SANDY SPRINGS™
GEORGIA

ADDENDUM NUMBER 3

INVITATION TO BID #19-008
Sandy Springs Circle Streetscape from Hammond Drive to Mt. Vernon Highway
PI No. 0010385 CC-10

Questions and Answers for ITB 19-008 Sandy Springs Circle Streetscape from Hammond Drive to Mt. Vernon Highway
PI No. 0010385 CC-10

Question:
Could you please provide the Geotechnical report exploration for all walls especially for wall G? We need it in order to determine the type of shoring needed.
Answer:
The geotechnical reports shall be attached to this addendum for review and posted to solicitation on the City's website.

Question:
Referring to subjected bid document Page10: BONDING REQUIREMENTS
Only the successful bidder be required to furnish following.

- **Payment Bond**
- **Performance Bond**
- **Maintenance Bond**

In addition any purchasing department never ask to submit above Contract Agreement items at bidding time.
Answer:
The Bid Bond is the only bond that shall be return with the bid. The Payment, Performance and Maintenance Bonds shall be required from the successful bidder.

Question:
While Bidding Instruction page7 asking to submit same at bid time.
Answer:
The Bid Bond is the only bond that shall be return with the bid. The Payment, Performance and Maintenance Bonds shall be required from the successful bidder.

Question: So I am requesting you to delete these mandatory Contract Agreement items submission listed on page7 bidding instruction & release to keep all bidder on same page.
Answer:
All other documents outside of the Insurance, Payment, Performance and Maintenance Bond. Shall be return with the bid.

Question: If a prime contractor is a certified GDOT DBE, will the self-perform work count to reach the DBE goal participation?
Answer: If the prime contractor is certified GDOT DBE then that will satisfy the DBE goal participation for the project.

Question:
Is there a utility adjustment schedule for this project?
Answer:
No, the City intends to have utility conflicts addressed prior to Contractor Notice to Proceed.

Question:
Also, the only bid schedule shown is in the "Sample Contract". Is that the bid schedule that needs to be submitted?
Answer: Yes

I hereby acknowledge receipt of Addendum Number 3 for Invitation to Bid #19-008 Sandy Springs Circle Streetscape from Hammond Drive to Mt. Vernon Highway PI No. 0010385 CC-10. I have incorporated the necessary changes into my response for the abovementioned Invitation to Bid.

COMPANY NAME_____
CONTACT PERSON: _____
ADDRESS: _____CITY: _____
STATE: _____ ZIP: _____
PHONE: _____ EMAIL ADDRESS_____

SIGNATURE: _____DATE: _____

End Addendum Number 3
ITB #19-008

REPORT

Retaining Wall Foundation Exploration (LFD) - Walls C-2, E, F, J Sandy Springs Circle

Streetscape Phase II

P.I. No. 0010385
Fulton County
Georgia

Project Number
2015.0839.03

August 5, 2016
Revision No. 0

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August 5, 2016

Ms. Beth Ann Schwartz
Michael Baker International
420 Technology Parkway, Suite 150
Norcross, Georgia 30092

Via Email: BSschwartz@mbakerintl.com

PROJECT: Retaining Wall Foundation Exploration (LFD)
Walls C2, E, F, J
Sandy Springs Circle Streetscape Phase II
Sandy Springs Project No.: CC-0010, P.I. No. 0010385
Fulton County, Georgia
UC Project No. **2015.0839.03**

Dear Ms. Schwartz:

United Consulting is pleased to submit this Report of Retaining Wall Foundation Exploration for Walls C2, E, F, and J on this project. This report includes a summary of subsurface conditions and our recommendations in accordance with general format required by Georgia Department of Transportation (GDOT). We appreciate the opportunity to assist you with this project and look forward to working with you on future projects. If you have any questions regarding this report, or if we can be of further assistance, please feel free to contact us.

Sincerely,

UNITED CONSULTING

GEORGIA REGISTERED NO. 23121 PROFESSIONAL ENGINEER MEHDI MOAZZAMI

Mehdi Moazzami, Ph.D., P.E.
Senior Geotechnical Engineer

Chris L. Roberds, P.G.
Senior Executive Vice President

NP/MM/CLR/nj

http://ucblade10/sites/Geotechenv/5763/2015.0839.03/Geotechnical Documents/LFD (C-2, E, F, J)/2015.0839.03.LFD.docx

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http://www.unitedconsulting.com ♦ E-mail: united@unitedconsulting.com

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Figure 3 – Boring Location Plan & Subsurface Profile – Wall F
Figure 4 – Boring Location Plan & Subsurface Profile – Wall J

APPENDIX

General Notes/Description of Drilling Operations
SPT Boring Logs – (9)
Hand Auger Log – (1)
Field Exploration Procedures
Summary of USCS Tests (4 Pages)
Laboratory Testing Procedures
Site Photographs (4 Pages)
Triaxial Shear Test Reports (2)

1. Location/ Description

The project is for the roadway improvement on Sandy Springs Circle in Fulton County, Georgia. One (1) concrete, one (1) parapet, and two (2) gravity walls will be constructed in this project.

2. Geology

This project is geologically sited in the Factory Shoals Formation and Powers Ferry Formation of the Georgia Piedmont Region. The Factory Shoals Formation is intercalated light-gray, lustrous, garnet-biotite-oligoclase or muscovite-biotite-plagioclase metagraywacke, kyanite-quartz schist, and staurolite-muscovite quartz schist (fs). The Powers Ferry Formation is undifferentiated biotite-quartz-plagioclase gneiss, mica schist and amphibolites (pfu).

3. Subsurface Information

SPT borings:

The borings, except borings drilled at Station 77+35±, 52'R and 88+35±, 55'L, encountered fill to depths varying from 3 to 8 feet below grade. The fill consisted of very loose to firm sand with varying amounts of silt, clay, and trace amounts of gravel and mica. Based on the proposed foundation bottom elevation, the fill extended below the bottom of the footing in borings 84+00±, 48'L and 87+35±, 35'R.

Below the surface or fill, the borings encountered residual soils. The residual soils encountered generally consisted of loose to very dense sand with varying amounts of silt, clay, and mica. The residual soils also contained layers of firm to very stiff sandy silt.

Partially weathered rock (PWR) was encountered in borings 76+60±, 52'R and 87+35±, 35'L, 88+35±, 33'R, 88+35±, 55'L, and 89+05±, 55'L at depths ranging from 8 to 19.5 feet (approximate elevation of 1049, 1081, 1089, 1085.5, and 1092, respectively). A lens of PWR was also encountered in borings 88+35, 55'L at the depth from 13 to 16 feet (approximate elevation of 1089 to 1092).

Auger refusal indicating presence of hard rock occurred in borings at Stations 76+60±, 52'R, 89+00±, 55'L, and 89+05±, 55'L at approximate elevations of 1048, 1097, and 1091 feet, respectively.

Hand Auger Boring:

One (1) hand auger boring was drilled at station 84+50, 58'L. The boring encountered about 2 feet of fill. The fill consisted of sand with

some silt and clay. Below the fill, the boring encountered residual soil with varying amount of silt and clay. Auger refusal occurred at a depth of 9 feet below the grade (Elv. 1063).

Groundwater was not encountered in the borings at the time of drilling.

Please refer to the attached boring logs for additional information.

4. Proposed Walls

The approximate stations and locations of the proposed retaining walls are presented in the following table.

Wall	Station to Station	Approximate Location	Approx. Max. Wall	
			Max Ht (ft)	Type
C2	83+90.55 to 84+62.13	55'L	7.1	Concrete
E	88+35 to 89+00	54'L	9.5	Parapet – P2
F	75+87 to 77+50	36'R to 44'R	7.5	Gravity
J	87+06 to 88+75	42'R	5	Gravity

5. Soil Parameters for Retaining Wall

The following soil design parameters are recommended for use for the proposed retaining walls:

Cohesion	C= 0.0 psf
Soil Unit Weight	γ = 110 pcf
Angle of Internal Friction (Soil)	ϕ = 28°
Coefficient of Sliding Friction)	μ = 0.34 (include FS=1.5)

6. Recommendations

The maximum allowable soil bearing pressure for the proposed Walls is 2,500 psf. We recommend that where foundations are placed on existing slope, they be placed at depths such that the face of the foundation is at least 10 feet from the crest of the adjacent slope.

7. Groundwater

Groundwater was not encountered at the time of drilling. We do not anticipate that groundwater will be problematic for construction of the wall.

To limit hydrostatic pressures, weep holes in the wall and porous drainage material immediately behind the wall should be included as part of the design and construction

8. Temporary Shoring

Temporary shoring may be needed to retain the existing slope for excavation of the wall footings. The requirement of shoring should be determined by the Engineer at the time of construction.

9. Special Problems

1. Heavy traffic shall be anticipated along Sandy Springs Circle during rush hours. The contractor shall be made aware of this.

2. Both overhead and underground utilities exist along the main roads and across the wall alignments.

3. All temporary slopes should comply with applicable OSHA regulations.

4. A few businesses are located very closed to the construction limits of this project. Vibrations from the construction may cause some concern with property owners. We recommend that the Project Engineer contact Fulton County Department of Transportation prior to the construction to evaluate the need for crack surveys and vibration monitoring.

LIMITATIONS

This report is for the exclusive use of Michael Baker, City of Sandy Springs, and Georgia Department of Transportation, its agents, and the designers of the project described herein, and may only be applied to this specific project. Our conclusions and recommendations have been prepared using generally accepted standards of Geotechnical Engineering practice in the State of Georgia. No other warranty is expressed or implied. Our firm is not responsible for conclusions, opinions or recommendations of others.

The scope of this evaluation was limited to an evaluation of the load-carrying capabilities and stability of the subsoils. Oil, hazardous waste, radioactivity, irritants, pollutants, molds, or other dangerous substance and conditions were not the subject of this study. Their presence and/or absence is not implied or suggested by this report, and should not be inferred.

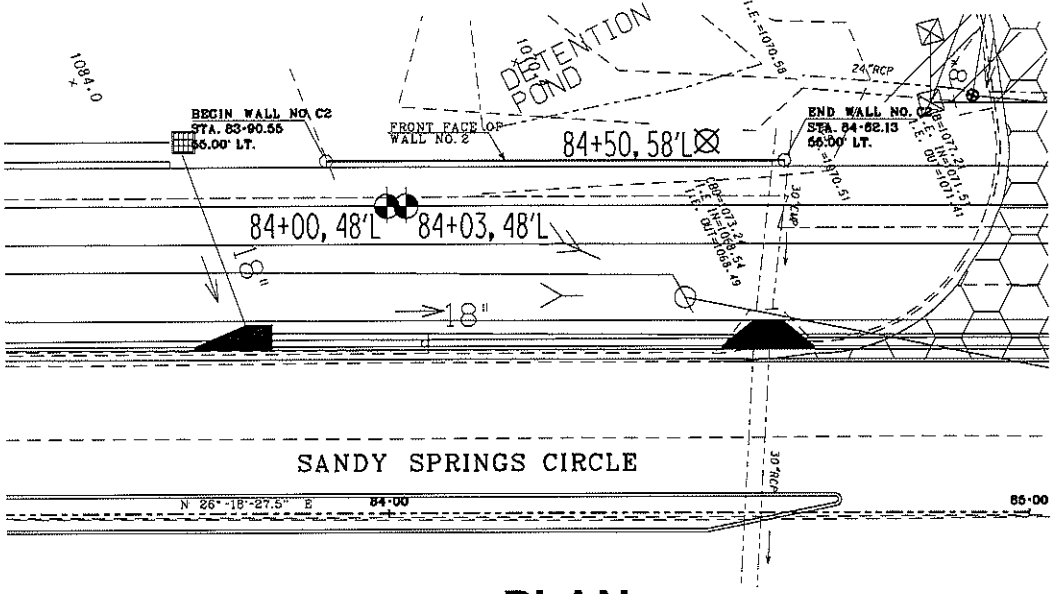
Our conclusions and recommendations are based upon design information furnished us, data obtained from the previously described exploration and testing program and our past experience. They do not reflect variations in subsurface conditions that may exist intermediate of our borings and in unexplored areas of the site. Should such variations become apparent during construction, it will be necessary to re-evaluate our conclusions and recommendations based upon “on-site” observations of the conditions.

If the design or location of the project is changed, the recommendations contained herein, must be considered invalid unless our firm reviews the changes and our recommendations are either verified or modified in writing.

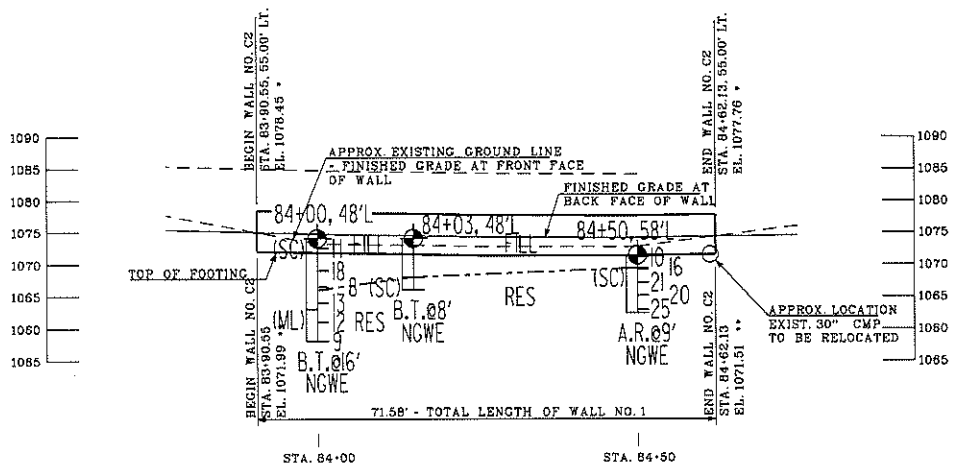
Prepared By	Nhan Pham
Reviewed By	Mehdi Mozzami, P.E.
QC Reviewed By	Chris L. Roberds, P.G.

SCALE: NTS	DATE: 7/20/2016	PROJECT NO: 2015.0839.03	**TITLE: PROJECT LOCATION MAP SANDY SPRINGS CIRCLE STREETSCAPE**	**FIG. A**
PREPARED: NP	CHECKED: NP	REVISIONS:		
CLIENT: MICHAEL BAKER		N	UNITED CONSULTING 625 Holcomb Bridge Road, Norcross, GA 30071 Tel. 770/209-0029 FAX 770/582-2900 www.unitedconsulting.com We're here for you UNITED CONSULTING	

REFERENCE: BASE PLAN PROVIDED BY MICHAEL BAKER INTERNATIONAL ON 7-20-16.



PLAN



PROFILE

LOOKING AT FRONT FACE

LEGEND

⊕	BORING LOCATION
⊠	HAND AUGER LOCATION
NGWE	NO GROUNDWATER ENCOUNTERED
B.T.	BORING TERMINATED
FILL	FILL SOIL
RES	RESIDUAL SOIL
----	TOP OF RESIDUAL
(SC)	CLAYEY SAND
(ML)	SILT

SCALE: 1" = 30'	DATE: 7-21-16	PROJECT NO: 2015.0839.03	TITLE: BORING PLAN & SUBSURFACE PROFILE - WALL C-2 SANDY SPRINGS CIRCLE STREETSCAPE - PHASE II FULTON COUNTY - P.I. NO.: 0010385
PREPARED: VPV	CHECKED:	REVISIONS:	
CLIENT: MICHAEL BAKER			UNITED CONSULTING — We're here for you

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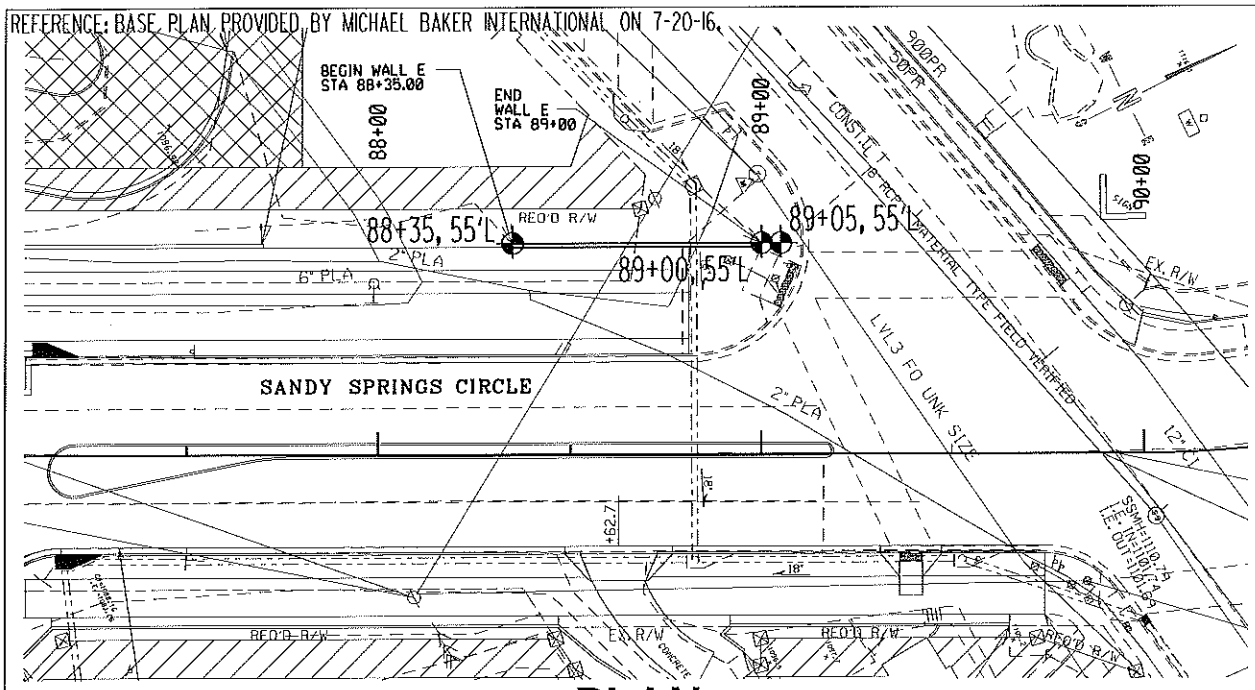
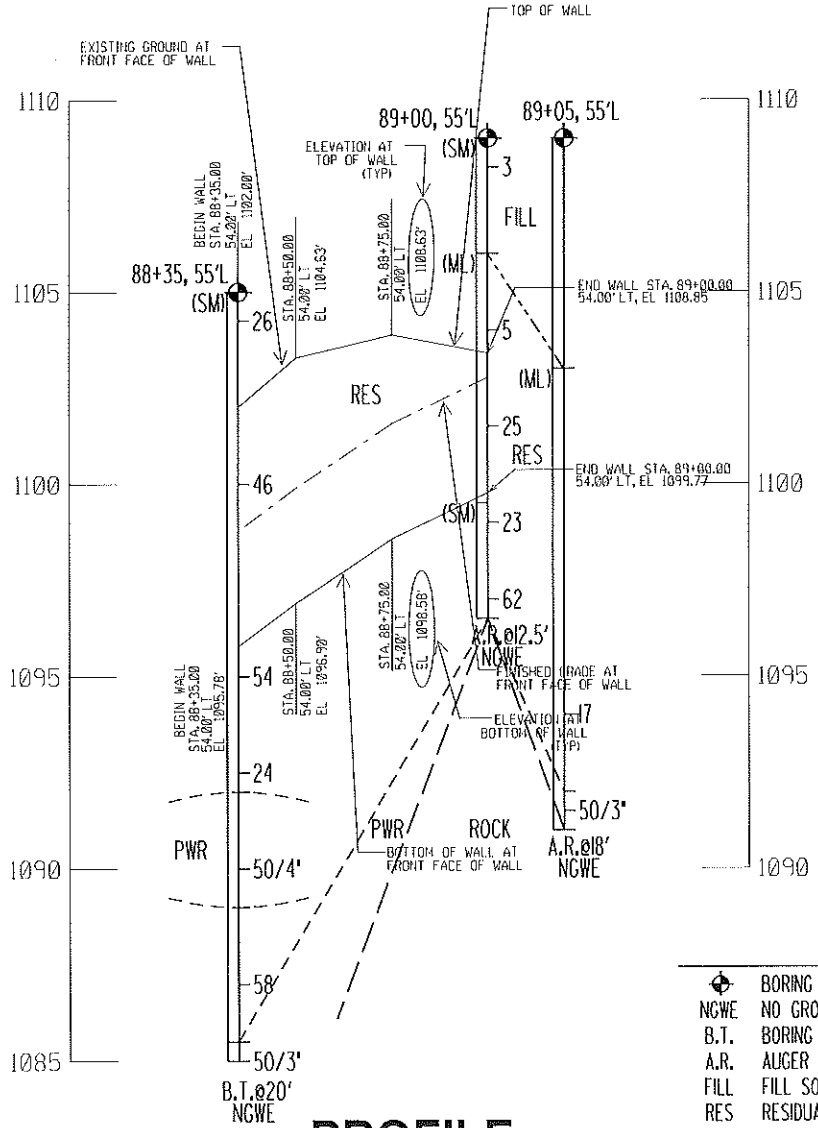
FIG. 1

REFERENCE: BASE PLAN PROVIDED BY MICHAEL BAKER INTERNATIONAL ON 7-20-16.



