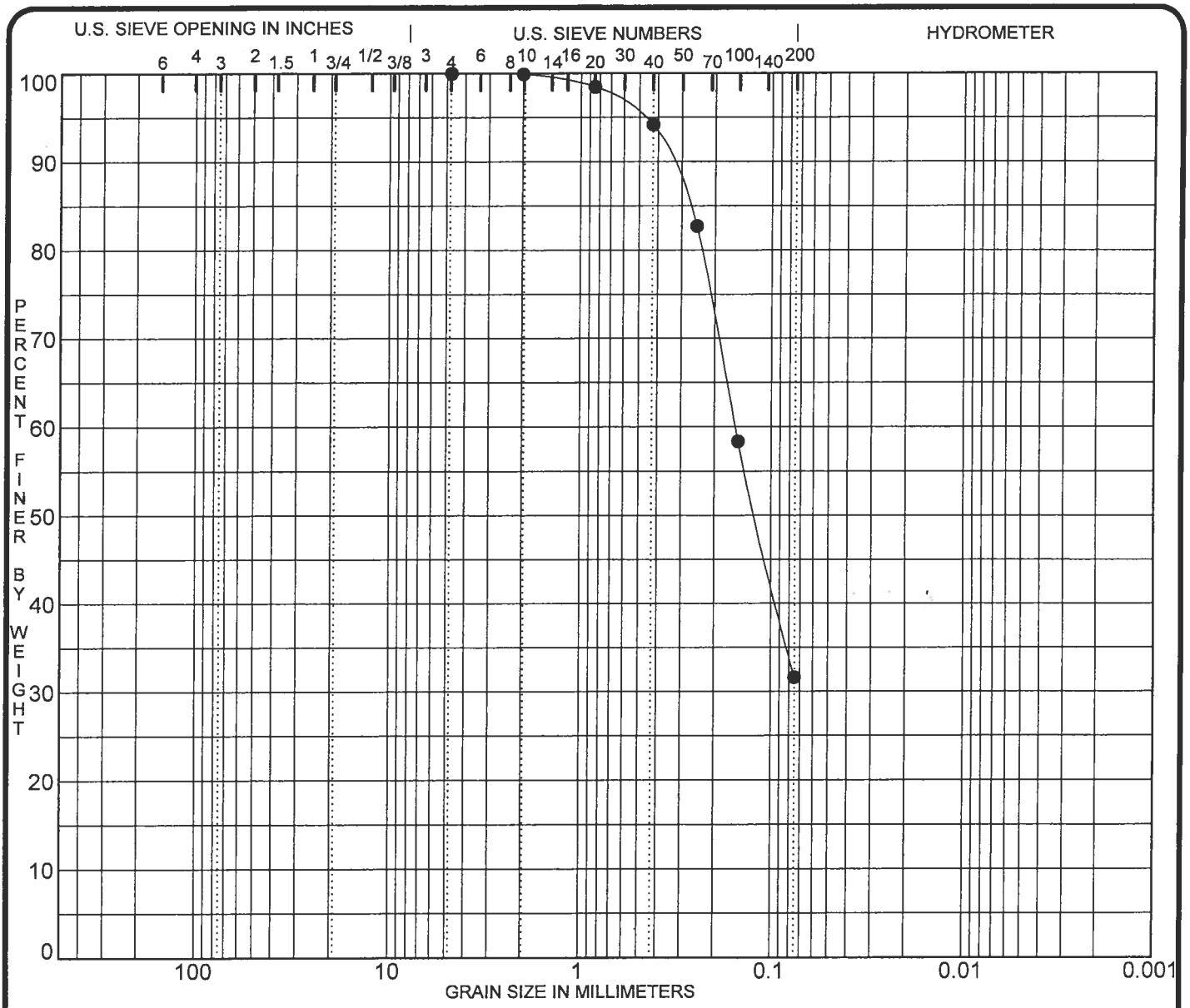
DRILLING METHOD

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

Hole No. RW 15-3

PTN 171-2867C.GPJ 8/5/08

APPENDIX II



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Soil Description	MC%	LL	PL	PI	Cc	Cu
●	**B-3 S4 (13.5 ft)**	**Light brown silty medium to fine SAND (micaceous)**						

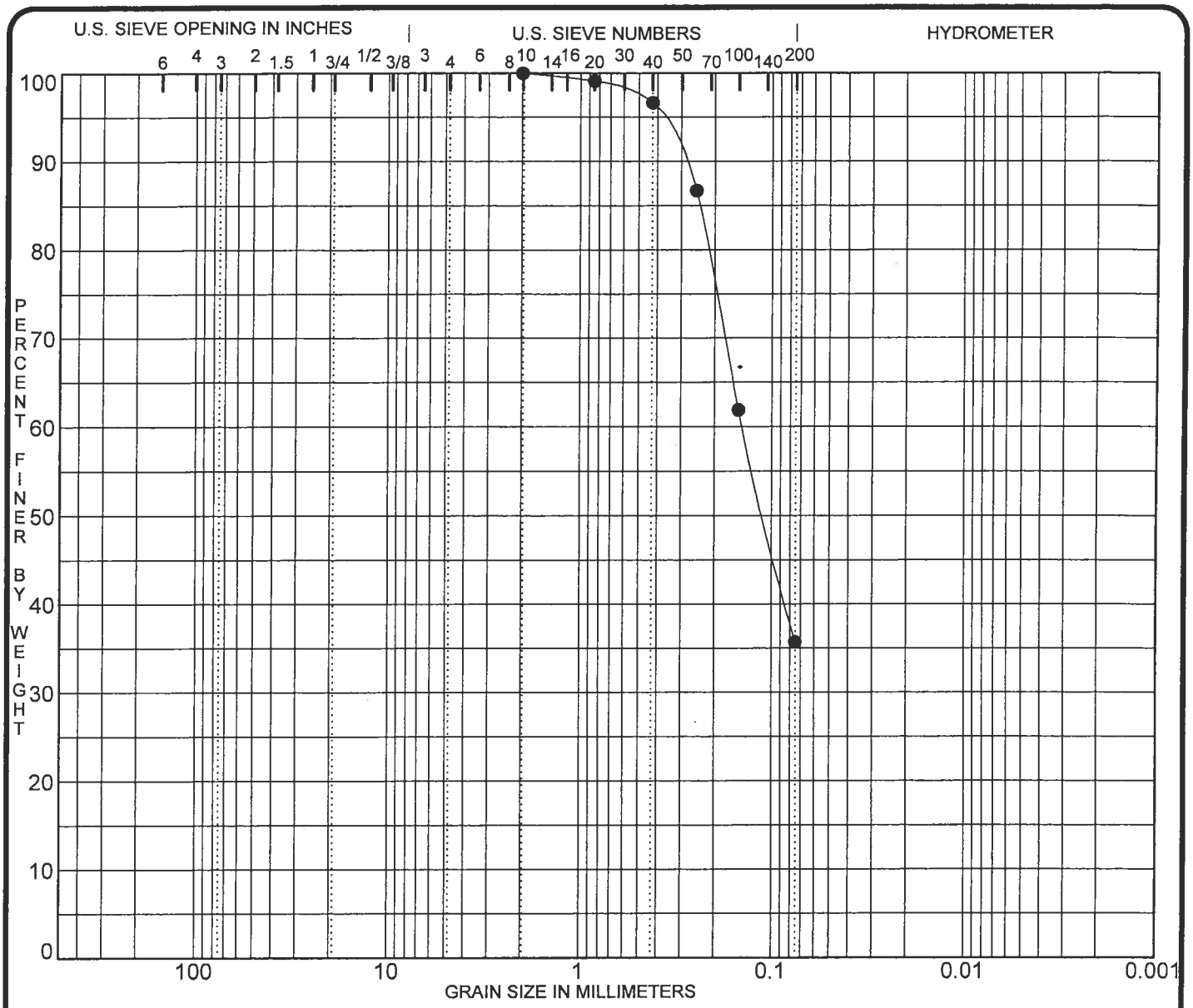
	Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**B-3 S4 (13.5 ft)**	**4.75**	**0.16**			**0.0**	**68.4**	**31.6**	