PLAN

SCALE: 1" = 50'



PROFILE

SCALE: 1" = 50' (H), 1" = 10' (V)

LEGEND

⊕	BORING LOCATION
NGWE	NO GROUNDWATER ENCOUNTERED
B.T.	BORING TERMINATED
A.R.	AUGER REFUSAL
FILL	FILL SOIL
RES	RESIDUAL SOIL
PWR	PARTIALLY WEATHERED ROCK
— · · —	TOP OF RESIDUAL
— — —	TOP OF PWR
(SM)	SILTY SAND
(ML)	SILT

FIG. 2

TITLE: BORING PLAN & SUBSURFACE PROFILE - WALL E
SANDY SPRINGS CIRCLE STREETSCAPE - PHASE II
FULTON COUNTY - P.I. NO.: 0010385

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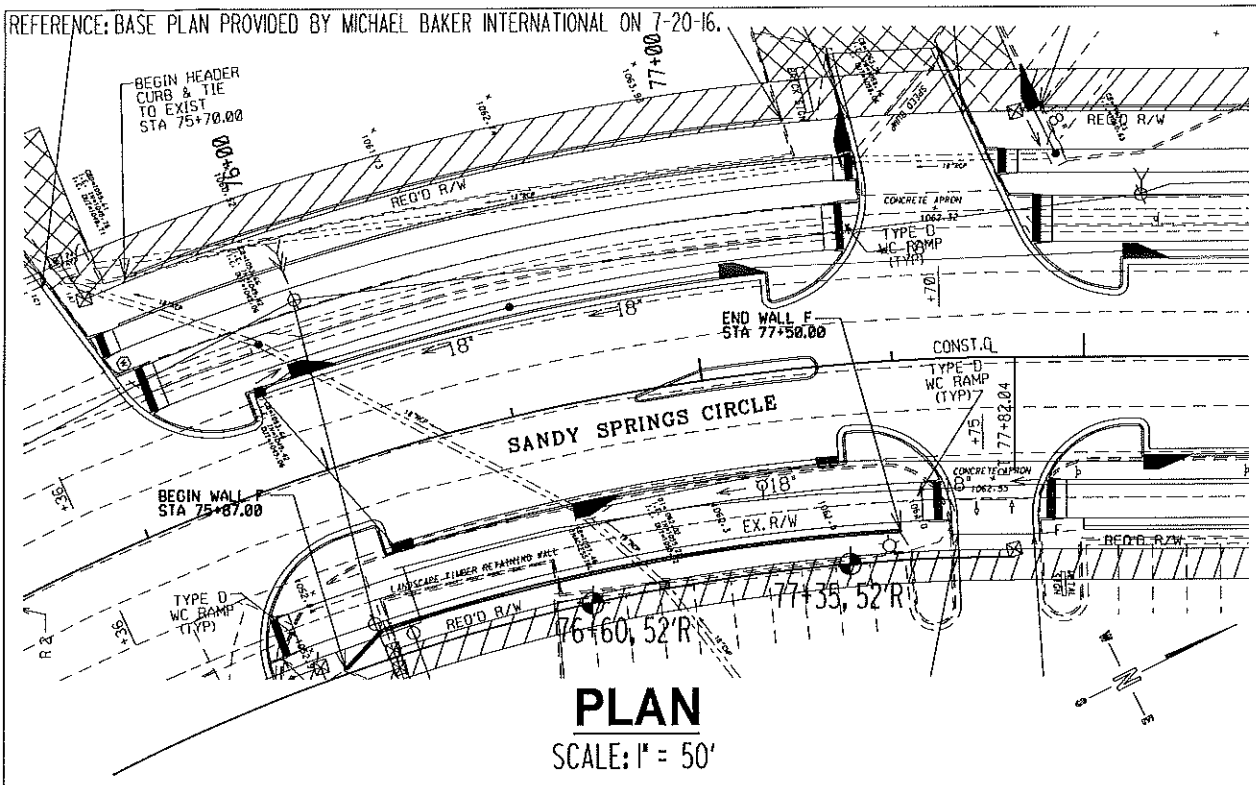
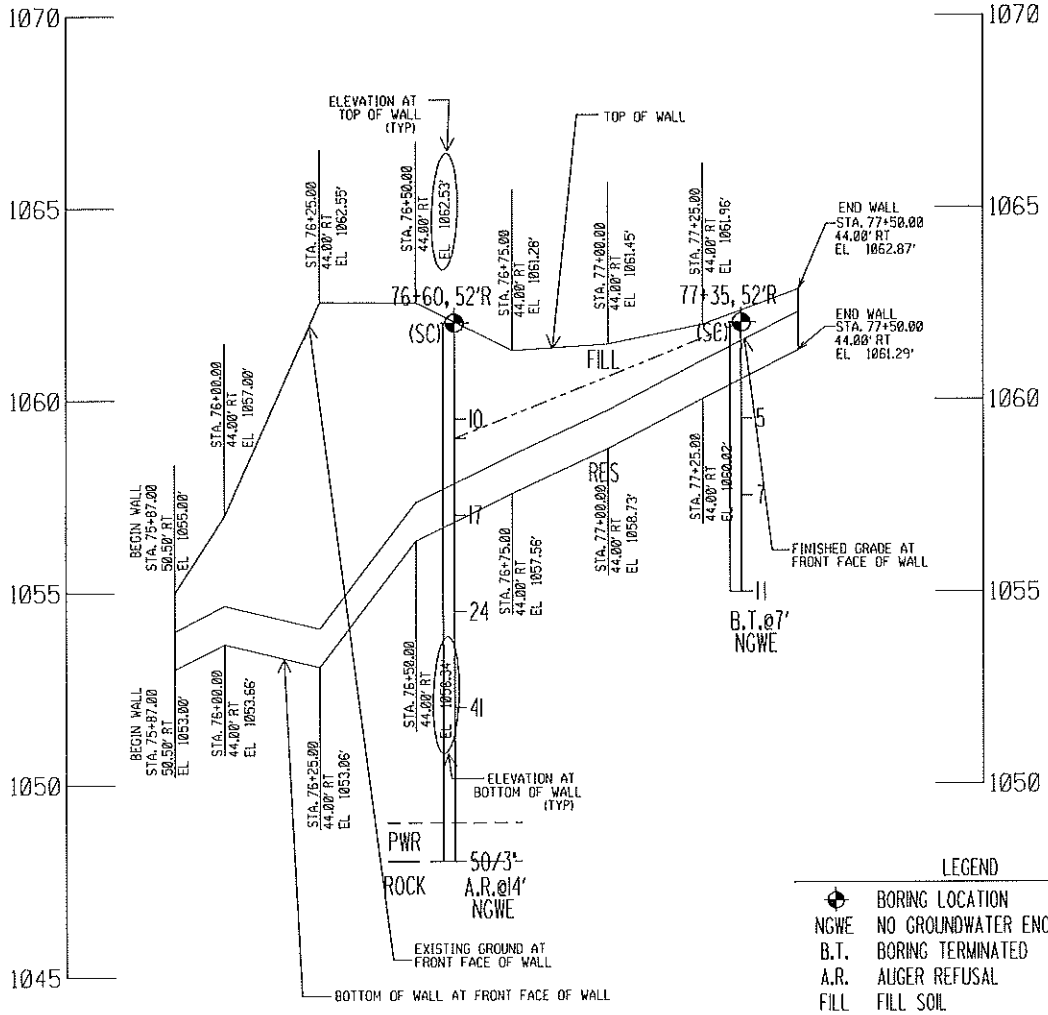
PROJECT NO: 2015.0839.03
REVISIONS:
DATE: 7-21-16
CHECKED:
SCALE: AS NOTED
PREPARED: VPV
CLIENT: MICHAEL BAKER

REFERENCE: BASE PLAN PROVIDED BY MICHAEL BAKER INTERNATIONAL ON 7-20-16.



PLAN

SCALE: 1" = 50'



PROFILE

SCALE: 1" = 50' (H), 1" = 10' (V)

LEGEND

⊕	BORING LOCATION
NGWE	NO GROUNDWATER ENCOUNTERED
B.T.	BORING TERMINATED
A.R.	AUGER REFUSAL
FILL	FILL SOIL
RES	RESIDUAL SOIL
PWR	PARTIALLY WEATHERED ROCK
———	TOP OF RESIDUAL
– – –	TOP OF PWR
—— —	TOP OF ROCK
(SC)	CLAYEY SAND

FIG. 3

TITLE: BORING PLAN & SUBSURFACE PROFILE - WALL F
SANDY SPRINGS CIRCLE STREETSCAPE - PHASE II
FULTON COUNTY - P.I. NO.: 0010385

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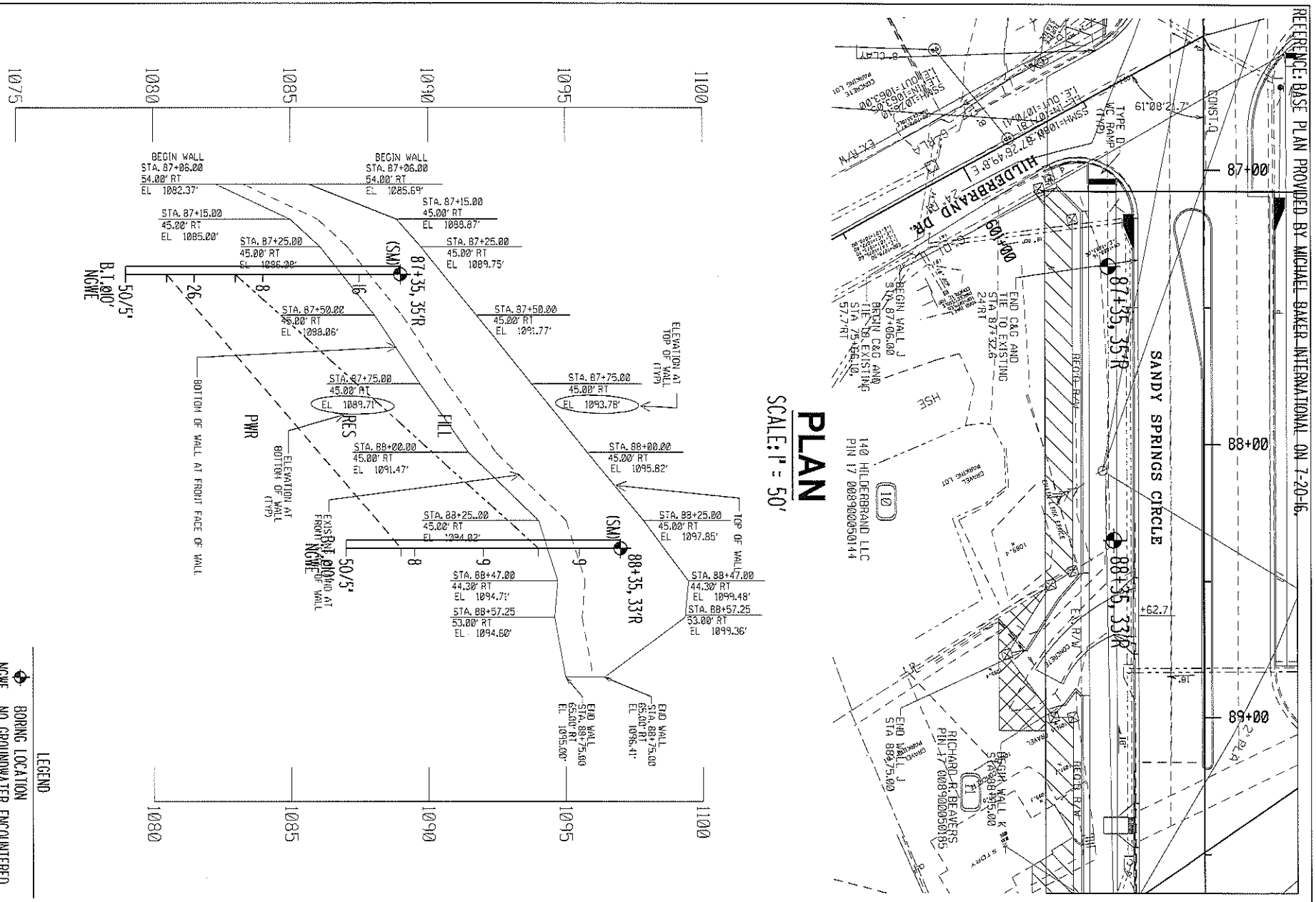
PROJECT NO: 2015.0839.03
REVISIONS:
DATE: 7-21-16
CHECKED:
SCALE: AS NOTED
PREPARED: VPV
CLIENT: MICHAEL BAKER



SCALE: AS NOTED	DATE: 7-21-16	PROJECT NO: 2015.0839.03	TITLE: BORING PLAN & SUBSURFACE PROFILE - WALL J SANDY SPRINGS CIRCLE STREETSCAPE - PHASE II FULTON COUNTY - P.I. NO.: 0010385
PREPARED: VPV	CHECKED:	REVISIONS:	
CLIENT: MICHAEL BAKER			

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FIG. 4

APPENDIX

General Notes/Description of Drilling Operations
SPT Boring Logs – (9)
Hand Auger Boring Log (1)
Field Exploration Procedures
Summary of USCS Tests (4 Pages)
Laboratory Testing Procedures
Site Photographs (4 Pages)
Tri-axial Shear Test Reports (2)

GENERAL NOTES

The soil classifications noted on the Boring Logs are visual classifications unless otherwise noted. Minor constituents of a soil sample are termed as follows:

Trace	0 - 10%
Some	11 - 35%
Suffix "y" or "ey"	36 - 49%

LEGEND

Split Spoon Sample obtained during Standard Penetration Testing

Relatively Undisturbed Shelby Tube Sample

Groundwater Level at Time of Boring Completion

Groundwater Level at 24 hours (or as noted) after Termination of Boring

w	Natural Moisture Content	
LL	Liquid Limit	
PL	Plastic Limit	Atterberg Limits
PI	Plasticity Index	
PF	Percent Fines (Percent Passing #200 Sieve)	
γ_d	Dry Unit Weight (Pounds per Cubic Foot or PCF	
γ_m	Moist or In-Situ Unit Weight (PCF)	
γ_{sat}	Saturated Unit Weight (PCF)	

BORING LOG DATA AND NARRATIVE OF DRILLING OPERATIONS

The test borings were made by mechanically advancing helical hollow stem augers into the ground. Samples were covered at regular intervals in each of the borings following established procedures for performing the Standard Penetration Test in accordance with ASTM Specification D-1586. Soil samples were obtained with a standard 1.4" I.D. x 2.0" O.D. split barrel sampler. The sampler is first seated 6" to penetrate any loose cuttings and then driven an additional foot with the blows of a 140 pound hammer freely falling a distance of 30". The number of blows required to drive the sampler each six inches is recorded on the Boring Logs. The total number of blows required to drive the sampler the final foot is designated the "standard penetration resistance." This driving resistance, known as the "N" value, is a measure of the relative density of granular soils and is an indication of the consistency of cohesive deposits.

The Following table describes soil consistencies and relative densities based on standard-penetration resistance values (N) determined by the Standard Penetration Test.

	"N"	Consistency
	0-2	Very Soft
	3-4	Soft
	5-8	Firm
Clay and Silt	9-15	Stiff
	16-30	Very Stiff
	Over 31	Hard

	"N"	Relative Density
	0-4	Very Loose
	5-10	Loose
	11-19	Firm
Sand	20-29	Medium Dense
	30-49	Dense
	50+	Very Dense

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BORING LOG

CONTRACTED WITH: MICHAEL BAKER
BORING NO.: 84+00, 48'L
PROJECT NAME: SANDY SPRINGS CIRCLE STREETSCAPE PHASE II
DATE: 6/30/2016
JOB NO.: 2015.0839.03 DRILLER: CALEB RIG: GEOPROBE LOGGED BY: RJ

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
1075	4" Topsoil	0						Wall C-2
	Sand-silty, trace clay and mica; firm; brown (Fill) (SC)		1		4-5-6	8		
BOF=1070.5 1070	-some clay	5	2		6-9-9	14		
	-some silt, trace gravel; loose		3		2-3-5	18	16.7	LL=34, PI=15
1065	Sand-some clay and silt, trace gravel and mica; firm; brown (Residual) (SC)	10	4		4-5-8	18	19.2	LL=52, PI=26
	Silt-sandy, trace clay; stiff; brown (ML)		5		4-5-7	18		
1060		15	6		3-4-5	18		
	BORING TERMINATED AT 16 FEET.							No groundwater encountered at the time of drilling.
1055		20						
1050		25						
1045		30						
1040		35						LL = Liquid Limit PI = Plasticity Index
1035		40						BOF = Bottom of Footing Fulton County PI No. 0010385

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BORING LOG

CONTRACTED WITH: MICHAEL BAKER
BORING NO.: 84+03, 48'L
PROJECT NAME: SANDY SPRINGS CIRCLE STREETSCAPE PHASE II
DATE: 6/29/2016
JOB NO.: 2015.0839.03 DRILLER: CALEB RIG: GEOPROBE LOGGED BY: RJ

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
1075	2" Topsoil	0						Wall C-2
	Straight Auger to 6 feet.							
BOF=1070.5 1070		5						
	Sand-sone clay and silt, trace gravel; dark brown (Residual) (SC)		1					Undisturbed sample obtained from 6' to 8'. LL=33, PI=11
1065	BORING TERMINATED AT 8 FEET.	10						No groundwater encountered at the time of drilling.
1060		15						
1055		20						
1050		25						
1045		30						
1040		35						LL = Liquid Limit PI = Plasticity Index
1035		40						BOF = Bottom of Footing Fulton County PI No. 0010385

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LOG OF BORING

HAND AUGER

CONTRACTED WITH: MICHAEL BAKER BORING NO.: 84 + 50, 58'L

PROJECT NAME: SANDY SPRINGS CIRCLE STREETSCAPE JOB NO.: 2015.0839.03 DATE: 6/29/2016

ELEV.	DESCRIPTION	DEPTH in FEET	PENETROMETER TESTS NO.	BLOWS PER 2"	BLOWS PER 1.75"	NOTES
	6" Topsoil	0				Wall C2
	Sand-some silt and clay; dark brown (Fill)		1	6	10	
1071.25		1.25				
1070	Sand-some silt and clay; brown (Residual) (SC)		2	12	16	
BOF=1069.5		2.5				
1068.75		3.75				
			3	15	21	
1067.5		5				
1066.25	-tan	6.25	4	12	20	
1065		7.5				
1063.75	-silty, trace clay	8.75	5	17	25	
	AUGER REFUSAL AT 9 FEET.					No groundwater encountered at the time of boring.
1062.5		10				BOF = Bottom of Footing Fulton County PI No. 0010385

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BORING LOG

CONTRACTED WITH: MICHAEL BAKER
BORING NO.: 88+35, 55'L
PROJECT NAME: SANDY SPRINGS CIRCLE STREETSCAPE PHASE II
DATE: 6/29/2016
JOB NO.: 2015.0839.03 DRILLER: CALEB RIG: GEOPROBE LOGGED BY: RJ

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
1105	4" Topsoil	0						Wall E
	Sand-silty, trace clay and mica; medium dense; brown (Residual) (SM)		1		10-11-15	14		
	-trace gravel; dense; brown	5	2		20-17-29	18	6.6	LL=NV, PI=NP
1100								
BOF=1097	-some clay; very dense; tan		3		30-31-23	10		
1095		10						
	-medium dense		4		10-12-12	12	17.9	LL=51, PI=14
	Partially weathered rock sampled as: sand-silty, trace clay and mica; very dense; tan	15	5		50/4	3		
1090								
	Sand-silty, trace clay and mica; very dense; tan (Residual) (SM)		6		12-34-24	14		
		20	7		12-24-50/3	12		
1085	Partially weathered rock sampled as: sand-silty, trace clay and mica; very dense; tan							No groundwater encountered at the time of drilling.
	BORING TERMINATED AT 20 FEET.							
1080		25						
1075		30						
1070		35						LL = Liquid Limit PI = Plasticity Index
1065		40						BOF = Bottom of Footing Fulton County PI No. 0010385

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BORING LOG

CONTRACTED WITH: MICHAEL BAKER
BORING NO.: 89+00, 55'L
PROJECT NAME: SANDY SPRINGS CIRCLE STREETSCAPE PHASE II
DATE: 6/29/2016
JOB NO.: 2015.0839.03 DRILLER: CALEB RIG: GEOPROBE LOGGED BY: RJ

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
1110	2" Topsoil	0						Wall E
	Sand-silty, trace clay; very loose; brown (Fill)		1		2-1-2	12		
1105	Silt-sandy, trace clay and gravel; firm; brown (Residual) (ML)	5	2		2-2-3	12	23.7	LL=39, PI=5
	-some clay; very stiff		3		4-8-17	14		
BOF=1100 1100	Sand-silty, trace clay; medium dense; tan (SM)	10	4		7-10-13	14	12.1	LL=NV, PI=NP
	-very dense		5		13-19-43	12		
1095	AUGER REFUSAL AT 12.5 FEET.	15						No groundwater encountered at the time of drilling.
1090		20						
1085		25						
1080		30						
1075		35						LL = Liquid Limit PI = Plasticity Index
1070		40						BOF = Bottom of Footing Fulton County PI No. 0010385

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BORING LOG

CONTRACTED WITH: MICHAEL BAKER
BORING NO.: 89+05, 55'L
PROJECT NAME: SANDY SPRINGS CIRCLE STREETSCAPE PHASE II
DATE: 6/29/2016
JOB NO.: 2015.0839.03 DRILLER: CALEB RIG: GEOPROBE LOGGED BY: RJ

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
1110	2" Topsoil	0						Wall E
	Straight Auger to 6 feet.							
1105		5						
	Silt-sandy, some clay, trace gravel; brown (Residual) (ML)		1					Undisturbed sample obtained from 6' to 8'. LL=49, PI=18
BOF=1100 1100	Straight Auger to 13.5 feet.	10						
1095	Sand-silty, some gravel, trace clay; firm; gray and tan (Residual)	15	2		5-8-9	18		
			3		12-42-50/3	12		
1090	Partially weathered rock sampled as: sand- some silt, trace clay; very dense; tan	20						No groundwater encountered at the time of drilling.
	AUGER REFUSAL AT 18 FEET.							
1085		25						
1080		30						
1075		35						LL = Liquid Limit PI = Plasticity Index
1070		40						BOF = Bottom of Footing Fulton County PI No. 0010385

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BORING LOG

CONTRACTED WITH: MICHAEL BAKER
BORING NO.: 76+60, 52'R
PROJECT NAME: SANDY SPRINGS CIRCLE STREETSCAPE PHASE II
DATE: 6/29/2016
JOB NO.: 2015.0839.03 DRILLER: CALEB RIG: GEOPROBE LOGGED BY: RJ

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	2" Asphalt	0						Wall F
1060	Sand-clayey, some silt, trace gravel; loose; brown (Fill) (SC)		1		8-5-5	4	14.3	LL=35, PI=11
	Sand-clayey, some silt, trace gravel; firm; brown (Residual) (SC)	5	2		7-8-9	12	15.2	LL=36, PI=12
BOF=1056 1055	-some clay; medium dense		3		9-11-13	12		
	-dense	10	4		16-19-22	12		
1050								
	Partially weathered rock sampled as: sand- some silt, trace clay; very dense; tan	15	5		50/3	2		No groundwater encountered at the time of drilling.
1045	AUGER REFUSAL AT 14 FEET.							
		20						
1040								
		25						
1035								
		30						
1030								
		35						LL = Liquid Limit PI = Plasticity Index
1025								
		40						BOF = Bottom of Footing Fulton County PI No. 0010385

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BORING LOG

CONTRACTED WITH: MICHAEL BAKER
BORING NO.: 77+35, 52'R
PROJECT NAME: SANDY SPRINGS CIRCLE STREETSCAPE PHASE II
DATE: 6/29/2016
JOB NO.: 2015.0839.03 DRILLER: CALEB RIG: GEOPROBE LOGGED BY: RJ