PROJECT **Collins Hill Rd over SR 316 -- Gwinett County, GA**
Proj. No. MSL00-0003-00(168), PI No. 0003168

JOB NO. **171-2867 C**
DATE **7/10/08**

WILLMER ENGINEERING INC. WE

GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Soil Description	MC%	LL	PL	PI	Cc	Cu
●	**B-3 S7 (28.5 ft)**	**Light reddish brown, gray and brown silty fine SAND (micaceous)**						

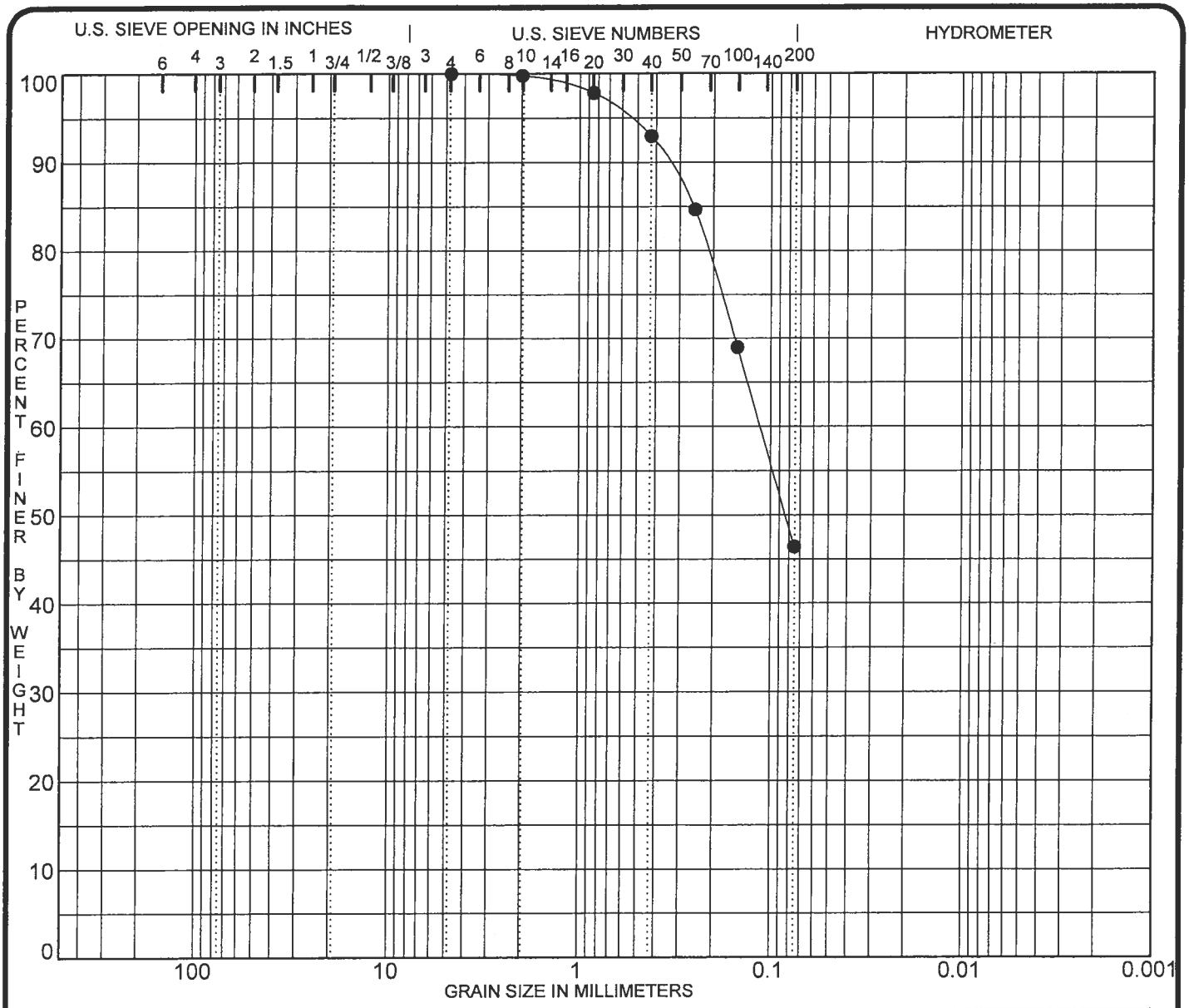
	Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**B-3 S7 (28.5 ft)**	**2.00**	**0.14**			**0.0**	**64.3**	**35.7**	

PROJECT **Collins Hill Rd over SR 316 -- Gwinett County, GA**
Proj. No. MSL00-0003-00(168), PI No. 0003168

JOB NO. **171-2867 C**
DATE **7/10/08**

WILLMER ENGINEERING INC. WE

GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Soil Description	MC%	LL	PL	PI	Cc	Cu
●	**B-3 S13 (58.5 ft)**	**Gray and light reddish brown silty medium to fine SAND (micaceous)**						

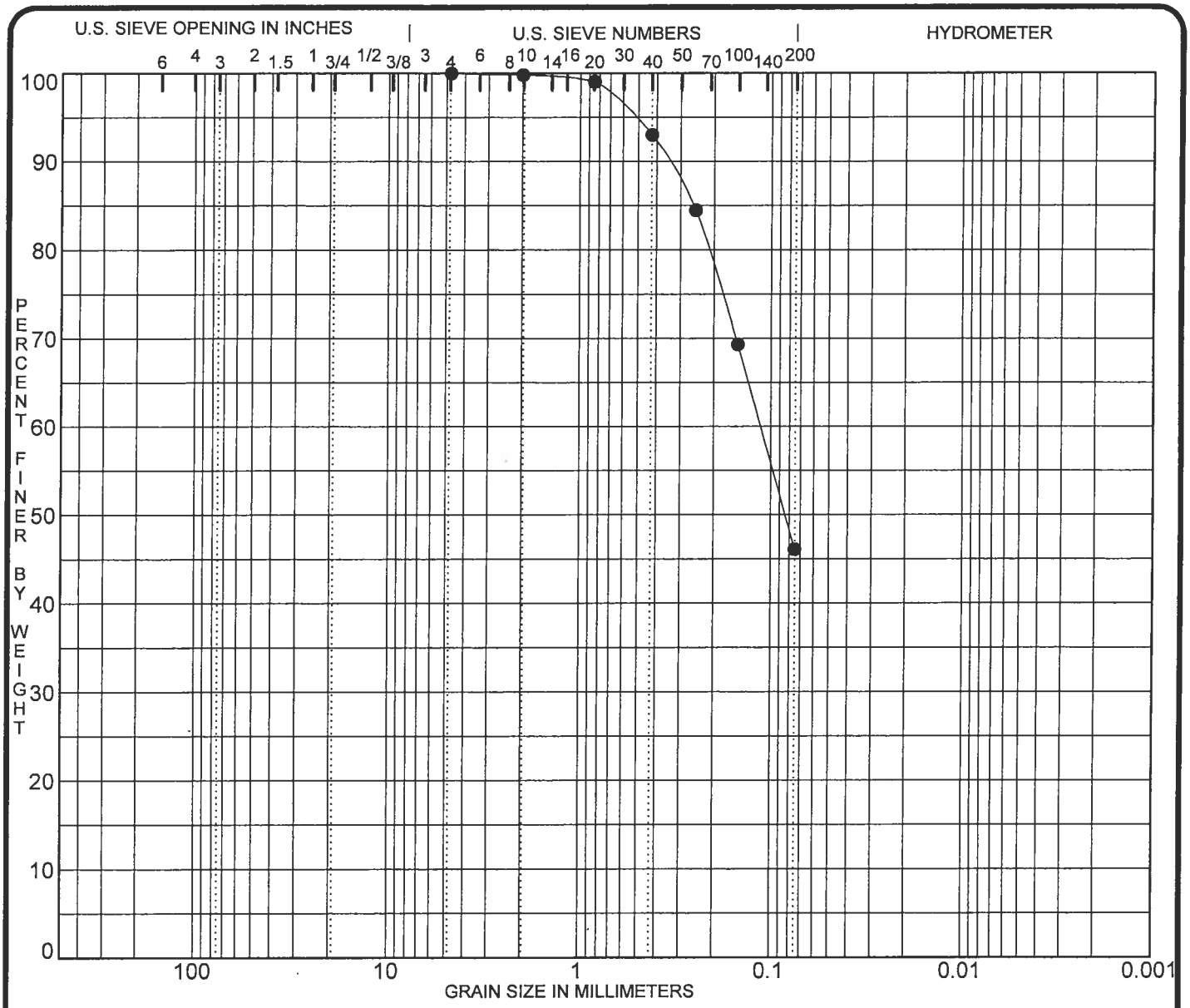
	Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**B-3 S13 (58.5 ft)**	**4.75**	**0.11**			**0.0**	**53.6**	**46.4**	

PROJECT **Collins Hill Rd over SR 316 -- Gwinett County, GA**
Proj. No. MSL00-0003-00(168), PI No. 0003168

JOB NO. **171-2867 C**
DATE **7/10/08**

WILLMER ENGINEERING INC. WE

GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Soil Description	MC%	LL	PL	PI	Cc	Cu
●	**RW 9-2, S-3 (5-7 ft)**	**Light reddish brown silty medium to fine SAND (micaceous)**	**36.7**					

	Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**RW 9-2, S-3 (5-7 ft)**	**4.75**	**0.11**			**0.0**	**53.9**	**46.1**	

PROJECT **Collins Hill Rd over SR 316 -- Gwinett County, GA**
Proj. No. MSL00-0003-00(168), PI No. 0003168