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	2" Asphalt	0						Wall F
BOF=1060 1060	Sand-clayey, some silt, trace gravel; loose; brown (Residual) (SC)		1		2-2-3	12		
			2		2-3-4	12	14.3	LL=28, PI=10
		5						
	-trace mica; firm; purple		3		4-5-6-6	16		
1055	BORING TERMINATED AT 7 FEET.							No groundwater encountered at the time of drilling.
		10						
1050								
		15						
1045								
		20						
1040								
		25						
1035								
		30						
1030								
		35						LL = Liquid Limit PI = Plasticity Index
1025								
		40						BOF = Bottom of Footing Fulton County PI No. 0010385

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NORCROSS, GEORGIA 30071
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BORING LOG

CONTRACTED WITH: MICHAEL BAKER
BORING NO.: 87+35, 35'R
PROJECT NAME: SANDY SPRINGS CIRCLE STREETSCAPE PHASE II
DATE: 6/29/2016
JOB NO.: 2015.0839.03 DRILLER: CALEB RIG: GEOPROBE LOGGED BY: RJ

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
1090	4" Topsoil	0						Wall J
	Sand-silty, some clay, trace mica; firm; brown (Fill) (SM)		1		7-8-8	10		
BOF=1086								
1085	-trace gravel; loose	5	2		3-4-4	12	8.5	LL=38, PI=12
	Sand-silty, some gravel, trace clay; medium dense; brown (Residual) (SM)		3		4-5-21	16	7.2	LL=38, PI=8
1080	Partially weathered rock sampled as: sand-silty, trace clay; very dense; brown	10	4		50/5	4		
	BORING TERMINATED AT 10 FEET.							No groundwater encountered at the time of drilling.
1075		15						
1070		20						
1065		25						
1060		30						
1055		35						LL = Liquid Limit PI = Plasticity Index
1050		40						BOF = Bottom of Footing Fulton County PI No. 0010385

UNITED CONSULTING
625 HOLCOMB BRIDGE ROAD
NORCROSS, GEORGIA 30071
(770)209-0029, FAX (770)582-2800

BORING LOG

CONTRACTED WITH: MICHAEL BAKER
BORING NO.: 88+35, 33'R
PROJECT NAME: SANDY SPRINGS CIRCLE STREETSCAPE PHASE II
DATE: 6/29/2016
JOB NO.: 2015.0839.03 DRILLER: CALEB RIG: GEOPROBE LOGGED BY: RJ

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	4" Topsoil	0						Wall J
	Sand-some silt, trace clay; loose; brown (Fill) (SM)		1		2-4-5	2		
1095								
BOF=1094	Sand-silty, some clay and gravel; loose; reddish brown (Residual) (SM)	5	2		3-4-5	12		
1090			3		3-4-4	16	13.1	LL=42, PI=14
	Partially weathered rock sampled as: sand- some silt, trace clay; very dense; brown	10	4		36-50/5	6		
	BORING TERMINATED AT 10 FEET.							No groundwater encountered at the time of drilling.
1085								
		15						
1080								
		20						
1075								
		25						
1070								
		30						
1065								
		35						LL = Liquid Limit PI = Plasticity Index
1060								
		40						BOF = Bottom of Footing Fulton County PI No. 0010385

FIELD EXPLORATION PROCEDURES
SOIL BORINGS

Eight (8) SPT and one (1) hand auger borings were drilled near/along the proposed walls. The depths of the SPT borings ranged from 10 to 20 feet below the existing grades. The hand auger boring was refused at a depth of 9 feet. The approximate locations of the borings and subsurface profiles are shown on the attached Boring Location Plan and Subsurface Profile (Figures 1, 2, 3, and 4) provided in Appendix of this report.

Boring locations were established in the field by the Project Engineer with use of measuring tape, provided plan, and compass from the proposed road centerline and existing site features. The drilling and sampling were performed in general accordance with ASTM Standard D-1586. Soil samples obtained were observed by a Geotechnical Engineer and classified according to the visual manual procedures (ASTM D-2488). A narrative of field operations is also included in The Appendix.

SUMMARY OF USCS TESTS

Project No.: 2015.0839.03
Project Name: Sandy Springs Circle Streetscape

Contract No.: CC – 0010
P.I. No.: 0010385
County: Fulton

Sample No.	1	2	3	4
Lab Sample No.	2	3	1	17
Station	76 + 60, 52'R	76 + 60, 52'R	77 + 35, 52'R	84 + 00, 48'L
Location	Wall F	Wall F	Wall F	Wall C-2
Depth (ft)	1.0 – 2.5	3.5 – 5.0	3.0 – 4.5	6.0 – 7.5
PHYSICAL TESTS				
2-1/2" Sieve	100	100	100	100
1-1/2" Sieve	100	100	100	100
#10 Sieve	86.7	96.0	86.5	94.1
#40 Sieve	63.3	65.8	71.3	77.7
#60 Sieve	53.3	55.5	61.6	66.9
#200 Sieve	34.2	34.4	40.4	44.4
Liquid Lmt. (%)	35	36	28	34
Plast. Index (%)	11	12	10	15
Moisture (%)	14.3	15.2	14.3	16.7
Organics (%)	-	-	-	-
Unified Soil Classification	SC	SC	SC	SC
TESTING DATES				
Date Sampled	6/29/2016	6/29/2016	6/29/2016	6/29/2016
Date Completed	7/12/2016	7/12/2016	7/12/2016	7/12/2016
Date Received	7/19/2016	7/19/2016	7/19/2016	7/19/2016

Remarks: _____

Respectfully Submitted: Mahvand Salehi

SUMMARY OF USCS TESTS

Project No.: 2015.0839.03
Project Name: Sandy Springs Circle Streetscape

Contract No.: CC – 0010
P.I. No.: 0010385
County: Fulton

Sample No.	5	6	7	8
Lab Sample No.	18	UD-2	19	8
Station	84 + 00, 48'L	84 + 03, 48'L	87 + 35, 35'R	87 + 35, 35'R
Location	Wall C-2	Wall C-2	Wall J	Wall J
Depth (ft)	8.5 – 10.0	6.0 – 8.0	3.5 – 5.0	6.0 – 7.5
PHYSICAL TESTS				
2-1/2" Sieve	100	100	100	100
1-1/2" Sieve	100	100	100	100
#10 Sieve	88.3	92.1	82.8	62.6
#40 Sieve	72.4	75.3	61.1	46.0
#60 Sieve	63.5	64.7	52.1	39.0
#200 Sieve	47.0	44.9	33.8	24.5
Liquid Lmt. (%)	52	33	38	38
Plast. Index (%)	26	11	12	8
Moisture (%)	19.2	7.8	8.5	7.2
Organics (%)	-	-	-	-
Unified Soil Classification	SC	SC	SM	SM
TESTING DATES				
Date Sampled	6/29/2016	6/30/2016	6/29/2016	6/29/2016
Date Completed	7/12/2016	7/5/2016	7/12/2016	7/12/2016
Date Received	7/19/2016	7/19/2016	7/19/2016	7/19/2016

Remarks: _____

Respectfully Submitted: Mahvand Salehi

SUMMARY OF USCS TESTS

Project No.: 2015.0839.03
Project Name: Sandy Springs Circle Streetscape

Contract No.: CC – 0010
P.I. No.: 0010385
County: Fulton

Sample No.	9	10	11	12
Lab Sample No.	22	20	21	23
Station	88 + 35, 33'R	88 + 35, 55'L	88 + 35, 55'L	89 + 00, 55'L
Location	Wall J	Wall E	Wall E	Wall E
Depth (ft)	6.0 – 7.5	3.5 – 5.0	11.0 – 12.5	3.5 – 5.0
PHYSICAL TESTS				
2-1/2" Sieve	100	100	100	100
1-1/2" Sieve	100	100	100	100
#10 Sieve	75.3	92.4	90.9	93.7
#40 Sieve	55.5	50.0	70.8	84.5
#60 Sieve	48.5	40.0	63.2	78.8
#200 Sieve	33.7	21.8	41.8	62.3
Liquid Lmt. (%)	42	NV	51	39
Plast. Index (%)	14	NP	14	5
Moisture (%)	13.1	6.6	17.9	23.7
Organics (%)	-	-	-	-
Unified Soil Classification	SM	SM	SM	ML
TESTING DATES				
Date Sampled	6/29/2016	6/30/2016	6/30/2016	6/30/2016
Date Completed	7/12/2016	7/12/2016	7/12/2016	7/12/2016
Date Received	7/19/2016	7/19/2016	7/19/2016	7/19/2016

Remarks: _____

Respectfully Submitted: Mahvand Salehi

SUMMARY OF USCS TESTS

Project No.: 2015.0839.03
Project Name: Sandy Springs Circle Streetscape

Sandy Springs Project No.: CC – 0010
P.I. No.: 0010385
County: Fulton

Sample No.	13	14		
Lab Sample No.	24	UD-3		
Station	89 + 00, 55'L	89 + 00, 55'L		
Location	Wall E	Wall E		
Depth (ft)	8.5 – 10.0	6.0 – 8.0		
PHYSICAL TESTS				
2-1/2" Sieve	100	100		
1-1/2" Sieve	100	100		
#10 Sieve	67.0	89.8		
#40 Sieve	45.7	77.7		
#60 Sieve	37.7	71.1		
#200 Sieve	21.8	56.3		
Liquid Lmt. (%)	NV	49		
Plast. Index (%)	NP	18		
Moisture (%)	12.1	21.6		
Organics (%)	-	-		
Unified Soil Classification	SM	ML		
TESTING DATES				
Date Sampled	6/30/2016	6/30/2016		
Date Completed	7/12/2016	7/8/2016		
Date Received	7/19/2016	7/19/2016		

Remarks: _____

Respectfully Submitted: Mahvand Salehi

LABORATORY TESTING PROCEDURES

Moisture Content

The moisture content was determined for selected soil samples obtained in the split-barrel sampler. A representative portion of each sample was weighed and then placed in an oven and dried at 110 degrees Centigrade for at least 15 to 16 hours. After removal from the oven, the soil was again weighed. The weight of the moisture lost during drying thus was determined. From this data, the moisture content of the sample was then calculated as the weight of moisture divided by dry weight of soil, expressed as a percentage. This test was conducted according to ASTM D 2216.

Moisture content is a useful index of a soil's compressibility. If the soil is to be used as fill, the moisture content may be compared to the range of water contents for which proper compaction may be achieved. The moisture content results are indicated on the boring logs attached and on the Summary of USCS Tests.

Unified Soil Classification System (USCS)

Soils to be classified as per Unified Soil classification System (USCS) are generally required to perform grain size analysis (particle size distribution), liquid limit and plasticity index tests when precise classification is required. After performing the required tests, the classification is generally performed in accordance with ASTM D 2487. These classification tests are also required by GDOT in the areas of construction of new pavement over existing paved shoulders, areas of muck, swamp, lake/pond bottom, etc.

Grain Size (Sieve) Analysis with or without Hydrometer

Grain Size Analysis tests were performed to determine the particle size distribution of selected samples tested. The grain size distribution of soils coarser than a number 200 sieve was determined by passing the samples through a standard set of nested sieves. Materials finer than the number 200 sieves were suspended in water and the grain size distribution computed from the time rate of settlement of the different size particles. Air-dried soil passed through #200 sieve. 50 grams of that must soak in s/c agent for a minimum of 8 hours. Soil is then put in graduated cylinder with a hydrometer. Readings are taken at specified times. A graph is drawn from data. These tests were similar to those described by ASTM D 421 and D 422. The data obtained are summarized on the enclosed Summary of USCS Test Data.

Liquid and Plastic Limits (Atterberg Limits)

Liquid Limit and Plastic Limit tests aid in the classification of the soils and provide an indication of the soil behavior with moisture change. The Plasticity Index is calculated by subtracting the Plastic Limit (PL) from the Liquid Limit (LL). The Liquid Limit is the moisture content at which the soil will flow as a heavy viscous fluid and is the upper limit of the plastic range, as determined in accordance with ASTM D 4318. The Plastic Limit is

the moisture content at which the soil begins to lose its plasticity, as determined in accordance with ASTM D 4318. The Liquidity Index is the ratio of the difference between the in-place moisture and the plastic limit to the Plasticity Limit. The data obtained are summarized on the enclosed Summary of USCS Test Data.

Triaxial Shear

Three specimens (with minimum of 6-inch long) are prepared from the UD sample. For Insufficient recovery, either multistage triaxial shear on one specimen or triaxial shear on smaller length is performed. We have the capability of performing triaxial shear on a 4-inch long sample using some difficult preparation time. After preparation of the specimen, the specimen is encased in a rubber membrane and is placed in the triaxial cell. The specimen is initially saturated using the increasing confining pressures. Once the saturation is obtained, the desired all around confining pressures are applied and the axial load is increased until the specimen fails in shear or in excess of 15% strain is achieved. Pore pressures are measured for CU tests to help determine total and effective stresses during testing. Readings are taken and then plotted in the form of Mohr's circles using the computer program. Method is similar as described in ASTM D4767.

Looking in increasing station from station 75 + 70±, 45’R – Wall F

Looking in decreasing station from station 77 + 60±, 55’R – Wall F

Looking in increasing station from station 83 + 75±, 45’L – Wall C-2

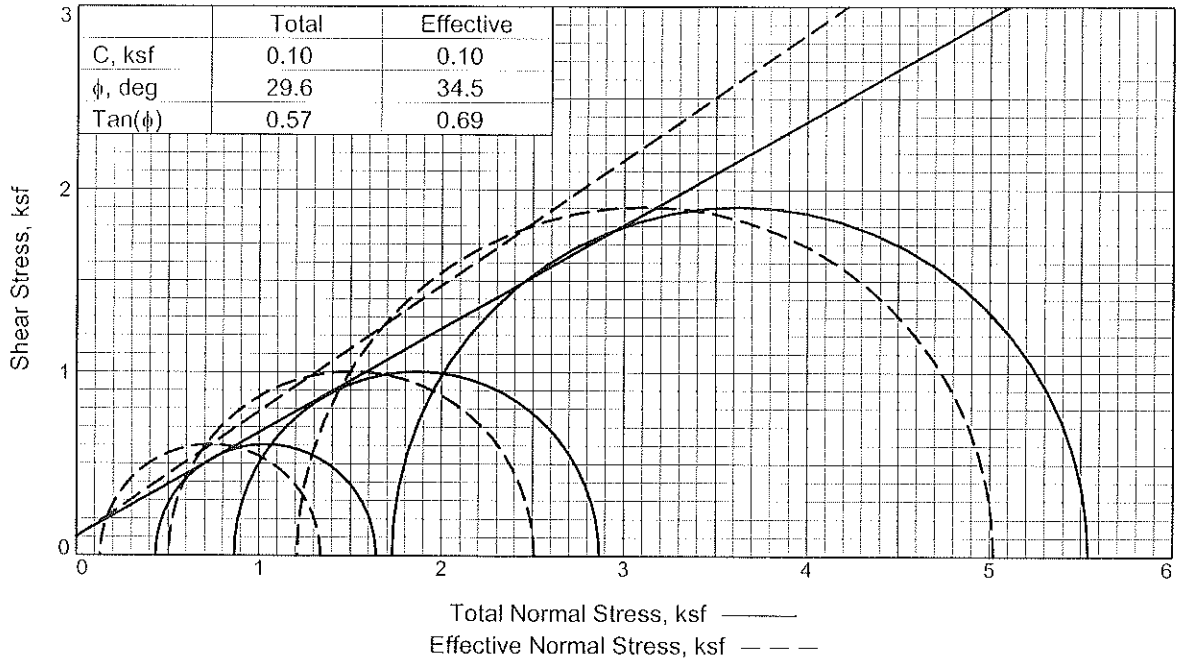
Looking in decreasing station from station 84 + 80±, 50’L – Wall C-2

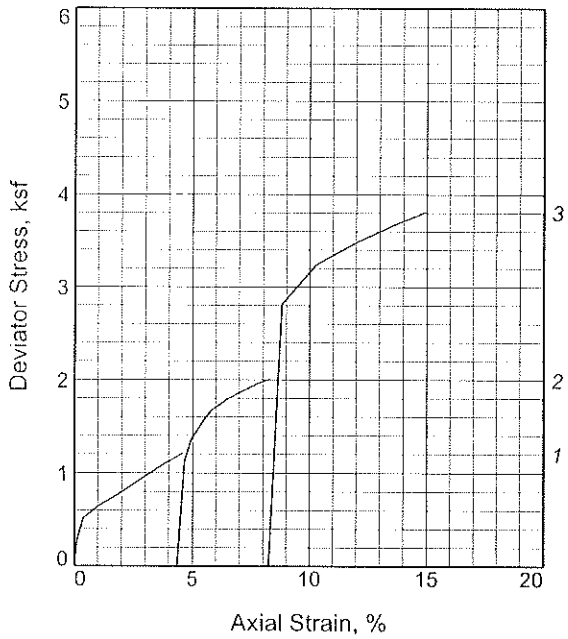
Looking in increasing station from station 86 + 90±, 50’R – Wall J

Looking in decreasing station from station 88 + 75±, 45’R – Wall J

Looking in increasing station from station 88 + 25±, 55’L – Wall E

Looking in decreasing station from station 89 + 00±, 55’L – Wall E





Sample No.		1	2	3
Initial	Water Content, %	9.1	9.1	9.1
	Dry Density, pcf	104.4	104.4	104.4
	Saturation, %	41.3	41.3	41.3
	Void Ratio	0.5844	0.5844	0.5844
	Diameter, in.	2.87	2.87	2.87
	Height, in.	5.60	5.60	5.60
At Test	Water Content, %	15.7	15.6	15.5
	Dry Density, pcf	116.9	116.9	117.2
	Saturation, %	100.0	100.0	100.0
	Void Ratio	0.4154	0.4146	0.4114
	Diameter, in.	2.76	2.76	2.76
	Height, in.	5.40	5.39	5.39
Strain rate, in./min.		0.01	0.01	0.01
Back Pressure, psi		80.00	80.00	80.00
Cell Pressure, psi		83.00	86.00	92.00
Fail. Stress, ksf		1.21	2.00	3.81
Total Pore Pr., ksf		11.82	11.88	12.04
Ult. Stress, ksf		1.21	2.00	3.81
Total Pore Pr., ksf		11.82	11.88	12.04
$\bar{\sigma}_1$ Failure, ksf		1.34	2.51	5.02
$\bar{\sigma}_3$ Failure, ksf		0.13	0.50	1.21

Type of Test:
CU with Pore Pressures

Sample Type: UD

Description: Sand, some clay and silt, trace gravel, dark brown

LL= 33 **PL=** 22 **PI=** 11

Assumed Specific Gravity= 2.65

Remarks:

Client: MICHAEL BAKER INTL.

Project: PI 0010385 SANDY SPRINGS CIRCLE STREETSCAPE

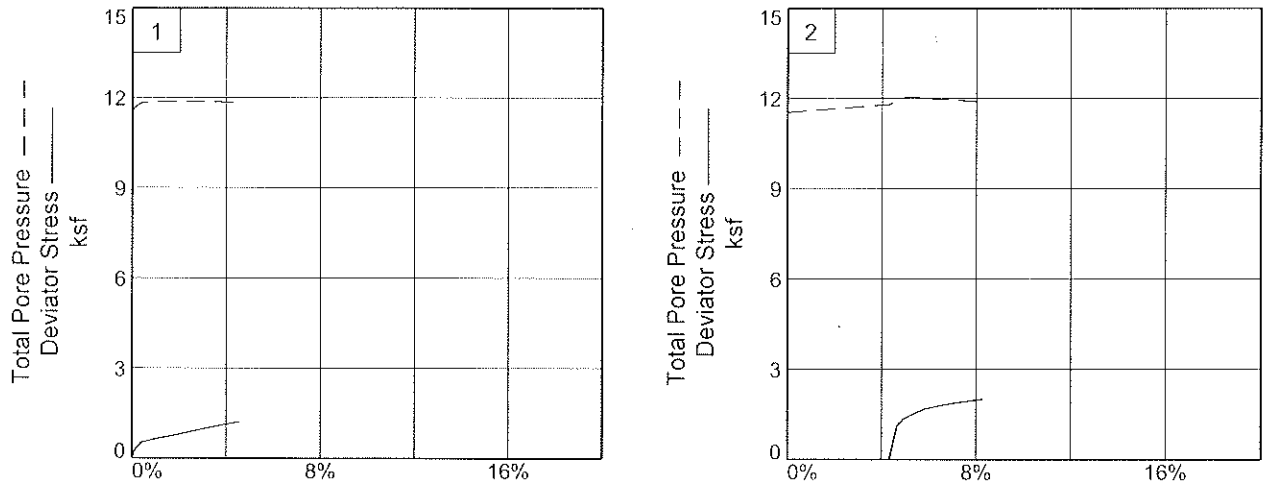
Location: 84+03,48'L

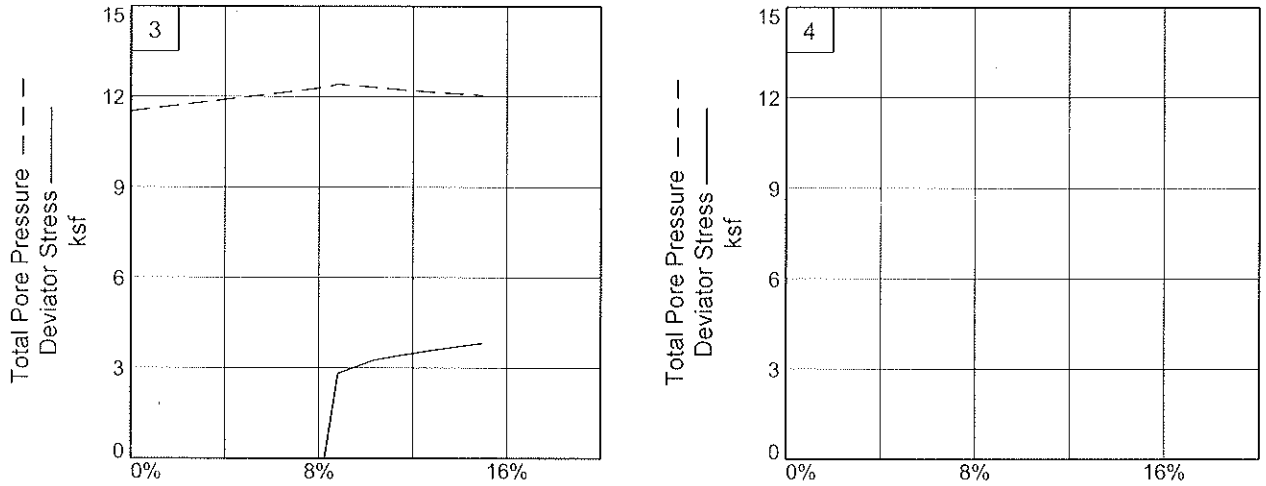
Sample Number: UD-2 **Depth:** 6.0-8.0 ft