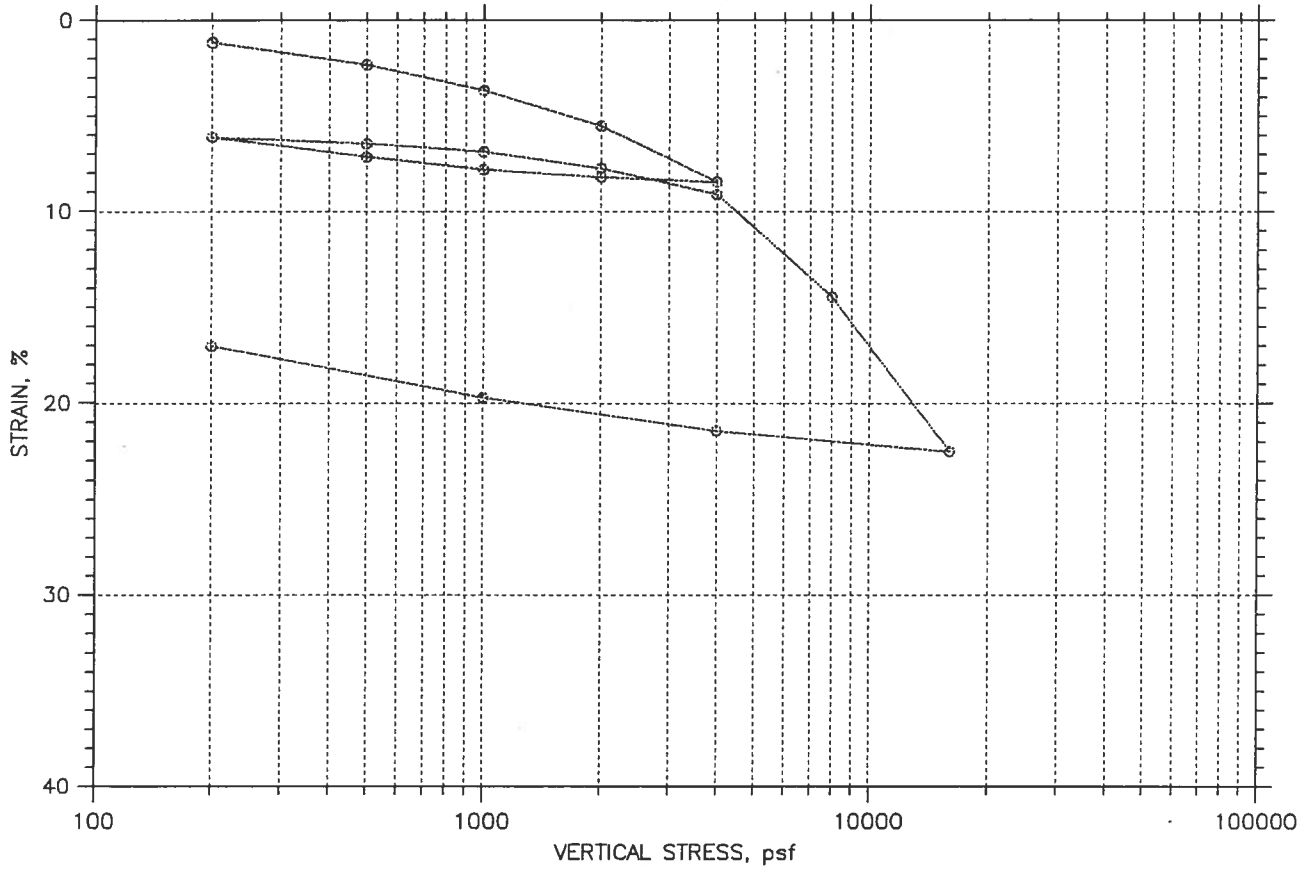
JOB NO. **171-2867 C**
DATE **7/10/08**

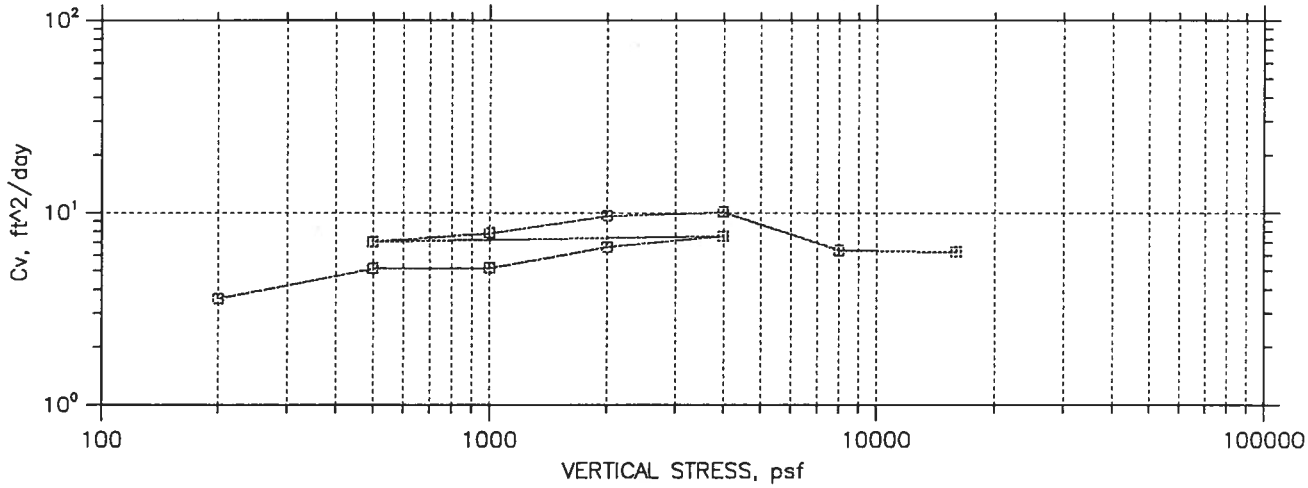
WILLMER ENGINEERING INC. WE

GRAIN SIZE DISTRIBUTION

CONSOLIDATION TEST DATA

SUMMARY REPORT



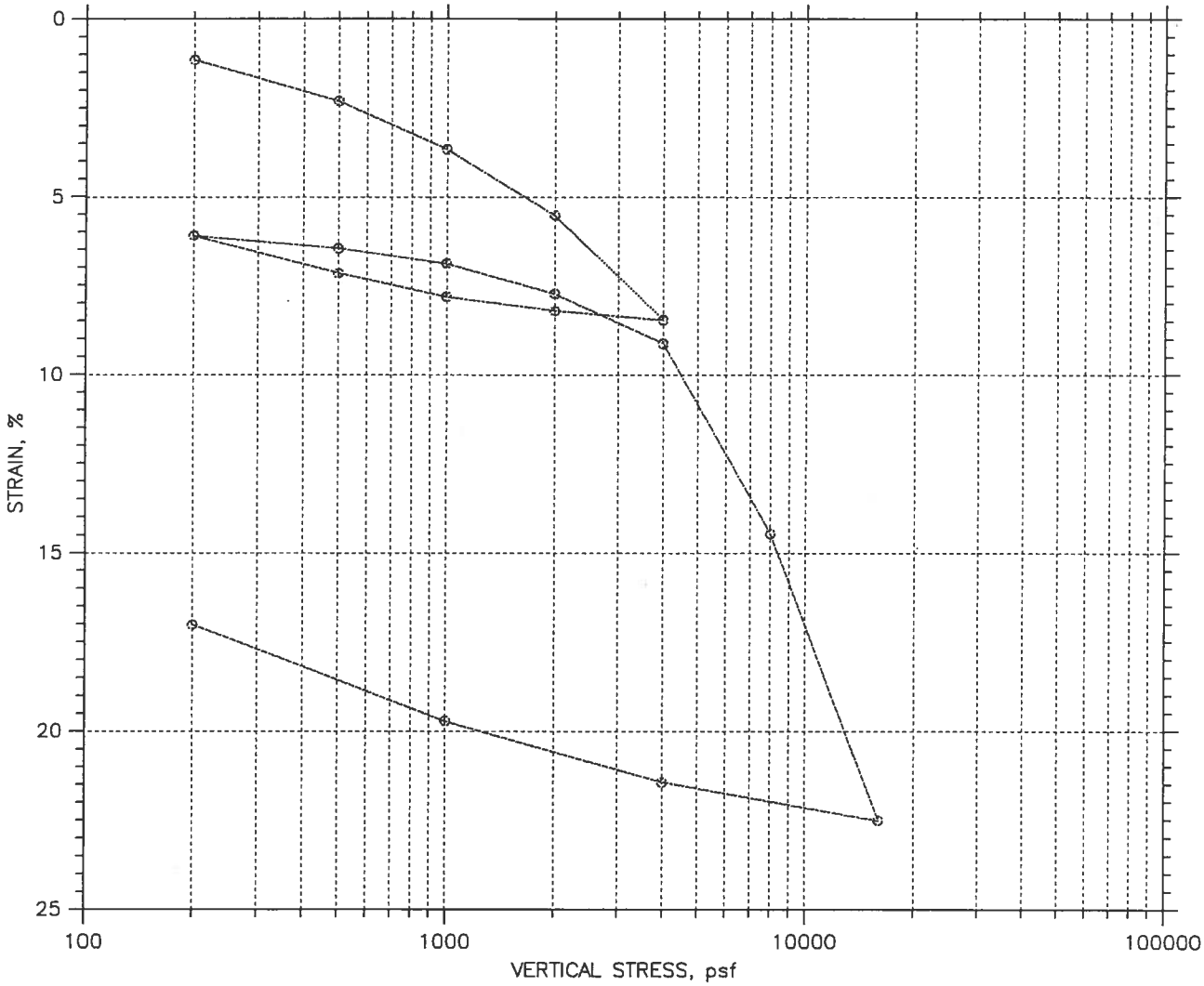


	Project: Collins Hill Rd/SR 316	Location: Gwinett County, GA	Project No.: 171-2867 C
	Boring No.: RW 9-2	Tested By: kulin	Checked By: M.Kotha
	Sample No.: S-3	Test Date: 05/12/2008	Depth: 5-7 ft
WE	Test No.: 4311	Sample Type: Shelby Tube	Elevation:
	Description: Brown silty fine SAND (micaceous)		
	Remarks: ASTM D2435		

Wed, 13-AUG-2008 13:55:01

CONSOLIDATION TEST DATA

SUMMARY REPORT



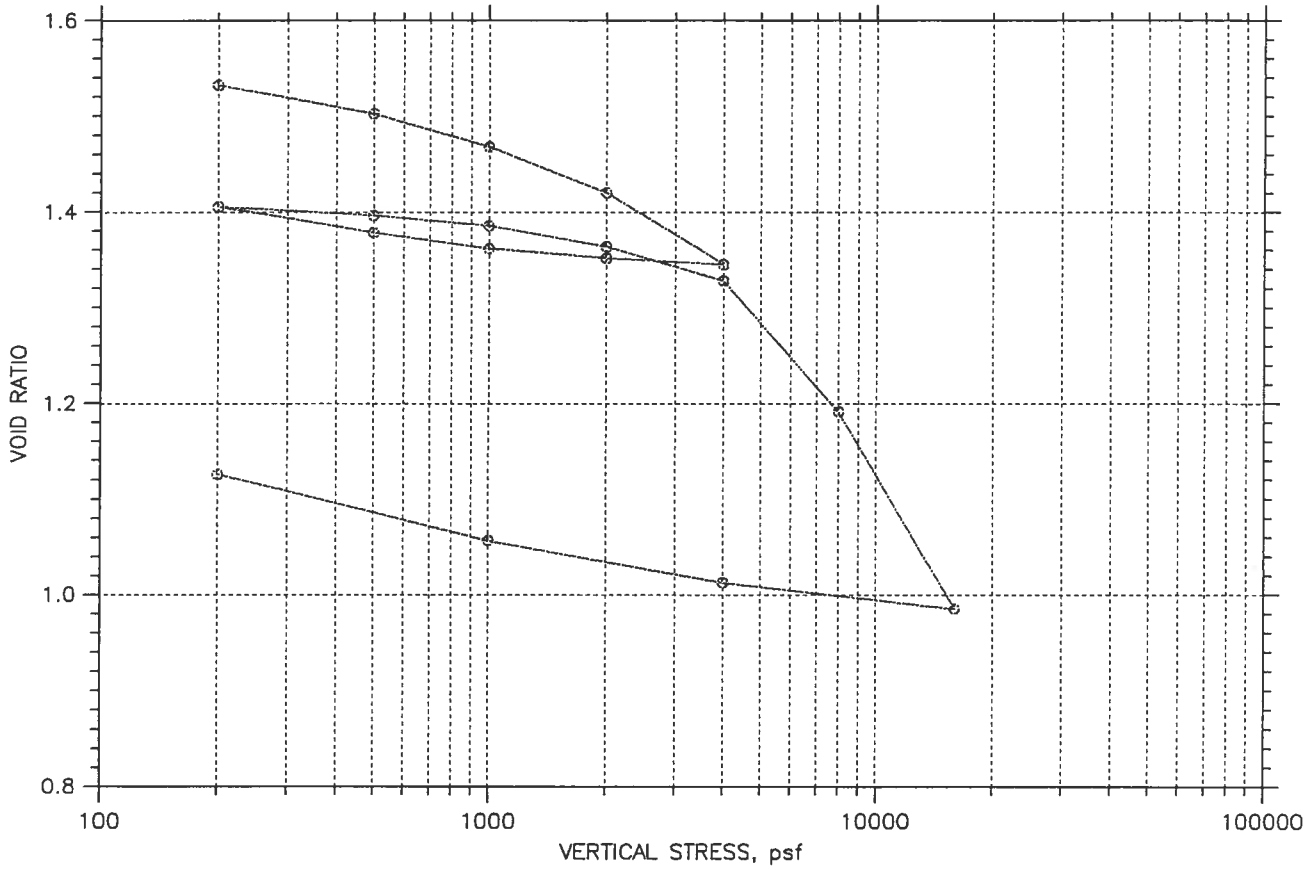
				Before Test	After Test
Overburden Pressure: 700 psf				Water Content, %	33.81	43.19
Preconsolidation Pressure: 3500 psf				Dry Unit Weight, pcf	66.04	79.6
Compression Index: 0.6				Saturation, %	58.66	103.99
Diameter: 2.5 in		Height: 1 in		Void Ratio	1.56	1.13
LL: 0	PL: 0	PI: 0	GS: 2.71			