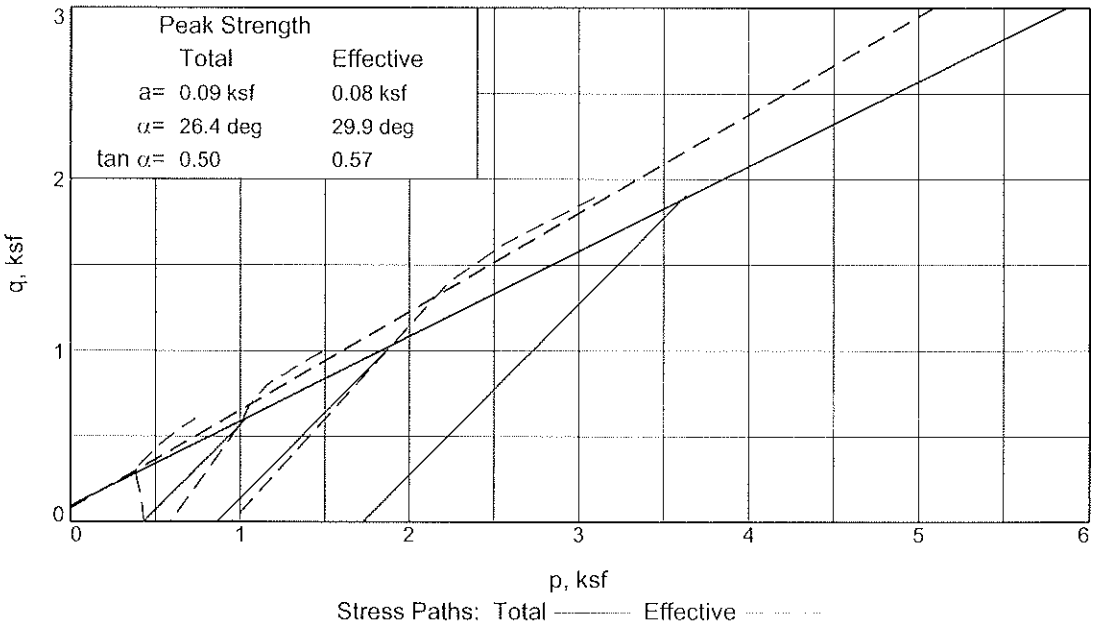
Proj. No.: 2015.0839.03 **Date Sampled:** 7/6/16

TRIAXIAL SHEAR TEST REPORT
United Consulting
Norcross, Georgia

Figure _____







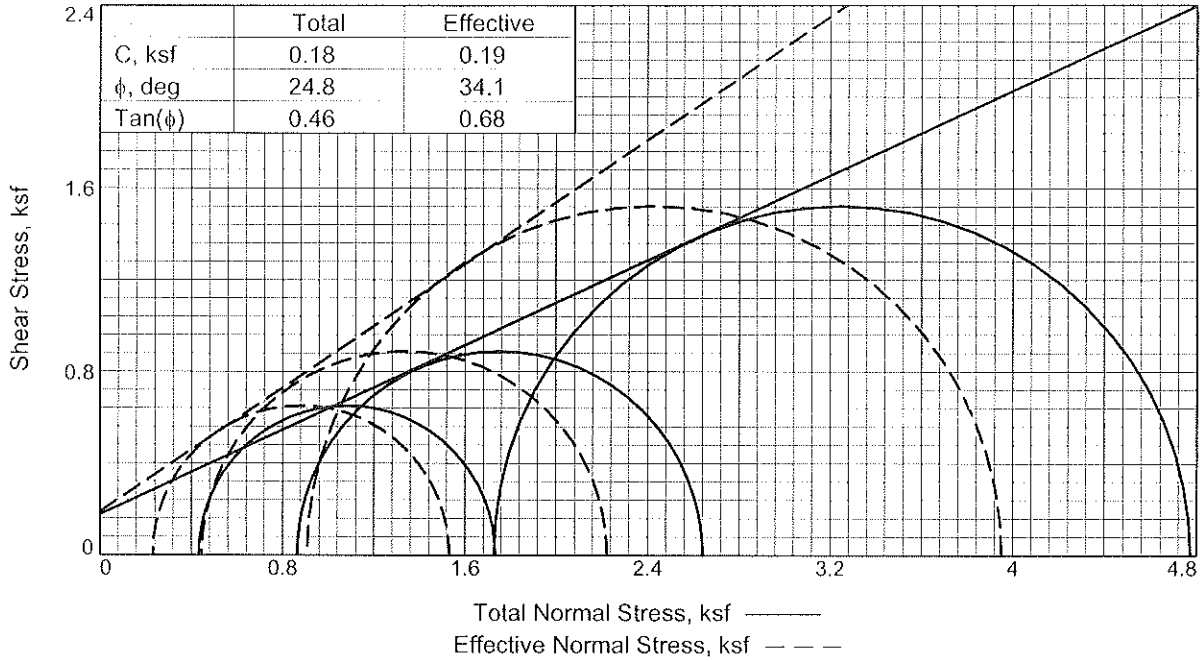
Client: MICHAEL BAKER INTL.

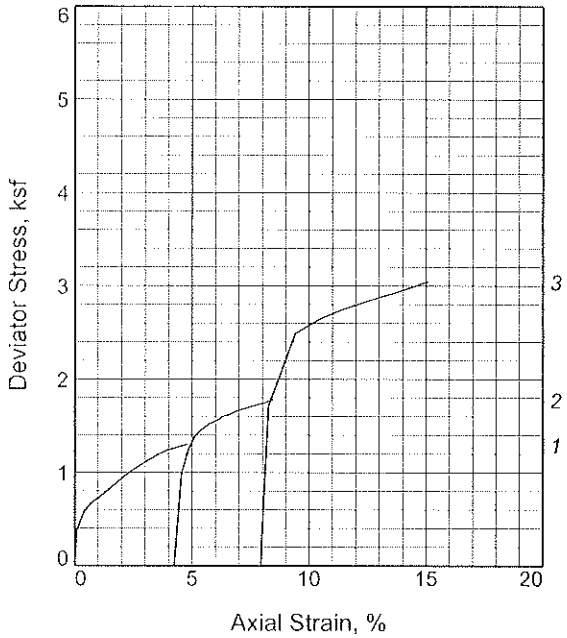
Project: PI 0010385 SANDY SPRINGS CIRCLE STREETSCAPE

Location: 84+03,48'L **Depth:** 6.0-8.0 ft **Sample Number:** UD-2

Project No.: 2015.0839.03 **Figure** _____

United Consulting





Sample No.		1	2	3
Initial	Water Content, %	27.1	27.1	27.1
	Dry Density, pcf	83.8	83.8	83.8
	Saturation, %	73.6	73.6	73.6
	Void Ratio	0.9737	0.9737	0.9737
	Diameter, in.	2.87	2.87	2.87
	Height, in.	5.60	5.60	5.60
At Test	Water Content, %	35.1	35.0	34.8
	Dry Density, pcf	85.7	85.9	86.1
	Saturation, %	100.0	100.0	100.0
	Void Ratio	0.9305	0.9263	0.9221
	Diameter, in.	2.85	2.85	2.84
	Height, in.	5.56	5.55	5.55
Strain rate, in./min.		0.01	0.01	0.01
Back Pressure, psi		90.00	90.00	90.00
Cell Pressure, psi		93.00	96.00	102.00
Fail. Stress, ksf		1.30	1.78	3.04
Total Pore Pr., ksf		13.16	13.38	13.78
Ult. Stress, ksf		1.30	1.78	3.04
Total Pore Pr., ksf		13.16	13.38	13.78
$\bar{\sigma}_1$ Failure, ksf		1.53	2.22	3.95
$\bar{\sigma}_3$ Failure, ksf		0.23	0.45	0.91

Type of Test:
CU with Pore Pressures

Sample Type: UD

Description: silt-sandy, some clay, trace gravel, brown

LL= 49 **PL=** 31 **PI=** 18

Assumed Specific Gravity= 2.65

Remarks:

Client: MICHAEL BAKER INTL.

Project: PI 0010385 SANDY SPRINGS CIRCLE STREETSCAPE

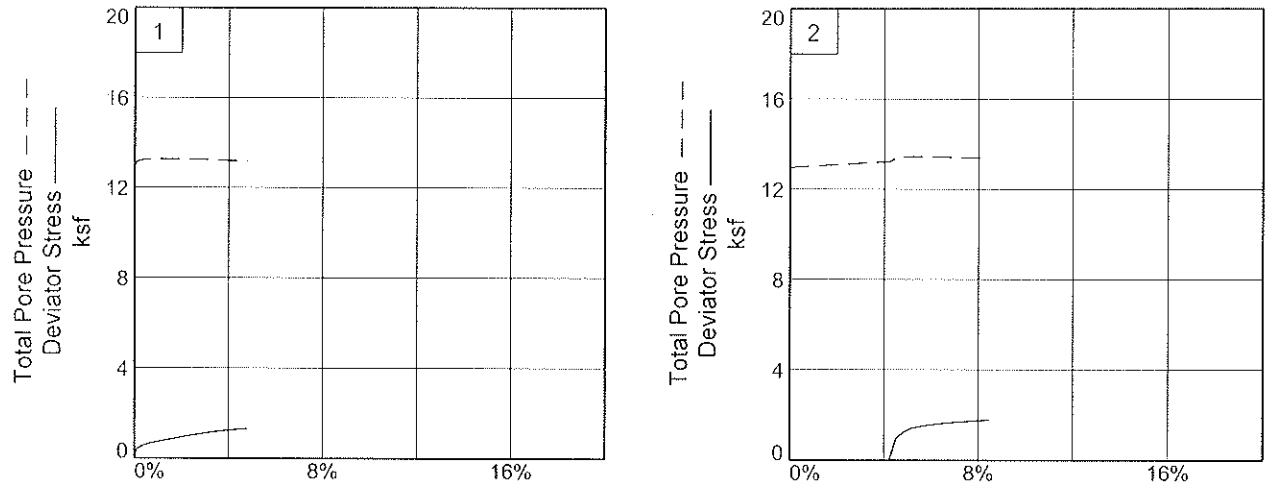
Location: 89+05,55'L

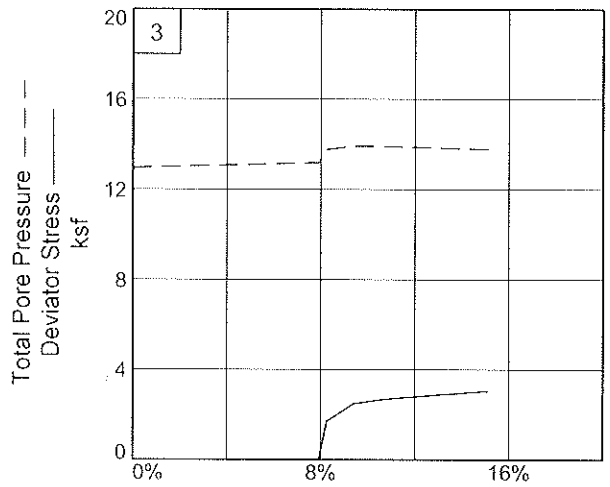
Sample Number: UD-3 **Depth:** 6.0-8.0 ft

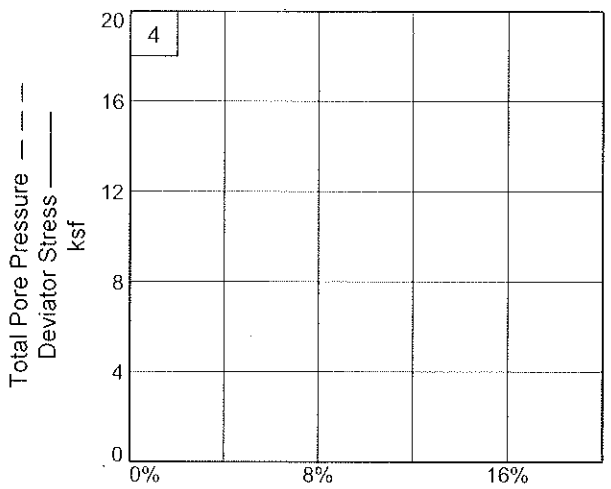
Proj. No.: 2015.0839.03 **Date Sampled:** 7/5/16

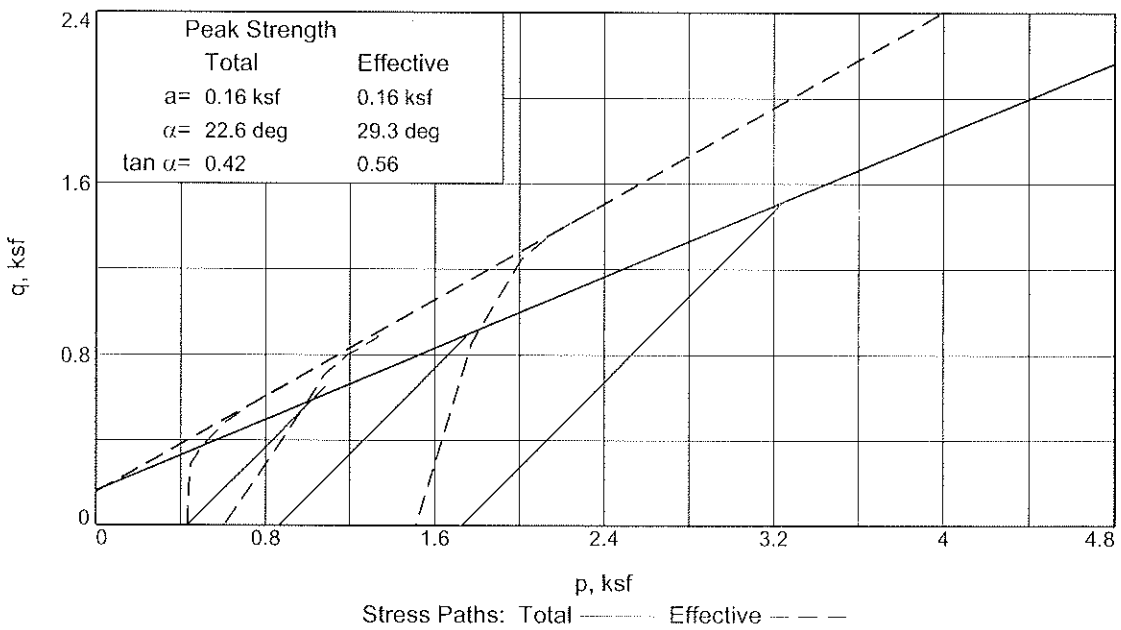
TRIAXIAL SHEAR TEST REPORT
United Consulting
Norcross, Georgia

Figure _____









Client: MICHAEL BAKER INTL.

Project: PI 0010385 SANDY SPRINGS CIRCLE STREETSCAPE

Location: 89+05,55'L **Depth:** 6.0-8.0 ft **Sample Number:** UD-3

Project No.: 2015.0839.03 **Figure** _____

United Consulting

Important Information About Your

Geotechnical Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

The following information is provided to help you manage your risks.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you* — should apply the report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual

subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report Is Subject to Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations" many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, a number of mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; ***none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.***

Rely, on Your ASFE-Member Geotechncial Engineer for Additional Assistance

Membership in ASFE/The Best People on Earth exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you ASFE-member geotechnical engineer for more information.

ASFE
The Best People on Earth

8811 Colesville Road/Suite G106, Silver Spring, MD 20910
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e-mail: info@asfe.org www.asfe.org

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IIGER06045.0M

REPORT

Retaining Wall Foundation Exploration (LRFD) – Walls C-1 and G Sandy Springs Circle Streetscape Phase II

P.I. No. 0010385 Fulton County Georgia

Project Number
2015.0839.03

August 4, 2016
Revision No. 0

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August 4, 2016

Ms. Beth Ann Schwartz
Michael Baker International
420 Technology Parkway, Suite 150
Norcross, Georgia 30092

Via Email: ***BSchwartz@mbakerintl.com***

PROJECT: Retaining Wall Foundation Exploration (LRFD)
Walls C1 and G
Sandy Springs Circle Streetscape Phase II
Sandy Springs Project No.: CC-0010, P.I. No. 0010385
Fulton County, Georgia
UC Project No. **2015.0839.03**

Dear Ms. Schwartz:

United Consulting is pleased to submit this Report of Retaining Wall Foundation Exploration for Walls C1 and G on this project. This report includes a summary of subsurface conditions and our recommendations in accordance with general format required by Georgia Department of Transportation (GDOT). We appreciate the opportunity to assist you with this project and look forward to working with you on future projects. If you have any questions regarding this report, or if we can be of further assistance, please feel free to contact us.

Sincerely,

UNITED CONSULTING

GEORGIA REGISTERED NO. 23121 PROFESSIONAL ENGINEER MEHDI MOAZZAMI

Mehdi Moazzami, Ph.D., P.E.
Senior Geotechnical Engineer

Chris L. Roberds, P.G.
Senior Executive Vice President

NP/MM/CLR/nj

http://ucblade10/sites/Geotechenv/5763/2015.0839.03/Geotechnical Documents/LFRD (C-1, G)/2015.0839.03.LRFD.docx

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Global Slope Stability Analysis – Wall G
Global Slope Stability Analysis – Area of Wall C-1 Un-shored During Construction

RETAINING WALL FOUNDATION EXPLORATION

Sandy Springs Circle Streetscape Phase II
Sandy Springs Project No.: CC-0010
Fulton County, P.I. No. 0010385
Revision No. 0

1. Location/ Description

The project is for the roadway improvement on Sandy Springs Circle in Fulton County, Georgia. One (1) concrete and one (1) parapet wall will be constructed in this project.

2. Geology

This project is geologically sited in the Factory Shoals Formation and Powers Ferry Formation of the Georgia Piedmont Region. The Factory Shoals Formation is intercalated light-gray, lustrous, garnet-biotite-oligoclase or muscovite-biotite-plagioclase metagraywacke, kyanite-quartz schist, and staurolite-muscovite quartz schist (fs). The Powers Ferry Formation is undifferentiated biotite-quartz-plagioclase gneiss, mica schist and amphibolites (pfu).

3. Subsurface Information

The boring at Station 78 + 10 encountered about 3 feet of fill. The fill consisted of sandy silt and traces clay and gravel.

Below the fill in the above referenced boring and below the surficial layers in borings drilled at Stations 79+45, 8+50, 81+00, 81+75, and 82+00 the borings encountered residual soils to boring terminative depth, top of Partially Weathered Rock (PWR), or auger refusal. The residual soils generally consisted of very stiff sandy silt or loose to very dense sand with varying amounts of silt, clay, and mica.

PWR was encountered in borings at Stations 80 + 50, 81 + 75, and 82 + 50 at depths of about 13 feet, 24 feet, and 22 feet, respectively. Lenses of PWR were also encountered in boring at Station 79 + 50 at depth from 7 to 8 feet and in boring at Station 81+00 from 4.5 to 8 feet and 13 to 22 feet.

Auger refusal indicating presence of rock or large boulders occurred in borings at Stations 79 + 45 Rt 45’, 79 + 50 Rt 48’, 81 + 00 Lt 77’, 81 + 75 Lt 75’, and 82 + 50 Lt 70’ at elevations of 1048 feet, 1051 feet, 1078.5 feet, 1083 feet, and 1080 feet, respectively.

Groundwater was not encountered in the borings at the time of drilling.

Please refer to the attached boring logs for detailed information.

4. Proposed Walls

The approximate stations and locations of the proposed retaining walls are presented in the following table.

Wall	Station to Station	Approximate Location	Type	Approximate Max. Wall Height (ft)
C-1	79+80.2 to 83+66.13	54'L	Concrete or Reconstructed Slope	18
G	78+00 to 80+63	44' to 78' R	Parapet	15

5. Soil Parameters for Retaining Wall

The following design parameters for foundation soils shall be used by the wall designer for bearing resistance computation in accordance with Section 11.10.5.4 of the AASHTO LRFD Design Manual, Seventh Edition, 2014:

Location	Parameters for Foundation Materials				Ultimate Sliding Friction Coefficient, μ
	Soil Type	γ (pcf)	ϕ (degrees)	C (psf)	
Wall C-1	Fill & Near Surface Residual	120	30	0	0.58
	Dense Residual	125	32°	0	0.62
	PWR	135	36°	0	0.73
	Rock	145	40°	0	0.84
Wall G	Fill or Residual	120	30°	0	0.58

6. Global Stability Analyses

The contractor shall be responsible for performing global stability analyses for each wall and submit all design calculations to the Department for their review. Internal Stability of the walls shall also be determined by the wall designer.

The slope stability computer software, SLIDE, developed by Rocscience, was used to evaluate the global stability at proposed Walls C1 and G. The SLIDE program evaluates factors of safety using the Janbu and Simplified Bishop methods. Traditional circular failure analyses were performed. A layered analysis was performed using soil parameters selected based on a comprehensive subsurface exploration and laboratory testing program as well as engineering judgment. Analyses were based on Steady State (long term) conditions, using effective soil parameters and considering improvement of the foundation soils due to the placement of the wall/embankment fill. Based on our analyses, all sections evaluated met or exceeded the acceptable safety factor of 1.33.

7. Groundwater

Groundwater was not encountered at the time of drilling. We do not anticipate that groundwater will be problematic for construction of the wall.

Drainage through the wall shall be included as part of the design and construction for all walls.

8. Temporary Shoring

Temporary shoring will be required to retain the existing embankment slope to allow excavation of the wall footing. For wall C-1, the embankment may be sloped back 1.5(H):1(V) in lieu of temporary shoring. Precautionary measures shall be taken by the contractor to limit the exposure of existing slope to inclement weather, surface runoff, etc., to prevent from potential sloughing, slope movement, safety hazards, etc, during construction.

9. Special Problems

1. Heavy traffic shall be anticipated along Sandy Springs Circle during rush hours. The contractor shall be made aware of this.

2. Both overhead and underground utilities exist along the main roads and across the wall alignments.

3. All temporary slopes should comply with applicable OSHA regulations.

4. A few businesses are located very closed to the construction limits of this project. Vibrations from the construction may cause some concern with property owners. We recommend that the Project Engineer contact Fulton County Department of Transportation prior to the construction to evaluate the need for crack surveys and vibration monitoring.

LIMITATIONS

This report is for the exclusive use of **Michael Baker, City of Sandy Springs, and Georgia Department of Transportation**, its agents, and the designers of the project described herein, and may only be applied to this specific project. Our conclusions and recommendations have been prepared using generally accepted standards of Geotechnical Engineering practice in the State of Georgia. No other warranty is expressed or implied. Our firm is not responsible for conclusions, opinions or recommendations of others.