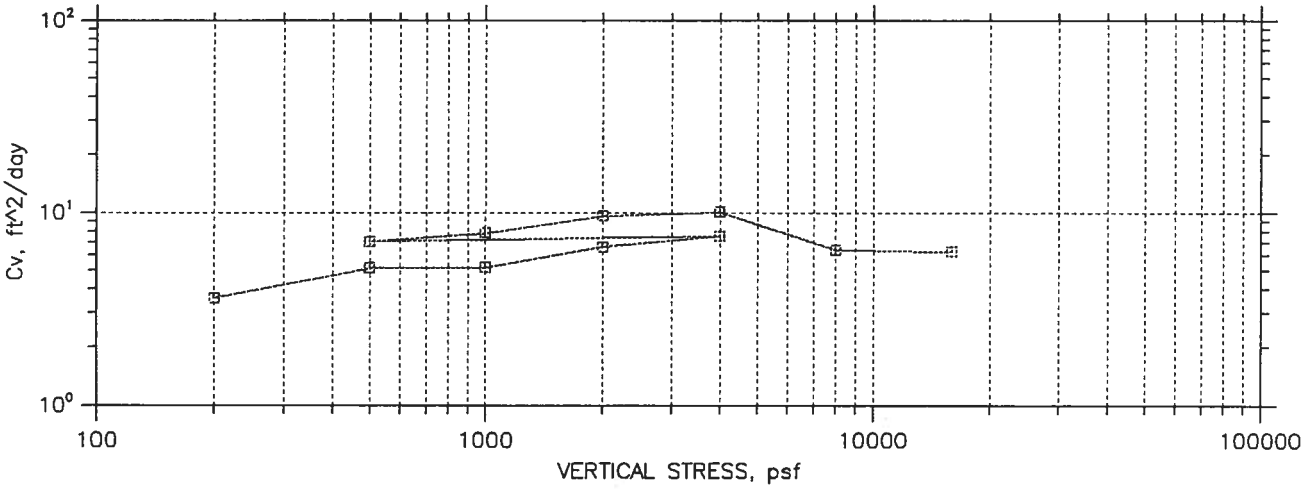
	Project: Collins Hill Rd/SR 316	Location: Gwinett County, GA	Project No.: 171-2867 C
	Boring No.: RW 9-2	Tested By: kulin	Checked By: M.Kotha
	Sample No.: S-3	Test Date: 05/12/2008	Depth: 5-7 ft
VVE	Test No.: 4311	Sample Type: Shelby Tube	Elevation:
	Description: Brown silty fine SAND (micaceous)		
	Remarks: ASTM D2435		

Wed, 13-AUG-2008 13:55:01

CONSOLIDATION TEST DATA

SUMMARY REPORT



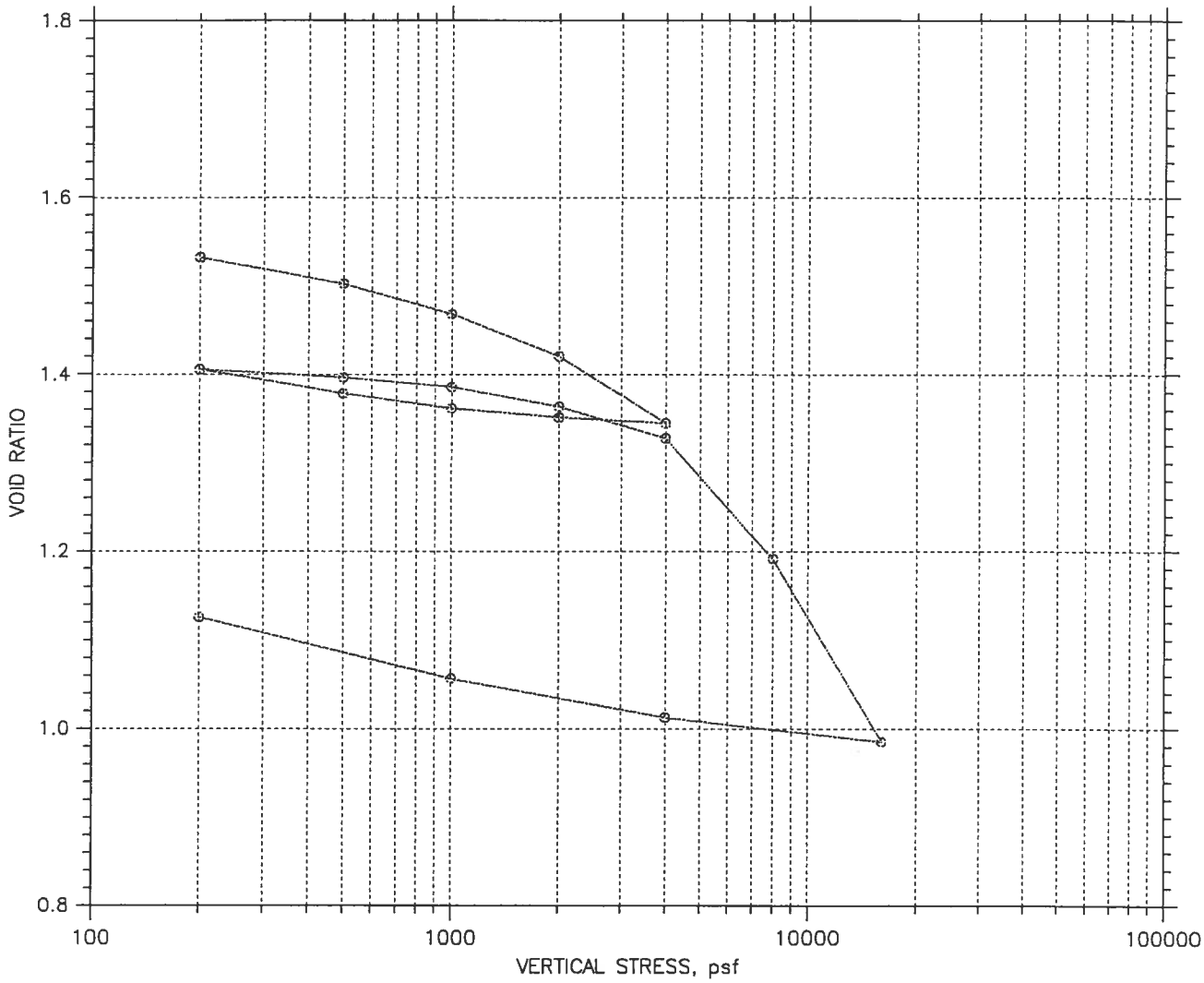


	Project: Collins Hill Rd/SR 316	Location: Gwinett County, GA	Project No.: 171-2867 C
	Boring No.: RW 9-2	Tested By: kulin	Checked By: M.Kotha
	Sample No.: S-3	Test Date: 05/12/2008	Depth: 5-7 ft
VVE	Test No.: 4311	Sample Type: Shelby Tube	Elevation:
	Description: Brown silty fine SAND (micaceous)		
	Remarks: ASTM D2435		

Wed, 13-AUG-2008 13:55:26

CONSOLIDATION TEST DATA

SUMMARY REPORT

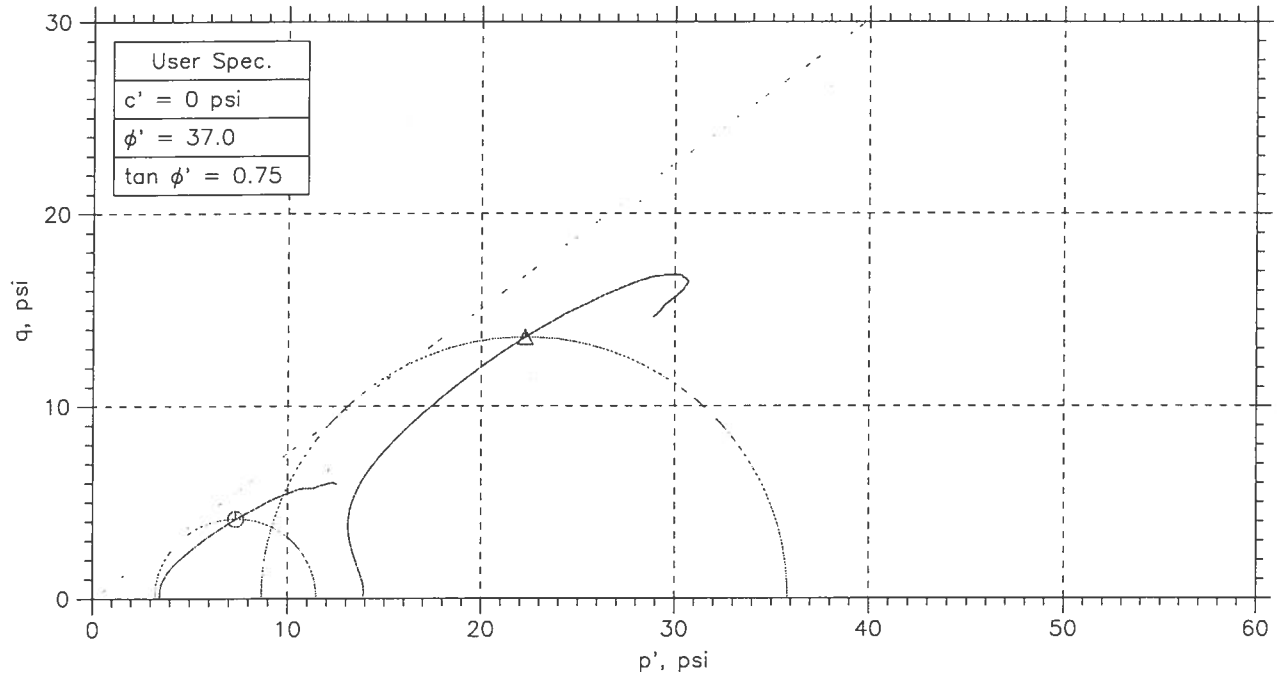


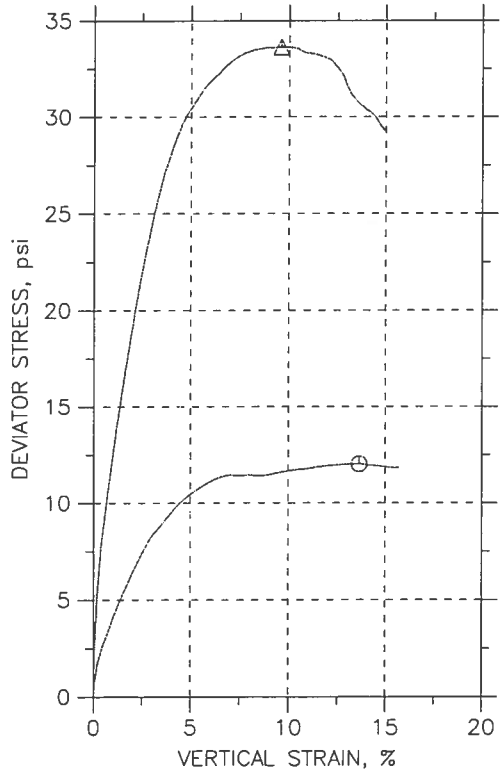
					Before Test	After Test
Overburden Pressure: 700 psf				Water Content, %	33.81	43.19
Preconsolidation Pressure: 3500 psf				Dry Unit Weight, pcf	66.04	79.6
Compression Index: 0.6				Saturation, %	58.66	103.99
Diameter: 2.5 in		Height: 1 in		Void Ratio	1.56	1.13
LL: 0	PL: 0	PI: 0	GS: 2.71			

	Project: Collins Hill Rd/SR 316	Location: Gwinett County, GA	Project No.: 171-2867 C
	Boring No.: RW 9-2	Tested By: kulin	Checked By: M.Kotha
	Sample No.: S-3	Test Date: 05/12/2008	Depth: 5-7 ft
VVE	Test No.: 4311	Sample Type: Shelby Tube	Elevation:
	Description: Brown silty fine SAND (micaceous)		
	Remarks: ASTM D2435		

Wed, 13-AUG-2008 13:55:26

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767





Symbol		⏲	△		
Sample No.		---	---		
Test No.		1.1	1.3		
Depth		5-7 ft	5-7 ft		
Initial	Diameter, in	2.82	2.848		
	Height, in	5.73	5.93		
	Water Content, %	28.7	26.1		
	Dry Density, pcf	78.77	85.42		
	Saturation, %	67.9	72.4		
	Void Ratio	1.14	0.973		
Before Shear	Water Content, %	42.4	35.2		
	Dry Density, pcf	78.57	86.41		
	Saturation*, %	100.0	100.0		
	Void Ratio	1.15	0.951		
	Back Press., psi	121.8	133.7		
Ver. Eff. Cons. Stress, psi		3.469	13.89		
Shear Strength, psi		6.008	16.81		
Strain at Failure, %		13.6	9.59		
Strain Rate, %/min		0.05	0.05		
B-Value		0.92	0.91		
Estimated Specific Gravity		2.7	2.7		
Liquid Limit		---	---		
Plastic Limit		---	---		