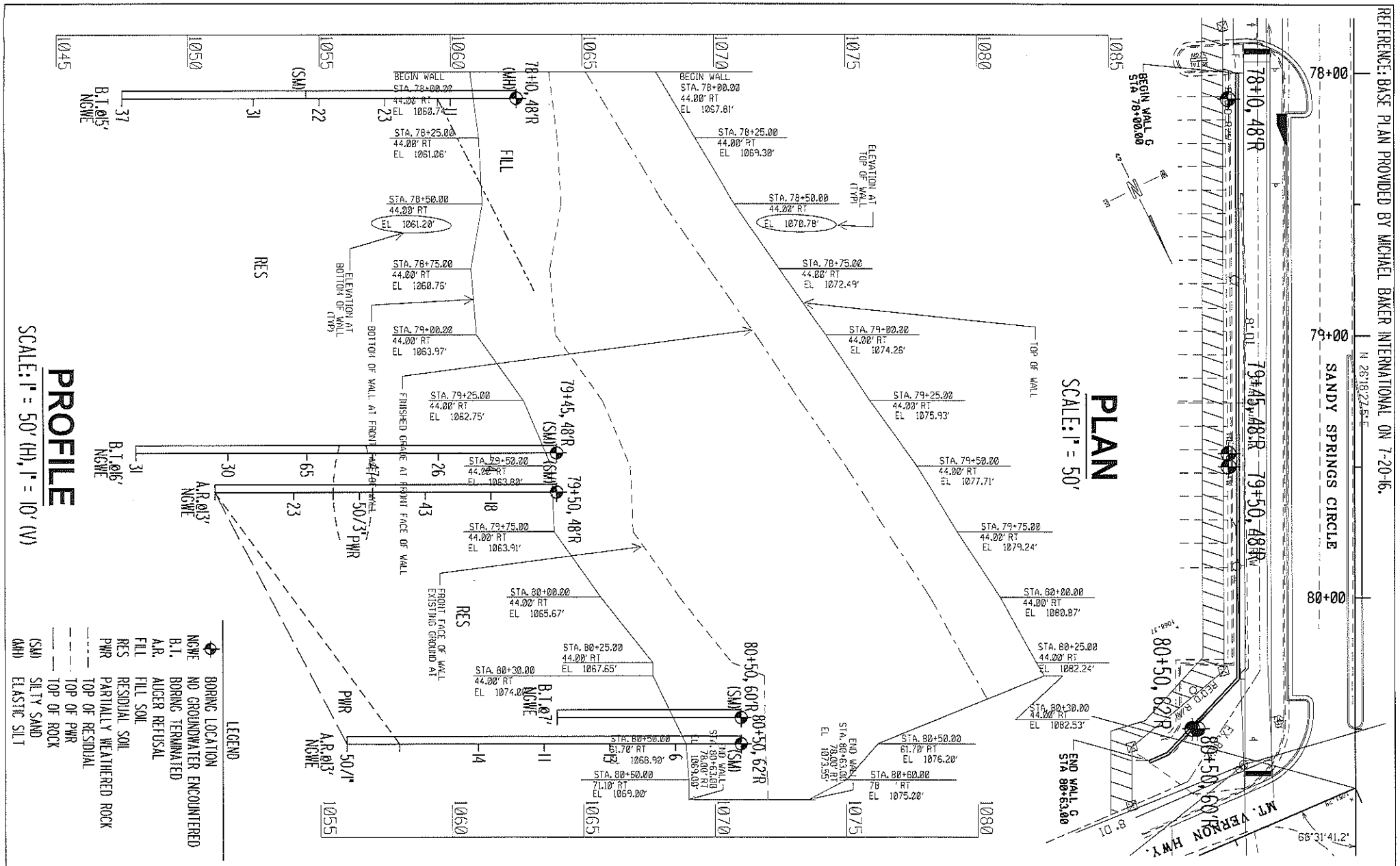
The scope of this evaluation was limited to an evaluation of the load-carrying capabilities and stability of the subsoils. Oil, hazardous waste, radioactivity, irritants, pollutants, molds, or other dangerous substance and conditions were not the subject of this study. Their presence and/or absence is not implied or suggested by this report, and should not be inferred.

Our conclusions and recommendations are based upon design information furnished us, data obtained from the previously described exploration and testing program and our past experience. They do not reflect variations in subsurface conditions that may exist intermediate of our borings and in unexplored areas of site. Should such variations become apparent during construction, it will be necessary to re-evaluate our conclusions and recommendations based upon "on-site" observations of the conditions.

If the design or location of the project is changed, the recommendations contained herein, must be considered invalid unless our firm reviews the changes and our recommendations are either verified or modified in writing.

Prepared By	Nhan Pham
Reviewed By	Mehdi Moazzami, P.E.
QC Reviewed By	Chris L. Roberds, P.G.

SCALE: NTS	DATE: 7/20/2016	PROJECT NO: 2015.0839.03	**TITLE: PROJECT LOCATION MAP** **SANDY SPRINGS CIRCLE STREETSCAPE** **FULTON COUNTY, P.I. NO. 0010385**	**FIG. A**
PREPARED: NP	CHECKED: NP	REVISIONS:		
CLIENT: MICHAEL BAKER		N	UNITED CONSULTING 625 Holcomb Bridge Road, Norcross, GA 30071 Tel. 770/209-0029 FAX 770/582-2900 www.unitedconsulting.com We're here for you UNITED CONSULTING	



SCALE: AS NOTED	DATE: 7-21-16	PROJECT NO: 2015.0839.03	TITLE: BORING PLAN & SUBSURFACE PROFILE - WALL G SANDY SPRINGS CIRCLE STREETSCAPE - PHASE II FULTON COUNTY - P.I. NO.: 0010385
PREPARED: VPV	CHECKED:	REVISIONS:	
CLIENT: MICHAEL BAKER			

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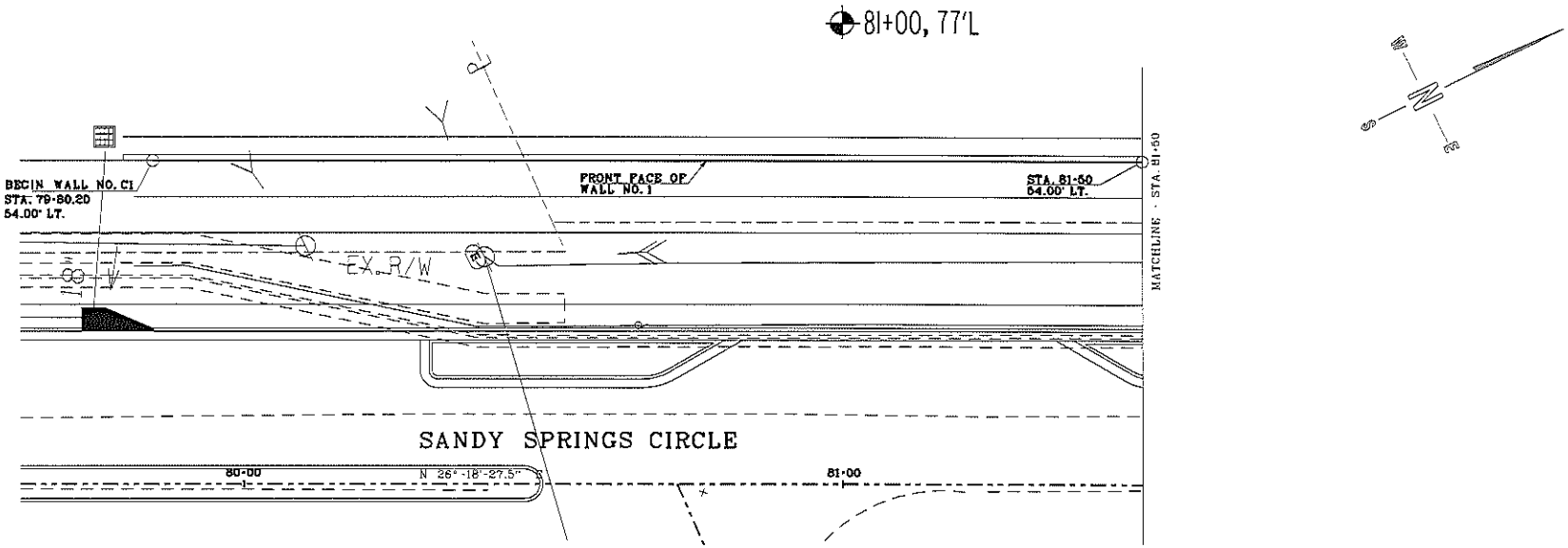
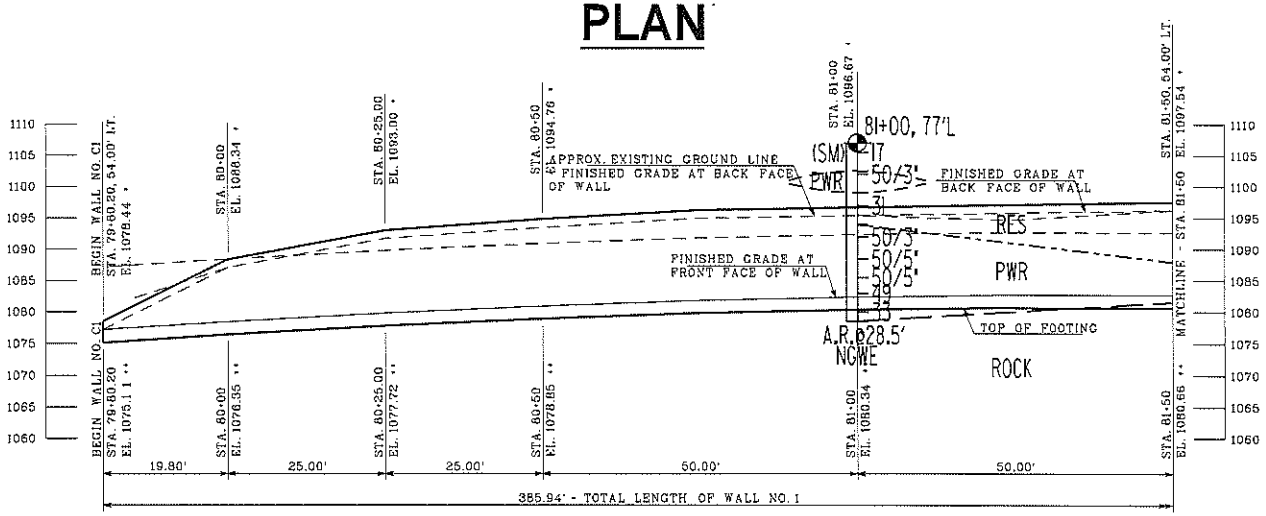
FIG. 1

REFERENCE: BASE PLAN PROVIDED BY MICHAEL BAKER INTERNATIONAL ON 7-20-16.



PLAN



PROFILE

LOOKING AT FRONT FACE

LEGEND

⊕	BORING LOCATION
NGWE	NO GROUNDWATER ENCOUNTERED
A.R.	AUGER REFUSAL
RES	RESIDUAL SOIL
PWR	PARTIALLY WEATHERED ROCK
----	TOP OF PWR
— —	TOP OF ROCK
(SM)	SILTY SAND

SCALE: 1" = 30'	DATE: 7-21-16	PROJECT NO: 2015.0839.03	TITLE: BORING PLAN & SUBSURFACE PROFILE - WALL C-1(PART I) SANDY SPRINGS CIRCLE STREETSCAPE - PHASE II FULTON COUNTY - P.I. NO.: 0010385
PREPARED: VPV	CHECKED:	REVISIONS:	
CLIENT: MICHAEL BAKER			

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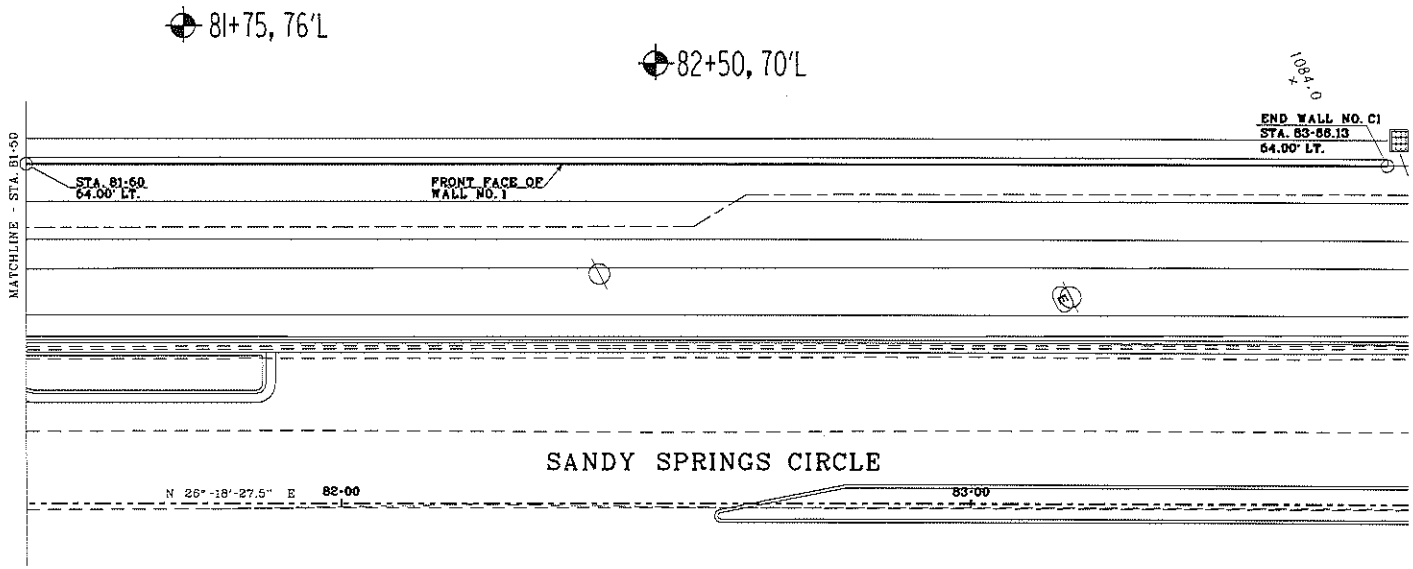
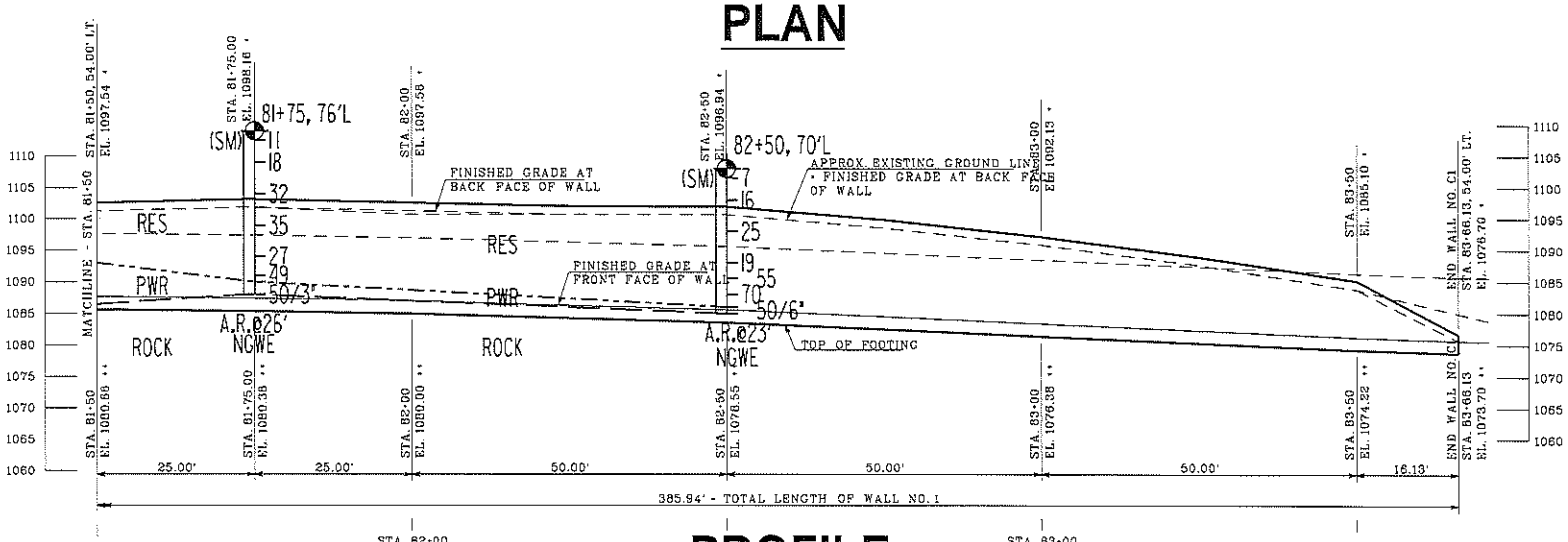
FIG. 2

REFERENCE: BASE PLAN PROVIDED BY MICHAEL BAKER INTERNATIONAL ON 7-20-16.



PLAN



PROFILE

LOOKING AT FRONT FACE

LEGEND

⊕	BORING LOCATION
NGWE	NO GROUNDWATER ENCOUNTERED
A.R.	AUGER REFUSAL
RES	RESIDUAL SOIL
PWR	PARTIALLY WEATHERED ROCK
- - - -	TOP OF PWR
— —	TOP OF ROCK
(SM)	SILTY SAND

SCALE: 1" = 30'	DATE: 7-21-16	PROJECT NO: 2015.0839.03	TITLE: BORING PLAN & SUBSURFACE PROFILE - WALL C-1 (PART 2) SANDY SPRINGS CIRCLE STREETSCAPE - PHASE II FULTON COUNTY - P.I. NO.: 0010385
PREPARED: VPV	CHECKED:	REVISIONS:	
CLIENT: MICHAEL BAKER			

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FIG. 3

APPENDIX A

General Notes/Description of Drilling Operations
Field Exploration Procedures
Boring Logs (8)

GENERAL NOTES

The soil classifications noted on the Boring Logs are visual classifications unless otherwise noted. Minor constituents of a soil sample are termed as follows:

Trace	0 - 10%
Some	11 - 35%
Suffix "y" or "ey"	36 - 49%

LEGEND

Split Spoon Sample obtained during Standard Penetration Testing

Relatively Undisturbed Shelby Tube Sample

Groundwater Level at Time of Boring Completion

Groundwater Level at 24 hours (or as noted) after Termination of Boring

w	Natural Moisture Content	
LL	Liquid Limit	
PL	Plastic Limit	Atterberg Limits
PI	Plasticity Index	
PF	Percent Fines (Percent Passing #200 Sieve)	
γ_d	Dry Unit Weight (Pounds per Cubic Foot or PCF	
γ_m	Moist or In-Situ Unit Weight (PCF)	
γ_{sat}	Saturated Unit Weight (PCF)	

BORING LOG DATA AND NARRATIVE OF DRILLING OPERATIONS

The test borings were made by mechanically advancing helical hollow stem augers into the ground. Samples were covered at regular intervals in each of the borings following established procedures for performing the Standard Penetration Test in accordance with ASTM Specification D-1586. Soil samples were obtained with a standard 1.4" I.D. x 2.0" O.D. split barrel sampler. The sampler is first seated 6" to penetrate any loose cuttings and then driven an additional foot with the blows of a 140 pound hammer freely falling a distance of 30". The number of blows required to drive the sampler each six inches is recorded on the Boring Logs. The total number of blows required to drive the sampler the final foot is designated the "standard penetration resistance." This driving resistance, known as the "N" value, is a measure of the relative density of granular soils and is an indication of the consistency of cohesive deposits.

The Following table describes soil consistencies and relative densities based on standard-penetration resistance values (N) determined by the Standard Penetration Test.

	"N"	Consistency
	0-2	Very Soft
	3-4	Soft
	5-8	Firm
Clay and Silt	9-15	Stiff
	16-30	Very Stiff
	Over 31	Hard

	"N"	Relative Density
	0-4	Very Loose
	5-10	Loose
	11-19	Firm
Sand	20-29	Medium Dense
	30-49	Dense
	50+	Very Dense

FIELD EXPLORATION PROCEDURES
SOIL BORINGS

Seven (7) SPT borings were drilled near/along the proposed walls. The depths of SPT borings ranged from 13 to 28.5 feet below the existing grades. Also, one boring was drilled to a depth of 7 feet to obtain undisturbed sample. The approximate locations of the borings and subsurface profiles are shown on the attached Boring Location Plan and Subsurface Profile (Figures 1, 2, and 3) provided in Appendix of this report.

Boring locations were established in the field by the Project Engineer with use of measuring tape, provided plan, and compass from the proposed road centerline and existing site features. The drilling and sampling were performed in general accordance with ASTM Standard D-1586. Soil samples obtained were observed by a Geotechnical Engineer and classified according to the visual manual procedures (ASTM D-2488). A narrative of field operations is also included in The Appendix.