Project: SR316/Collins Hill

Location: ---

Project No.: GTX-1365

Boring No.: ~~B8-4~~ RW 8-4

Sample Type: UD

Description: Brown Sandy silt

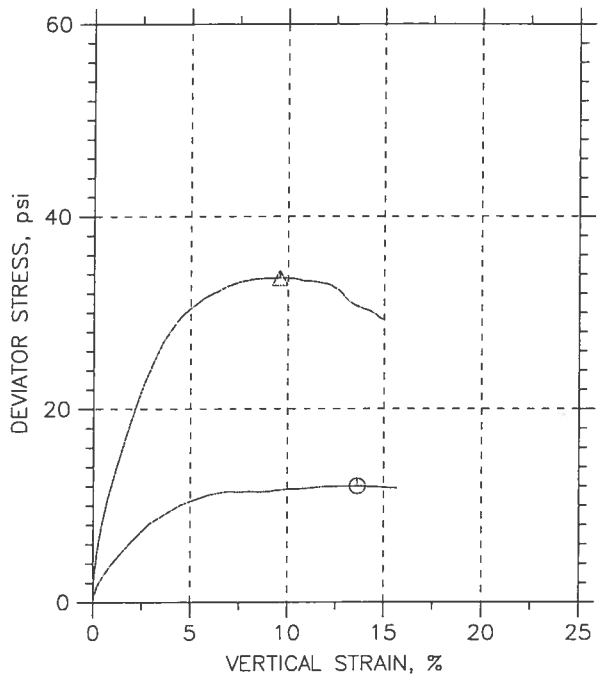
Remarks: System 1062

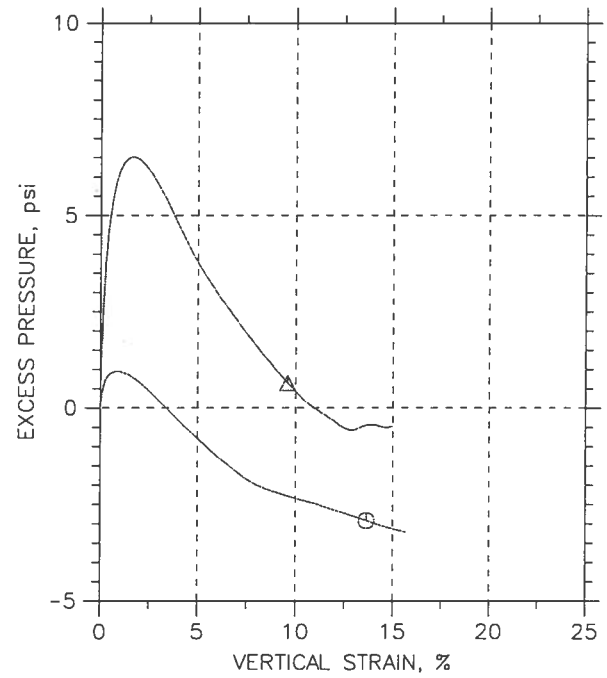
Phase calculations based on start and end of test.

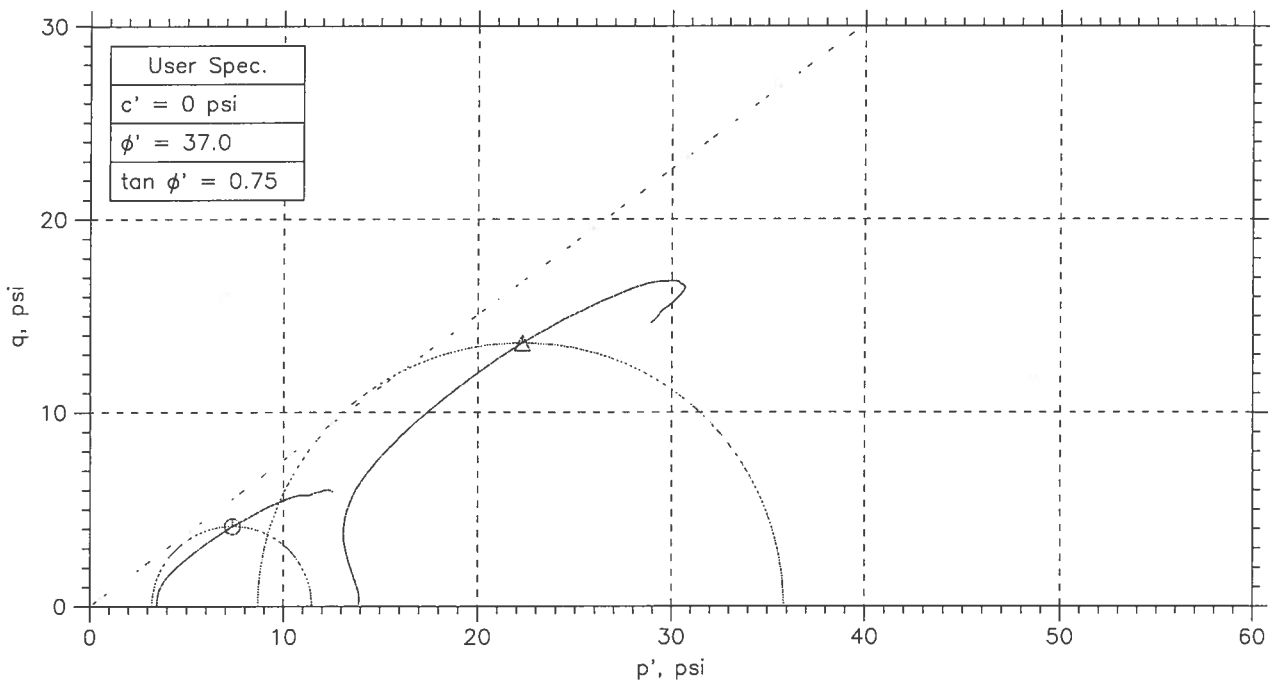
* Saturation is set to 100% for phase calculations

Fri, 02-MAY-2008 11:39:34

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767







	Sample No.	Test No.	Depth	Tested By	Test Date	Checked By	Check Date	Test File
⊙	---	1.1	5-7 ft	MM	4/29/08	CA		1365-1.1.dat
△	---	1.3	5-7 ft	MM	4/29/08	CA		1365-1.3.dat

Project: SR316/Collins Hill	Location: ---	Project No.: GTX-1365
Boring No.: ~~B8-4~~ RW 8-4	Sample Type: UD	
Description: Brown Sandy silt		
Remarks: System 1062		

Fri, 02-MAY-2008 11:39:34