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(770)209-0029, FAX (770)582-2800

BORING LOG

CONTRACTED WITH: MICHAEL BAKER
BORING NO.: 78+10, 48'R
PROJECT NAME: SANDY SPRINGS CIRCLE STREETSCAPE PHASE II
DATE: 6/29/2016
JOB NO.: 2015.0839.03 DRILLER: CALEB RIG: GEOPROBE LOGGED BY: RJ

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	2" Asphalt	0						Wall G
	Silt-sandy, trace clay and gravel; stiff; brown (Fill) (MH)		1		2-4-7	14	19.7	LL=60, PI=27
BOF=1060 1060								
	Silt-sandy, trace clay and gravel; medium dense; very stiff; brown (Residual) (MH)	5	2		8-10-13	18	19.5	LL=54, PI=18
	-some mica; reddish brown		3		8-11-11	18		
1055								
	Sand-silty, trace clay and gravel; dense; brown (SM)	10	4		8-15-16	18		
1050								
		15	5		15-17-20	12		
	BORING TERMINATED AT 15 FEET.							No groundwater encountered at the time of drilling.
1045								
		20						
1040								
		25						
1035								
		30						
1030								
		35						LL = Liquid Limit PI = Plasticity Index
1025								
		40						BOF = Bottom of Footing Fulton County PI No. 0010385

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625 HOLCOMB BRIDGE ROAD
NORCROSS, GEORGIA 30071
(770)209-0029, FAX (770)582-2800

BORING LOG

CONTRACTED WITH: MICHAEL BAKER
BORING NO.: 79+45, 48'R
PROJECT NAME: SANDY SPRINGS CIRCLE STREETSCAPE PHASE II
DATE: 6/29/2016
JOB NO.: 2015.0839.03 DRILLER: CALEB RIG: GEOPROBE LOGGED BY: RJ

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
1065	2" Asphalt	0						Wall G
BOF=1062	Sand-silty, some clay, trace mica; firm; brown (Residual) (SM)		1		6-7-7	12		
1060	-trace gravel; medium dense	5	2		5-12-14	18	13.0	LL=40, PI=13
	-trace clay; dense; purple		3		22-27-20	12		
1055	-very dense	10	4		30-33-32	12		
	-dense; tan		5		13-14-16	14		
1050		15	6		20-20-11	14		
	AUGER REFUSAL AT 16 FEET.							No groundwater encountered at the time of drilling.
1045		20						
1040		25						
1035		30						
1030		35						LL = Liquid Limit PI = Plasticity Index
1025		40						BOF = Bottom of Footing Fulton County PI No. 0010385

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BORING LOG

CONTRACTED WITH: MICHAEL BAKER
BORING NO.: 79+50, 48'R
PROJECT NAME: SANDY SPRINGS CIRCLE STREETSCAPE PHASE II
DATE: 6/29/2016
JOB NO.: 2015.0839.03 DRILLER: CALEB RIG: GEOPROBE LOGGED BY: RJ

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
1065	2" Asphalt	0						Wall G
BOF=1062	Sand-silty, some clay, trace gravel and mica; firm; brown (Residual) (SM)		1		4-8-10	12		
1060	-dense	5	2		16-21-22	16		
			3		25-45-50/3	12		
	Partially weathered rock sampled as: sand-silty, trace clay and mica; very dense; tan							
1055		10	4		9-11-12	18	24.5	LL=55, PI=21
	Sand-silty, trace clay and gravel; medium dense; red and brown (Residual) (SM)							
	AUGER REFUSAL AT 13 FEET.							No groundwater encountered at the time of drilling.
1050		15						
1045		20						
1040		25						
1035		30						
1030		35						LL = Liquid Limit PI = Plasticity Index
1025		40						BOF = Bottom of Footing Fulton County PI No. 0010385

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BORING LOG

CONTRACTED WITH: MICHAEL BAKER
BORING NO.: 80+50, 60'R
PROJECT NAME: SANDY SPRINGS CIRCLE STREETSCAPE PHASE II
DATE: 6/29/2016
JOB NO.: 2015.0839.03 DRILLER: CALEB RIG: GEOPROBE LOGGED BY: RJ

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	2" Asphalt	0						Wall G
1070	Straight Auger to 5 feet.							
BOF=1069		5						
1065	Sand-some silt, trace clay; brown (Residual) (SM)		1				22.0	Undisturbed sample obtained from 5' to 7'. LL=56, PI=19
	BORING TERMINATED AT 7 FEET.							No groundwater encountered at the time of drilling.
		10						
1060								
		15						
1055								
		20						
1050								
		25						
1045								
		30						
1040								
		35						LL = Liquid Limit
1035								PI = Plasticity Index
								BOF = Bottom of Footing
		40						Fulton County
								PI No. 0010385
1030								

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BORING LOG

CONTRACTED WITH: MICHAEL BAKER
BORING NO.: 80+50, 62'R
PROJECT NAME: SANDY SPRINGS CIRCLE STREETSCAPE PHASE II
DATE: 6/29/2016
JOB NO.: 2015.0839.03 DRILLER: CALEB RIG: GEOPROBE LOGGED BY: RJ

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	2" Asphalt	0						Wall G
1070	Sand-some silt and clay; loose; brown (Residual) (SM)		1		2-3-3	10		
BOF=1069	-firm	5	2		4-6-7	14		
1065	-trace clay; red and brown		3		4-5-6	18	25.4	LL=56, PI=15
		10	4		4-6-8	18		
1060								
	Partially weathered rock sampled as: sand-some silt, trace clay; very dense; brown	15	5		50/1	1		
1055	BORING TERMINATED AT 15 FEET.							No groundwater encountered at the time of drilling.
		20						
1050								
		25						
1045								
		30						
1040								
		35						LL = Liquid Limit
1035								PI = Plasticity Index
		40						BOF = Bottom of Footing Fulton County PI No. 0010385

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BORING LOG

CONTRACTED WITH: MICHAEL BAKER
BORING NO.: 81+00, 77'L
PROJECT NAME: SANDY SPRINGS CIRCLE STREETSCAPE PHASE II
DATE: 6/30/2016
JOB NO.: 2015.0839.03
DRILLER: CALEB
RIG: GEOPROBE
LOGGED BY: RJ

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	5" Topsoil	0						Wall C-1
	Sand-silty, some gravel, trace clay and mica; firm; brown (Residual) (SM)		1		1-2-15	10	6.3	LL=29, PI=5
1105								
			2		5-25-50/3	12		
	Partially weathered rock sampled as: sand-silty, trace clay and mica; very dense; brown	5						
1100								
	Sand-silty, some mica, trace clay and gravel; dense; brown (Residual) (SM)		3		7-12-19	16	8.2	LL=NV, PI=NP
		10						
1095								
	Partially weathered rock sampled as: sand-silty, trace clay and gravel; very dense; dark brown (SM)		4		50/3	2		
		15						
1090			5		50/5	4	7.6	LL=NV, PI=NP
		20						
			6		20-50/5	5		
1085								
	Sand-some silt, trace clay; dense; tan (Residual)		7		14-20-29	12		
		25						
BOF=1080			8		12-13-20	12		
1080								
	AUGER REFUSAL AT 28.5 FEET.	30						No groundwater encountered at the time of drilling.
1075								
		35						LL = Liquid Limit PI = Plasticity Index
1070								
		40						BOF = Bottom of Footing Fulton County PI No. 0010385

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BORING LOG

CONTRACTED WITH: MICHAEL BAKER
BORING NO.: 81+75, 76'L
PROJECT NAME: SANDY SPRINGS CIRCLE STREETSCAPE PHASE II
DATE: 6/30/2016
JOB NO.: 2015.0839.03 DRILLER: CALEB RIG: GEOPROBE LOGGED BY: RJ

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
1110	4" Topsoil	0						Wall C-1
	Sand-silty, trace clay and mica; firm; brown (Residual) (SM)		1		2-3-8	14		
1105	-some clay, trace gravel; tan	5	2		7-8-10	18	11.7	LL=41, PI=12
1100	-some mica, trace clay; dense; gray	10	3		8-12-20	18		
1095	-tan	15	4		17-16-19	14		
1090	-medium dense; brown	20	5		5-10-17	12	11.0	LL=36, PI=10
	-dense		6		15-20-29	12		
1085	Partially weathered rock sampled as: sand-some silt, trace clay; very dense; tan	25	7		50/3	2		
	AUGER REFUSAL AT 26 FEET.							No groundwater encountered at the time of drilling.
BOF=1080 1080		30						
1075		35						LL = Liquid Limit PI = Plasticity Index
1070		40						BOF = Bottom of Footing Fulton County PI No. 0010385

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BORING LOG

CONTRACTED WITH: MICHAEL BAKER
BORING NO.: 82+50, 70'L
PROJECT NAME: SANDY SPRINGS CIRCLE STREETSCAPE PHASE II
DATE: 6/30/2016
JOB NO.: 2015.0839.03 DRILLER: CALEB RIG: GEOPROBE LOGGED BY: RJ

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	4" Topsoil	0						Wall C-1
	Sand-silty, trace clay and mica; loose; brown (Residual) (SM)		1		2-3-4	12		
1100	-firm; tan	5	2		6-8-8	12		
1095	-some gravel; medium dense; brown	10	3		15-12-13	16	12.3	LL=43, PI=12
1090	-firm; red and brown	15	4		8-8-11	16	7.8	LL=NV, PI=NP
	-very dense; tan		5		16-22-33	18		
1085		20	6		21-30-40	14		
			7		20-41-50/6	12		
1080	Partially weathered rock sampled as: sand-some silt, trace clay; very dense; tan	25						No groundwater encountered at the time of drilling.
BOF=1078	AUGER REFUSAL AT 23 FEET.							
1075		30						
1070		35						LL = Liquid Limit PI = Plasticity Index
1065		40						BOF = Bottom of Footing Fulton County PI No. 0010385

APPENDIX B

Laboratory Testing Procedures
Summary of USCS Tests (4 Pages)
Particle Size Distribution Report (1)
Consolidation Test Report (1)

LABORATORY TESTING PROCEDURES

Moisture Content

The moisture content was determined for selected soil samples obtained in the split-barrel sampler. A representative portion of each sample was weighed and then placed in an oven and dried at 110 degrees Centigrade for at least 15 to 16 hours. After removal from the oven, the soil was again weighed. The weight of the moisture lost during drying thus was determined. From this data, the moisture content of the sample was then calculated as the weight of moisture divided by dry weight of soil, expressed as a percentage. This test was conducted according to ASTM D 2216.

Moisture content is a useful index of a soil's compressibility. If the soil is to be used as fill, the moisture content may be compared to the range of water contents for which proper compaction may be achieved. The moisture content results are indicated on the boring logs attached and on the Summary of USCS Tests.

Unified Soil Classification System (USCS)

Soils to be classified as per Unified Soil classification System (USCS) are generally required to perform grain size analysis (particle size distribution), liquid limit and plasticity index tests when precise classification is required. After performing the required tests, the classification is generally performed in accordance with ASTM D 2487. These classification tests are also required by GDOT in the areas of construction of new pavement over existing paved shoulders, areas of muck, swamp, lake/pond bottom, etc.

Grain Size (Sieve) Analysis with or without Hydrometer

Grain Size Analysis tests were performed to determine the particle size distribution of selected samples tested. The grain size distribution of soils coarser than a number 200 sieve was determined by passing the samples through a standard set of nested sieves. Materials finer than the number 200 sieves were suspended in water and the grain size distribution computed from the time rate of settlement of the different size particles. Air-dried soil passed through #200 sieve. 50 grams of that must soak in s/c agent for a minimum of 8 hours. Soil is then put in graduated cylinder with a hydrometer. Readings are taken at specified times. A graph is drawn from data. These tests were similar to those described by ASTM D 421 and D 422. The data obtained are summarized on the enclosed Summary of USCS Test Data.

Liquid and Plastic Limits (Atterberg Limits)

Liquid Limit and Plastic Limit tests aid in the classification of the soils and provide an indication of the soil behavior with moisture change. The Plasticity Index is calculated by subtracting the Plastic Limit (PL) from the Liquid Limit (LL). The Liquid Limit is the moisture content at which the soil will flow as a heavy viscous fluid and is the upper limit of the plastic range, as determined in accordance with ASTM D 4318. The Plastic Limit is the moisture content at which the soil begins to lose its plasticity, as determined in accordance with ASTM D 4318. The Liquidity Index is the ratio of the difference between the in-place moisture and the plastic limit to the Plasticity Limit. The data obtained are summarized on the enclosed Summary of USCS Test Data.

Consolidation

A section of a selected undisturbed sample was extruded from its sampling tube for consolidation testing. The section was trimmed into a disc 2.5 inches in diameter and 1.0 inch thick. The disc was confined in a stainless steel ring and sandwiched between porous stone plates. After being submerged in water, the sample was then subjected to incrementally increasing vertical loads and the resulting deformations measured with a micrometer dial gauge. This test procedure is described by ASTM D 2435.

SUMMARY OF USCS TESTS

Project No.: 2015.0839.03
Project Name: Sandy Springs Circle Streetscape

Sandy Springs Project No.: CC – 0010
P.I. No.: 0010385
County: Fulton

Sample No.	1	2	3	4
Lab Sample No.	4	5	6	7
Station	78 + 10, 48'R	78 + 10, 48'R	79 + 45, 48'R	79 + 50, 48'R
Location	Wall G	Wall G	Wall G	Wall G
Depth (ft)	1.0 – 2.5	3.5 – 5.0	3.5 – 5.0	8.5 – 10.0
PHYSICAL TESTS				
2-1/2" Sieve	100	100	100	100
1-1/2" Sieve	100	100	100	100
#10 Sieve	97.1	93.2	91.9	92.2
#40 Sieve	81.1	76.0	60.4	67.8
#60 Sieve	72.7	68.5	49.9	61.1
#200 Sieve	57.0	51.5	31.4	43.3
Liquid Lmt. (%)	60	54	40	55
Plast. Index (%)	27	18	13	21
Moisture (%)	19.7	19.5	13.0	24.5
Organics (%)	-	-	-	-
Unified Soil Classification	MH	MH	SM	SM
TESTING DATES				
Date Sampled	6/29/2016	6/29/2016	6/29/2016	6/29/2016
Date Completed	7/12/2016	7/12/2016	7/12/2016	7/12/2016
Date Received	7/19/2016	7/19/2016	7/19/2016	7/19/2016

Remarks: _____

Respectfully Submitted: Mahnand Salilli

SUMMARY OF USCS TESTS

Project No.: 2015.0839.03
Project Name: Sandy Springs Circle Streetscape

Sandy Springs Project No.: CC – 0010
P.I. No.: 0010385
County: Fulton

Sample No.	5	6	7	8
Lab Sample No.	UD-1	9	10	11
Station	80 + 50, 60'R	80 + 50, 62'R	81 + 00, 77'L	81 + 00, 77'L
Location	Wall G	Wall G	Wall C-1	Wall C-1
Depth (ft)	5.0 – 7.0	6.0 – 7.5	0 – 1.5	8.5 – 10.0
PHYSICAL TESTS				
2-1/2" Sieve	100	100	100	100
1-1/2" Sieve	100	100	100	100
#10 Sieve	97.3	96.9	65.9	73.3
#40 Sieve	73.3	74.7	39.3	43.7
#60 Sieve	61.2	64.9	32.5	36.4
#200 Sieve	39.6	44.2	20.6	23.7
Liquid Lmt. (%)	56	56	29	NV
Plast. Index (%)	19	15	5	NP
Moisture (%)	23.2	25.4	6.3	8.2
Organics (%)	-	-	-	-
Unified Soil Classification	SM	SM	SM	SM
TESTING DATES				
Date Sampled	6/30/2016	6/30/2016	6/30/2016	6/30/2016
Date Completed	7/12/2016	7/5/2016	7/12/2016	7/12/2016
Date Received	7/19/2016	7/19/2016	7/19/2016	7/19/2016

Remarks: _____

Respectfully Submitted: Mahvand Salehi

SUMMARY OF USCS TESTS

Project No.: 2015.0839.03
Project Name: Sandy Springs Circle Streetscape

Sandy Springs Project No.: CC – 0010
P.I. No.: 0010385
County: Fulton

Sample No.	9	10	11	12
Lab Sample No.	12	13	14	15
Station	81 + 00, 77'L	81 + 75, 76'L	81 + 75, 76'L	82 + 50, 70'L
Location	Wall C-1	Wall C-1	Wall C-1	Wall C-1
Depth (ft)	17.0 – 18.5	3.5 – 5.0	18.5 – 20.0	8.5 – 10.0
PHYSICAL TESTS				
2-1/2" Sieve	100	100	100	100
1-1/2" Sieve	100	100	100	100
#10 Sieve	85.0	78.9	84.0	92.7
#40 Sieve	50.8	49.4	51.5	63.2
#60 Sieve	42.1	41.0	42.0	53.3
#200 Sieve	26.7	27.7	24.0	31.4
Liquid Lmt. (%)	NV	41	36	43
Plast. Index (%)	NP	12	10	12
Moisture (%)	7.6	11.7	11.0	12.3
Organics (%)	-	-	-	-
Unified Soil Classification	SM	SM	SM	SM
TESTING DATES				
Date Sampled	6/30/2016	6/30/2016	6/30/2016	6/30/2016
Date Completed	7/12/2016	7/12/2016	7/12/2016	7/12/2016
Date Received	7/19/2016	7/19/2016	7/19/2016	7/19/2016

Remarks: _____

Respectfully Submitted: Mahvand Salehi

SUMMARY OF USCS TESTS

Project No.: 2015.0839.03
Project Name: Sandy Springs Circle Streetscape

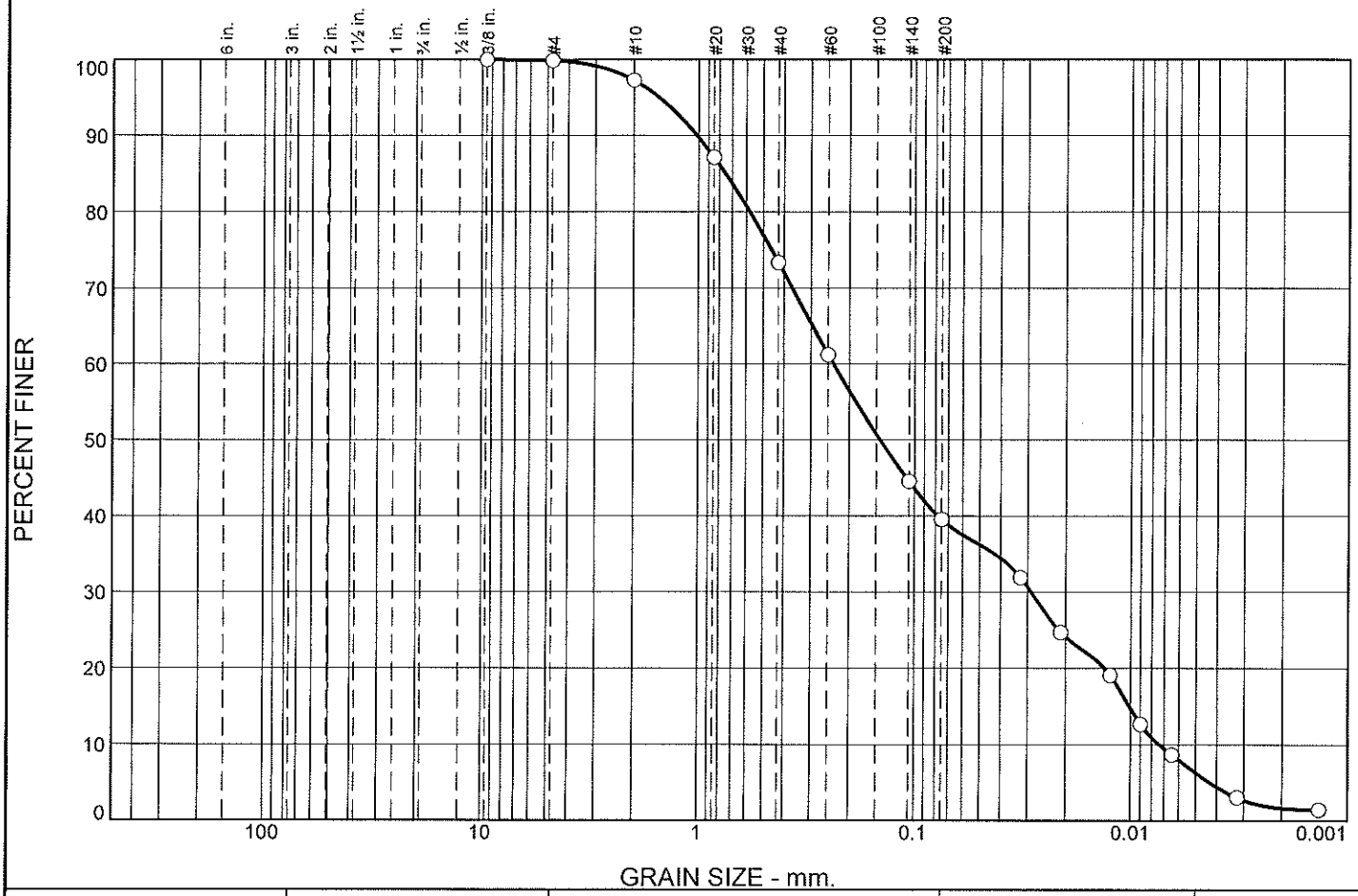
Sandy Springs Project No.: CC – 0010
P.I. No.: 0010385
County: Fulton

Sample No.	13			
Lab Sample No.	16			
Station	82 + 50, 70'L			
Location	Wall C-1			
Depth (ft)	13.5 – 15.0			
PHYSICAL TESTS				
2-1/2" Sieve	100			
1-1/2" Sieve	100			
#10 Sieve	84.4			
#40 Sieve	52.2			
#60 Sieve	42.4			
#200 Sieve	23.6			
Liquid Lmt. (%)	NV			
Plast. Index (%)	NP			
Moisture (%)	7.8			
Organics (%)	-			
Unified Soil Classification	SM			
TESTING DATES				
Date Sampled	6/30/2016			
Date Completed	7/12/2016			
Date Received	7/19/2016			

Remarks: _____

Respectfully Submitted: Mahvand Salehi

Particle Size Distribution Report



% +3"	% Gravel	% Sand	% Silt	% Clay
0.0	0.1	60.3	33.3	6.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375	100.0		
#4	99.9		
#10	97.3		
#20	87.1		
#40	73.3		
#60	61.2		
#140	44.6		
#200	39.6		

* (no specification provided)

Material Description

Sand, some silt, trace clay and gravel, purple

Atterberg Limits

PL= 37 LL= 56 PI= 19

Coefficients

D_{90}= 1.0198 D_{85}= 0.7513 D_{60}= 0.2367
D_{50}= 0.1443 D_{30}= 0.0289 D_{15}= 0.0101
D_{10}= 0.0074 C_u= 31.97 C_c= 0.48

Classification

USCS= SM AASHTO= A-7-5(4)

Remarks

Location: 80+50,60'R
Sample Number: UD-1 **Depth:** 5.0-7.0 ft **Date:** 7/5/16

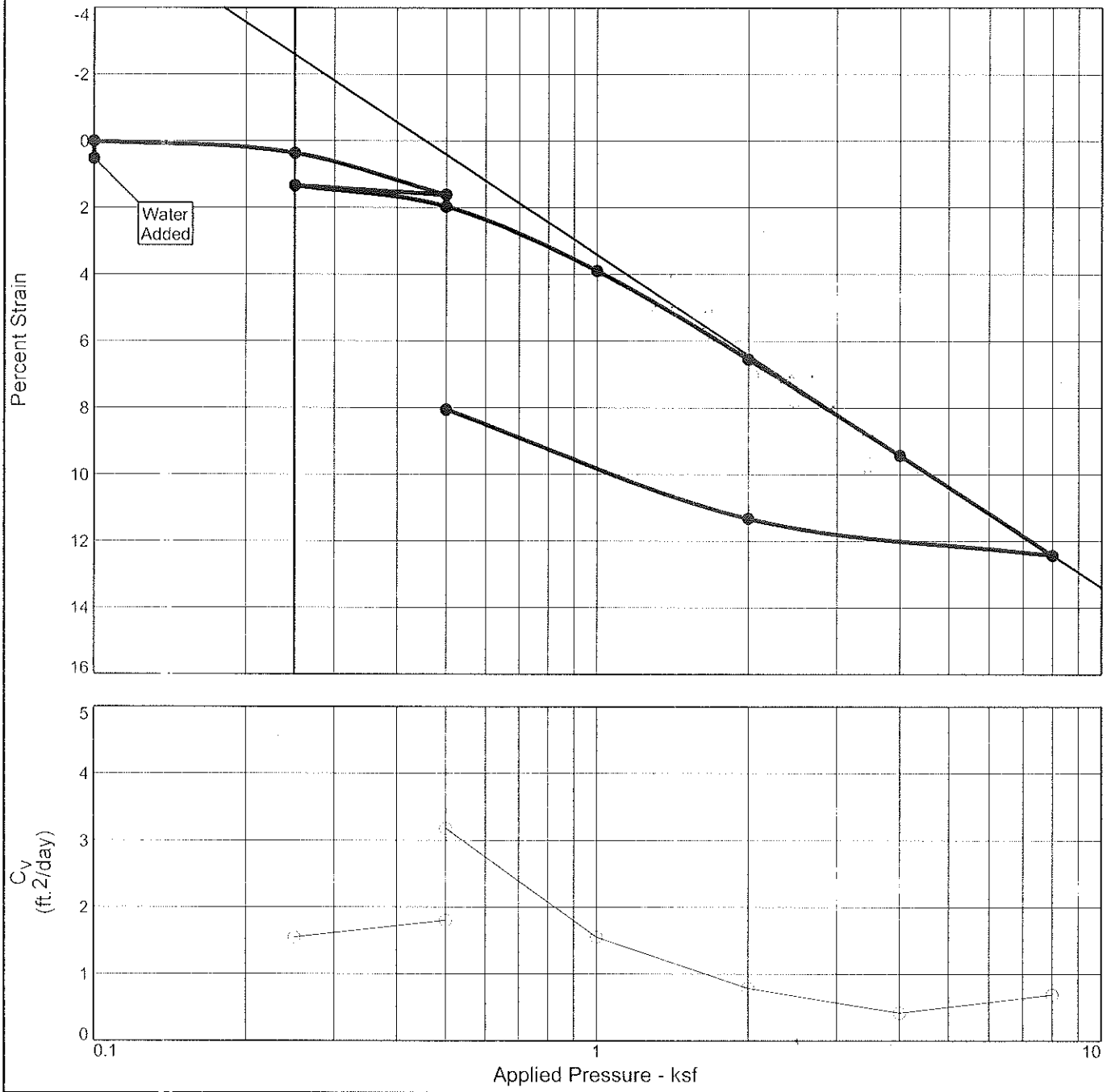
United Consulting

Norcross, Georgia

Client: MICHAEL BAKER INTL.
Project: PI 0010385 SANDY SPRINGS CIRCLE STREETSCAPE

Project No: 2015.0839.03 **Figure**

CONSOLIDATION TEST REPORT-METHOD B



Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_r	Initial Void Ratio
58.8 %	22.0 %	83.1	56	19	2.65	0.5	0.5	0.20	0.05	0.990

MATERIAL DESCRIPTION	USCS	AASHTO
Sand, some silt, trace clay and gravel, purple	SM	A-7-5(4)

Project No. 2015.0839.03 **Client:** MICHAEL BAKER INTL.

Project: PI 0010385 SANDY SPRINGS CIRCLE STREETSCAPE

Location: 80+50,60'R **Depth:** 5.0-7.0 ft **Sample Number:** UD-1

Remarks:

United Consulting

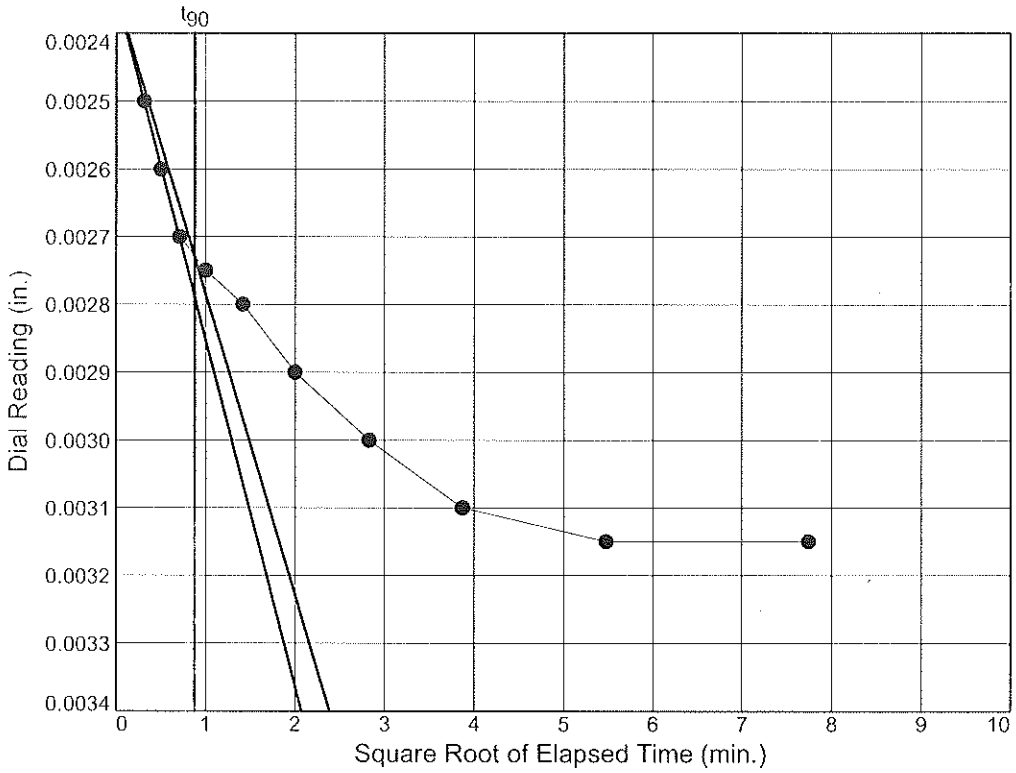
Norcross, Georgia

Figure

Dial Reading vs. Time

Project No.: 2015.0839.03
Project: PI 0010385 SANDY SPRINGS CIRCLE STREETSCAPE

Location: 80+50,60'R Depth: 5.0-7.0 ft Sample Number: UD-1



Load No.= 3

Load= 0.25 ksf

D_0 = 0.0023

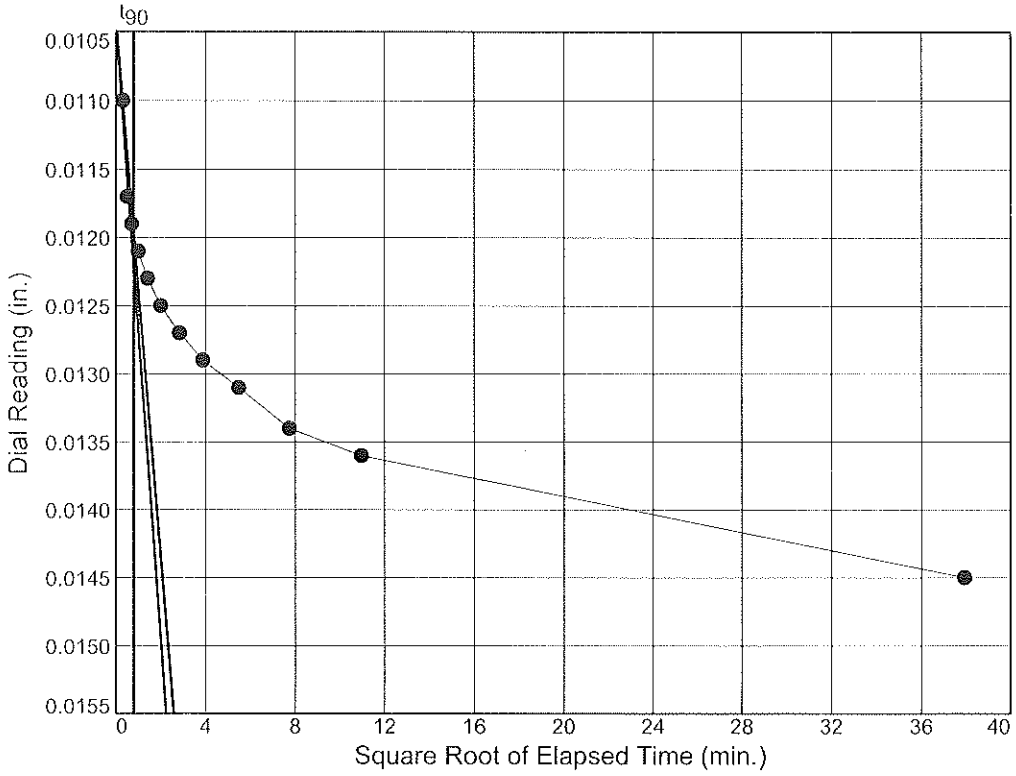
D_{90} = 0.0027

D_{100} = 0.0028

T_{90} = 0.77 min.

C_v @ T_{90}

1.547 ft.^{2}/day



Load No.= 4

Load= 0.50 ksf

D_0 = 0.0104

D_{90} = 0.0120

D_{100} = 0.0121

T_{90} = 0.64 min.

C_v @ T_{90}

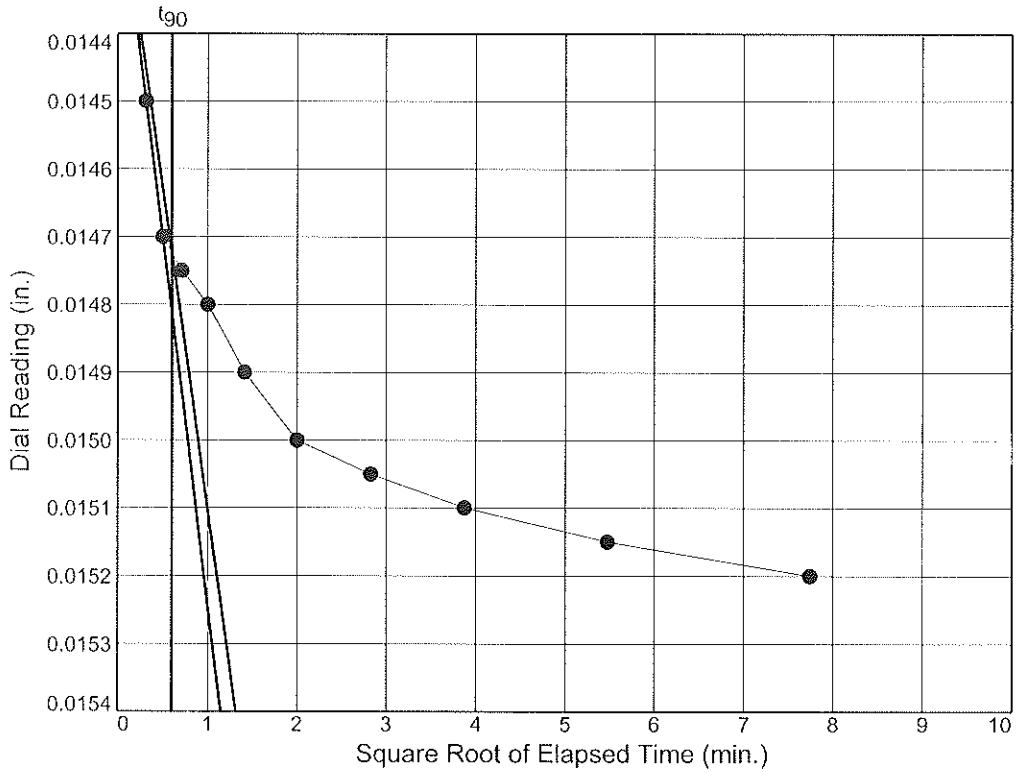
1.800 ft.^{2}/day

Figure

Dial Reading vs. Time

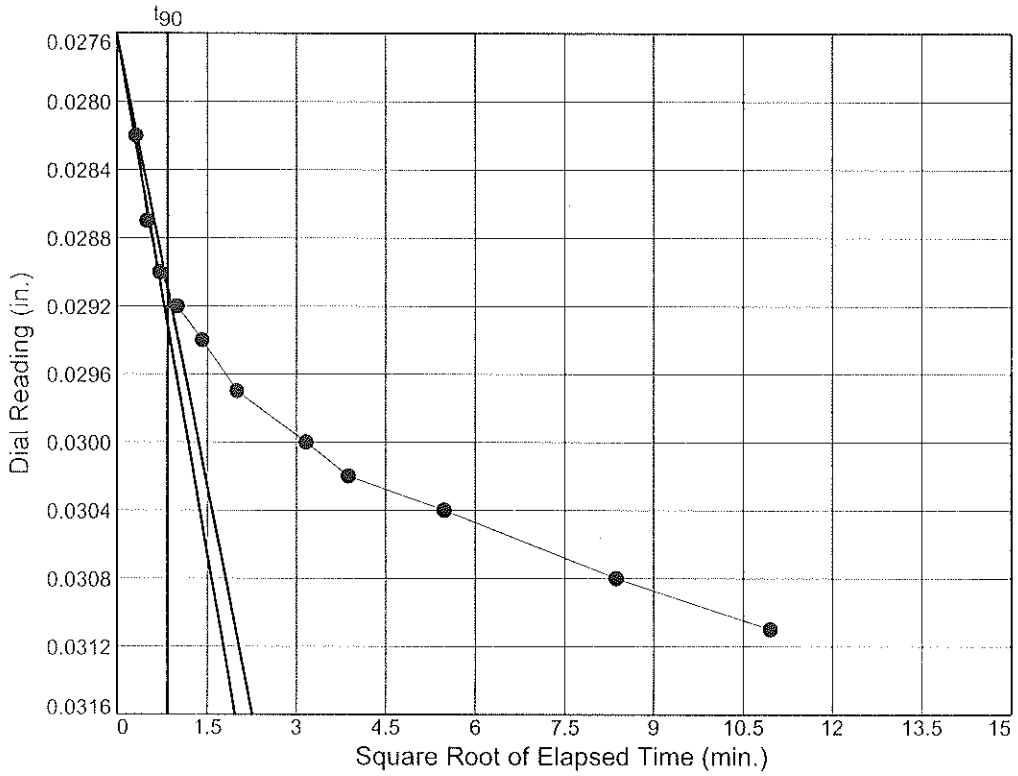
Project No.: 2015.0839.03
Project: PI 0010385 SANDY SPRINGS CIRCLE STREETSCAPE

Location: 80+50,60'R Depth: 5.0-7.0 ft Sample Number: UD-1



Load No.= 6
Load= 0.50 ksf
D_0 = 0.0142
D_{90} = 0.0147
D_{100} = 0.0148
T_{90} = 0.36 min.

C_v @ T_{90}
3.175 ft.^{2}/day



Load No.= 7
Load= 1.00 ksf
D_0 = 0.0276
D_{90} = 0.0291
D_{100} = 0.0293
T_{90} = 0.71 min.

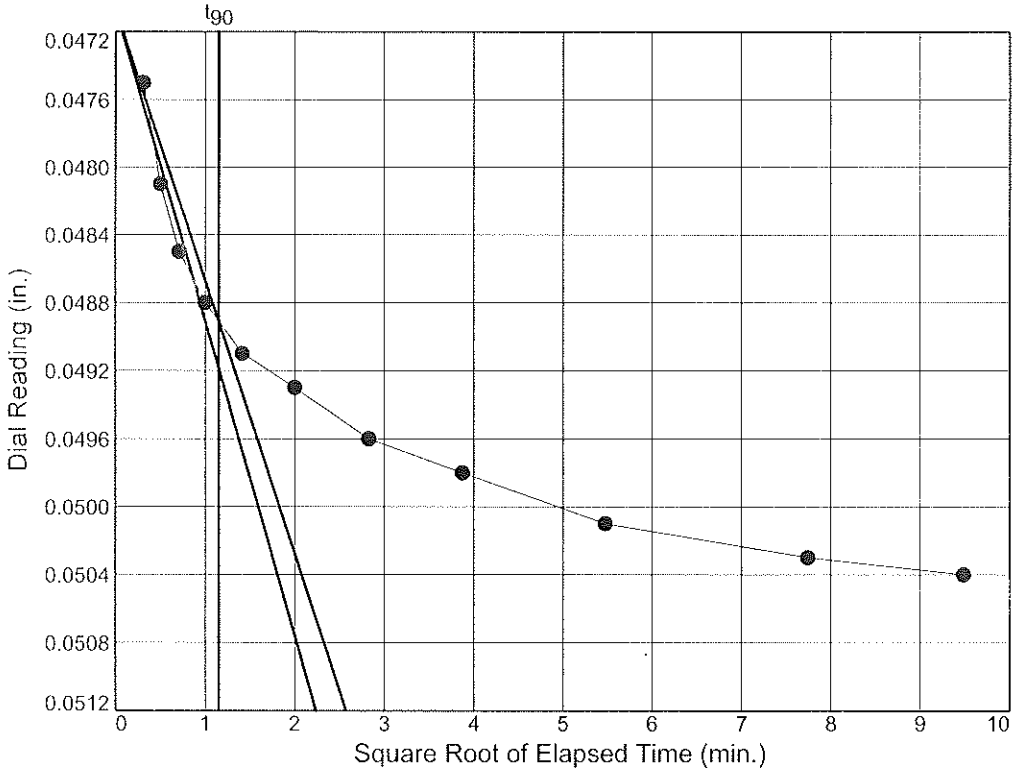
C_v @ T_{90}
1.552 ft.^{2}/day

Figure

Dial Reading vs. Time

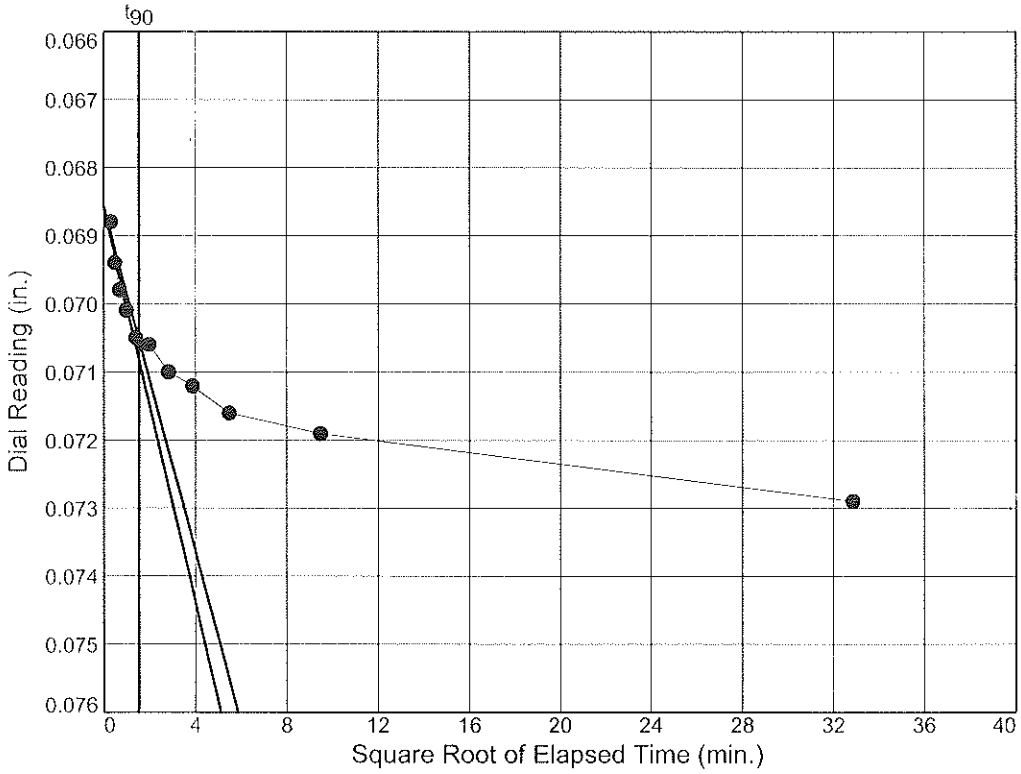
Project No.: 2015.0839.03
Project: PI 0010385 SANDY SPRINGS CIRCLE STREETSCAPE

Location: 80+50,60'R Depth: 5.0-7.0 ft Sample Number: UD-1



Load No.= 8
Load= 2.00 ksf
D_0 = 0.0471
D_{90} = 0.0489
D_{100} = 0.0491
T_{90} = 1.33 min.

C_v @ T_{90}
0.788 ft.^{2}/day



Load No.= 9
Load= 4.00 ksf
D_0 = 0.0686
D_{90} = 0.0705
D_{100} = 0.0707
T_{90} = 2.37 min.

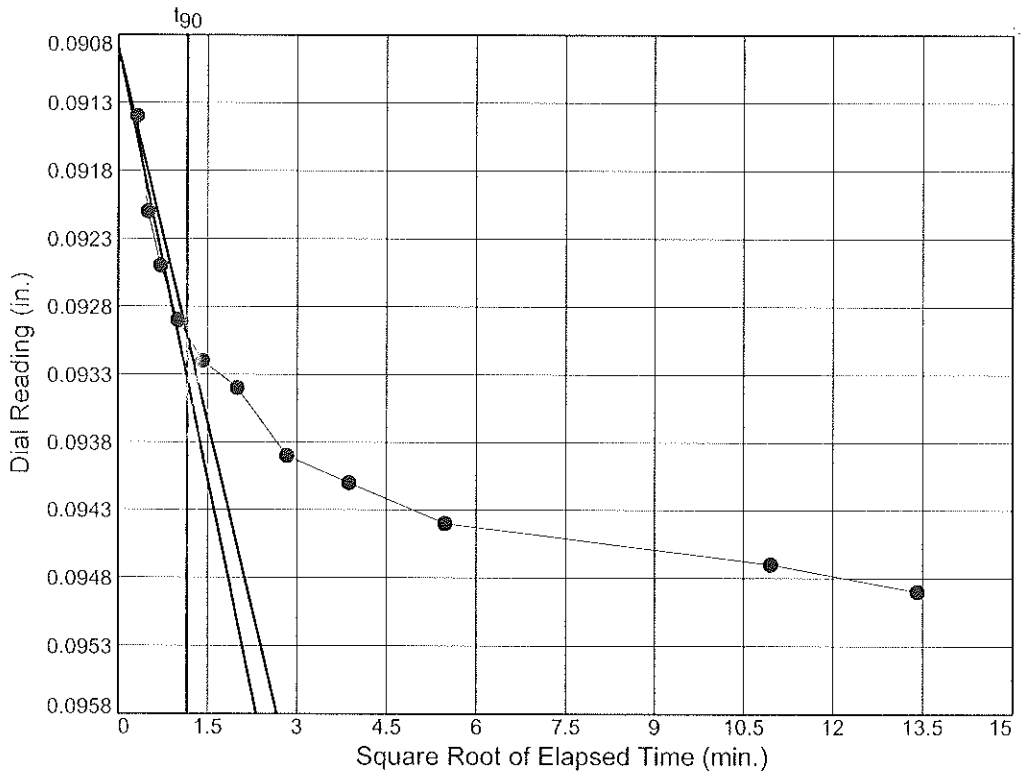
C_v @ T_{90}
0.414 ft.^{2}/day

Figure

Dial Reading vs. Time

Project No.: 2015.0839.03
Project: PI 0010385 SANDY SPRINGS CIRCLE STREETSCAPE

Location: 80+50,60'R Depth: 5.0-7.0 ft Sample Number: UD-1



Load No.= 10

Load= 8.00 ksf

D_0 = 0.0909

D_{90} = 0.0930

D_{100} = 0.0932

T_{90} = 1.33 min.

C_v @ T_{90}

0.691 ft.^{2}/day

APPENDIX C

Site Photographs (2 Pages)

Looking in increasing station from station 77 + 75±, 45’R – Wall G

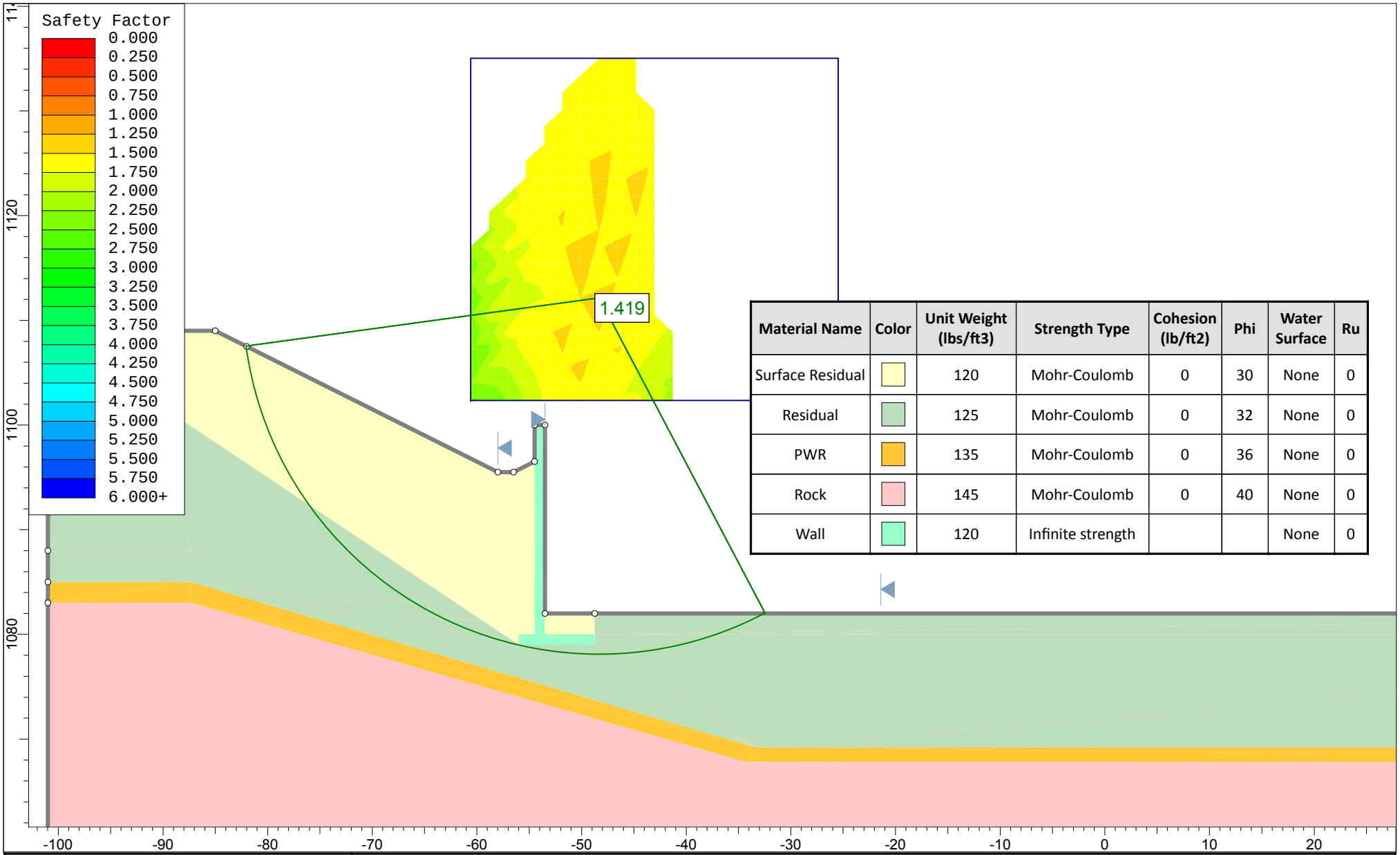
Looking in decreasing station from station 80 + 75±, 55’R – Wall G

Looking in increasing station from station 79 + 75±, 55’L

Looking in decreasing station from station 83 + 20±, 40’L

APPENDIX D

Global Slope Stability Analysis – Wall C-1
Global Slope Stability Analysis – Wall G
Global Slope Stability Analysis – Area of Wall C-1 Un-shored During Construction

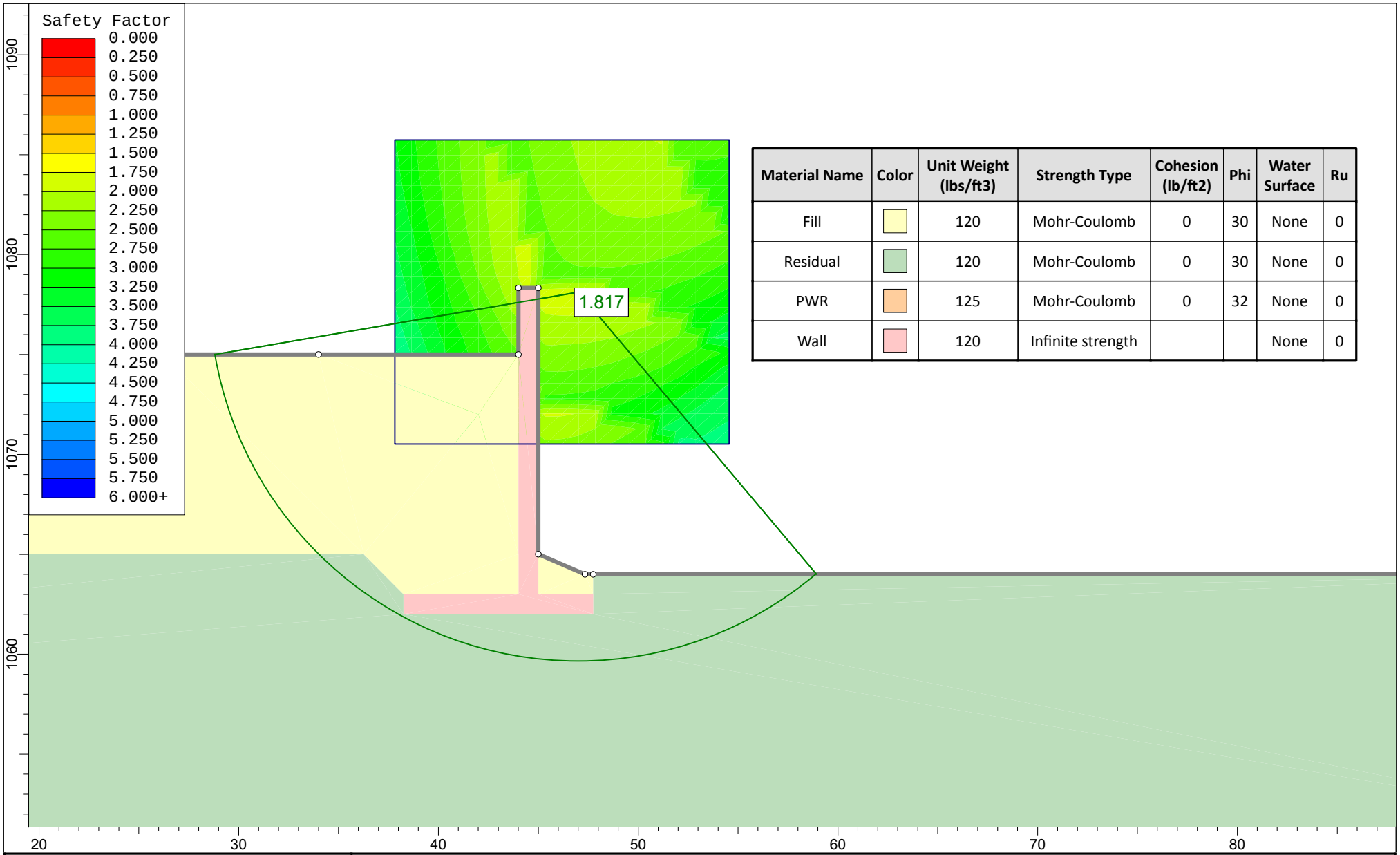


Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (lb/ft2)	Phi	Water Surface	Ru
Surface Residual		120	Mohr-Coulomb	0	30	None	0
Residual		125	Mohr-Coulomb	0	32	None	0
PWR		135	Mohr-Coulomb	0	36	None	0
Rock		145	Mohr-Coulomb	0	40	None	0
Wall		120	Infinite strength			None	0

rocscience

SLIDEINTERPRET 6.005

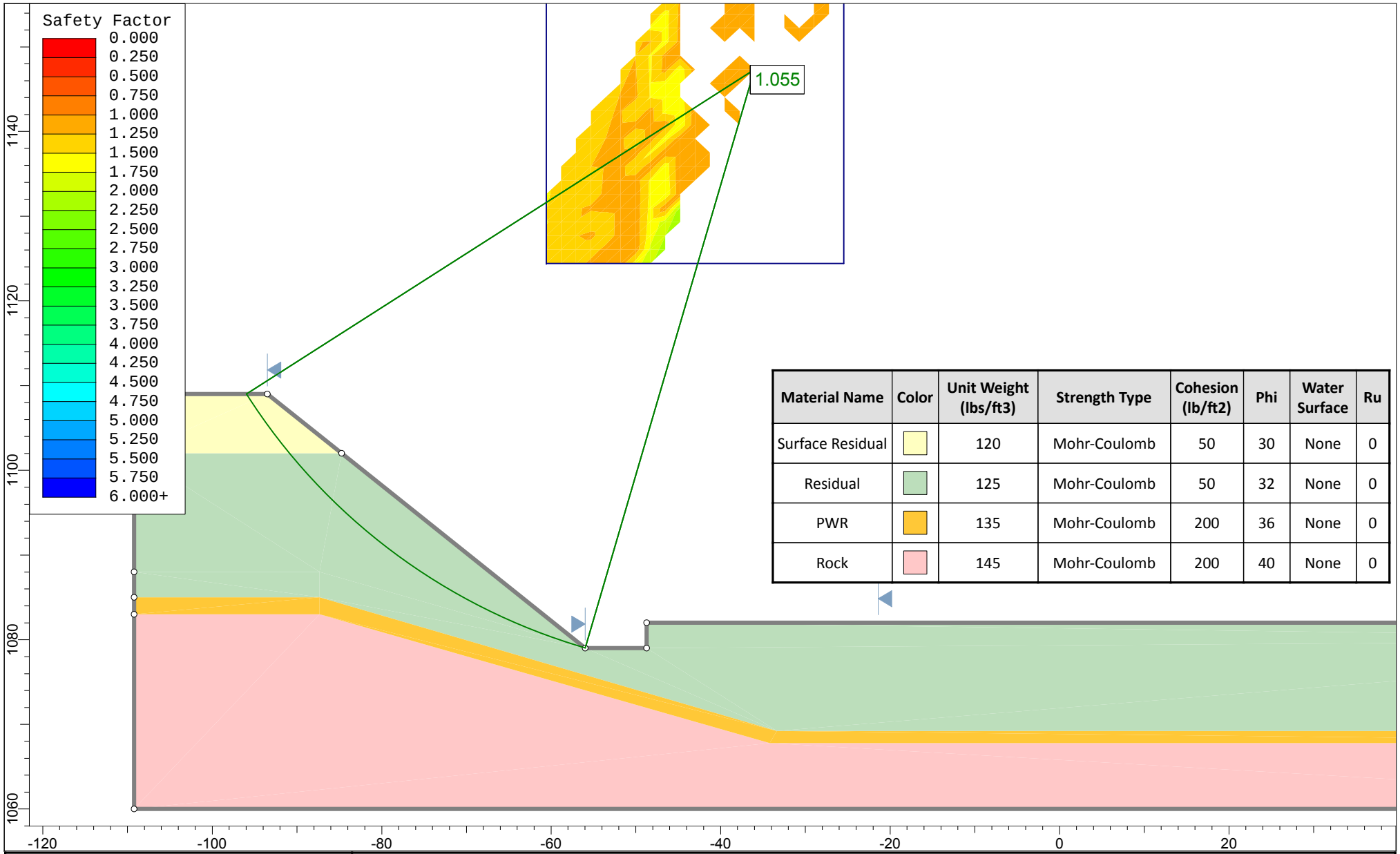
Project	SANDY SPRINGS CIRCLE STREETSCAPE PHASE II		
Analysis Description	GLOBAL SLOPE STABILITY ANALYSIS - WALL C-1		
Drawn By	NP	*Scale* 1:152.1	*Company* UNITED CONSULTING
Date	7/14/2016		*File Name* Slide_WALL C1.slim



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (lb/ft2)	Phi	Water Surface	Ru
Fill		120	Mohr-Coulomb	0	30	None	0
Residual		120	Mohr-Coulomb	0	30	None	0
PWR		125	Mohr-Coulomb	0	32	None	0
Wall		120	Infinite strength			None	0

SLIDEINTERPRET 6.005

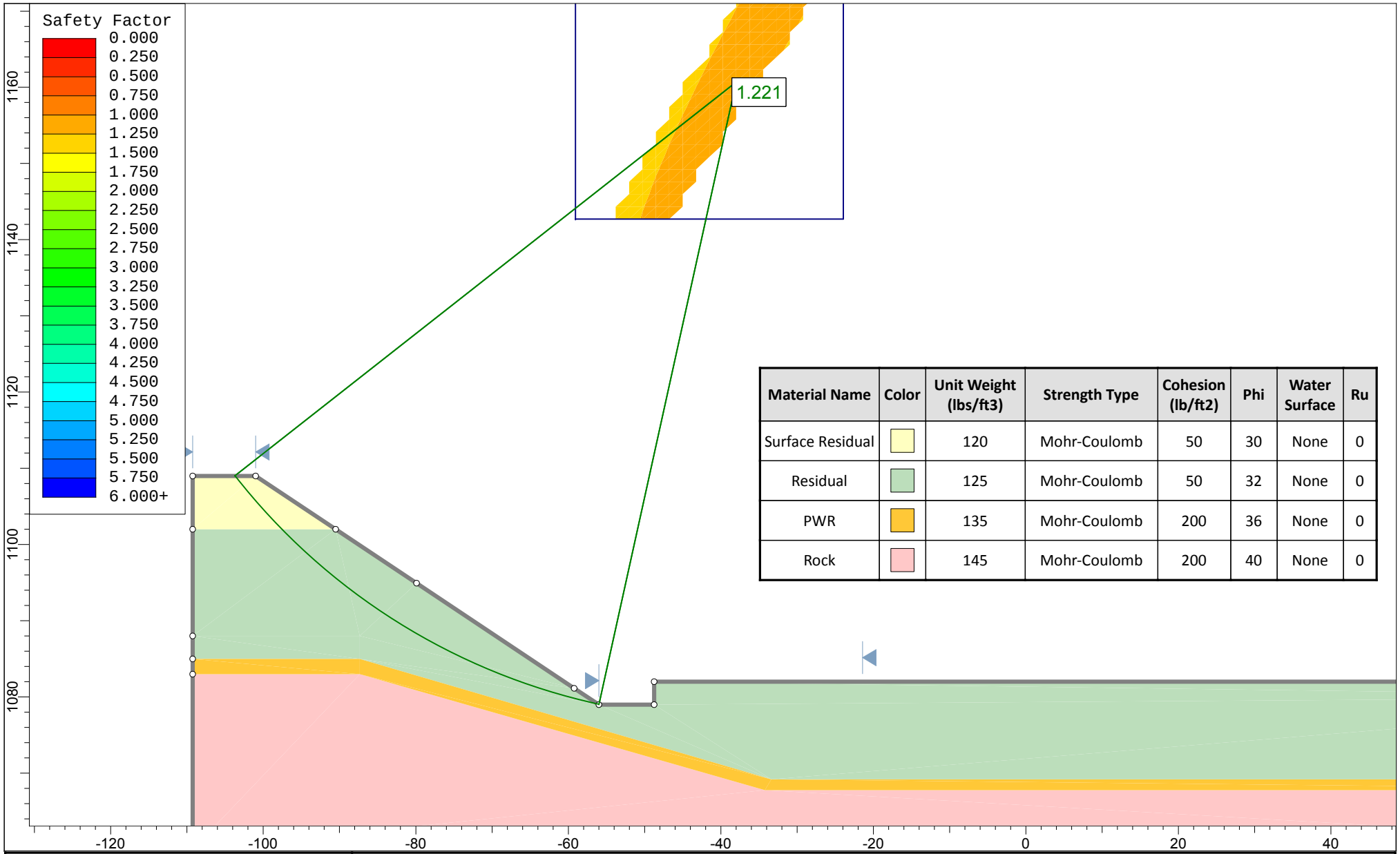
Project	SANDY SPRINGS CIRCLE STREETSCAPE PHASE II		
Analysis Description	GLOBAL SLOPE STABILITY ANALYSIS - WALL G		
Drawn By	NP	*Scale* 1:79.7	*Company* UNITED CONSULTING
Date	7/14/2016, 9:34:54 AM		*File Name* Slide_WALL G.slim



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (lb/ft2)	Phi	Water Surface	Ru
Surface Residual		120	Mohr-Coulomb	50	30	None	0
Residual		125	Mohr-Coulomb	50	32	None	0
PWR		135	Mohr-Coulomb	200	36	None	0
Rock		145	Mohr-Coulomb	200	40	None	0

SLIDEINTERPRET 6.005

Project	SANDY SPRINGS CIRCLE STREETSCAPE PHASE II		
Analysis Description	GLOBAL SLOPE STABILITY ANALYSIS - AREA OF WALL C-1 - UN-SHORED DURING CONSTRUCTION		
Drawn By	NP	*Scale* 1:187.8	*Company* UNITED CONSULTING
Date	7/14/2016		*File Name* Slide_WALL C1 - 1.25 to 1.slim



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (lb/ft2)	Phi	Water Surface	Ru
Surface Residual		120	Mohr-Coulomb	50	30	None	0
Residual		125	Mohr-Coulomb	50	32	None	0
PWR		135	Mohr-Coulomb	200	36	None	0
Rock		145	Mohr-Coulomb	200	40	None	0

rocscience

SLIDEINTERPRET 6.005

Project	SANDY SPRINGS CIRCLE STREETSCAPE PHASE II		
Analysis Description	GLOBAL SLOPE STABILITY ANALYSIS - AREA OF WALL C-1 - UN-SHORED DURING CONSTRUCTION		
Drawn By NP	*Scale* 1:208.7	*Company*	UNITED CONSULTING
Date 7/14/2016		*File Name*	Slide_WALL C1 - 1.5 to 1.slim

Important Information About Your

Geotechnical Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

The following information is provided to help you manage your risks.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you* — should apply the report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual

subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report Is Subject to Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations" many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, a number of mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; ***none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.***

Rely, on Your ASFE-Member Geotechncial Engineer for Additional Assistance

Membership in ASFE/The Best People on Earth exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you ASFE-member geotechnical engineer for more information.

ASFE
The Best People on Earth

8811 Colesville Road/Suite G106, Silver Spring, MD 20910
Telephone: 301/565-2733 Facsimile: 301/589-2017
e-mail: info@asfe.org www.asfe.org

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REPORT

For Michael Baker International

Retaining Wall Foundation
Exploration (LRFD) Wall G
Sandy Springs Circle
Streetscape Phase II
P.I. No. 0010385
Fulton County Georgia
Project No. MBLPA-19-GA-03072-04

August 4,2016
May 10, 2019
Revision No. 3

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UNITED CONSULTING

August 4, 2016
Revised May 10, 2019

Ms. Beth Ann Schwartz
Michael Baker International
420 Technology Parkway
Suite 150
Norcross, Georgia 30092

Via Email: ***BSchwartz@mbakerintl.com***

PROJECT: Retaining Wall Foundation Exploration (LRFD)
Wall G
Sandy Springs Circle Streetscape Phase II
Sandy Springs Project No.: CC-0010, P.I. No. 0010385
Fulton County, Georgia
UC Project No. **MBLPA-19-GA-03072-04**

Dear Ms. Schwartz:

United Consulting is pleased to submit this Report of Retaining Wall Foundation Exploration for Wall G on this project. This report was done to upgrade in accordance with LRFD dated December 18, 2017 format required by Georgia Department of Transportation (GDOT). The current revision is based on the comments from GDOT Interdepartmental Correspondence dated April 8, 2019 and our follow up telephone conversation with GDOT-OMAT on May 9, 2019. We appreciate the opportunity to assist you with this project and look forward to working with you on future projects. If you have any questions regarding this report, or if we can be of further assistance, please feel free to contact us.

Sincerely,

UNITED CONSULTING

GEORGIA REGISTERED NO. 23121 PROFESSIONAL ENGINEER MEHDI MOAZZAMI

Mehdi Moazzami, Ph.D., P.E.
Senior Geotechnical Engineer

Santanu Sinharoy, P.E.
Chief Engineer/Principal

MM/SS/nj

SP/Geotechnical Documents/ MBLPA-19-GA-03072-04.wfi.docx

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Consolidation Test Report (1)

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Site Class Calculation

Wall Foundation Investigation (LRFD), Wall G
Sandy Springs Circle Streetscape Phase II
Sandy Springs Project No.: CC-0010
Fulton County, PI No. 0010385
May 10, 2019
Revision No. 3

LOCATION (See Map) The project is for the roadway improvement on Sandy Springs Circle in Fulton County, Georgia. The proposed wall will be constructed along the eastern boundary of Sandy Springs Circle NE to the south of Sandy Springs Pl NE.

GENERAL INFORMATION

GEOLOGIC FORMATION This project is geologically sited in the Biotitic Gneiss/Mica Schist/ Amphibolite Formation of the Georgia Piedmont Region.

SUBSURFACE FEATURES The boring at Station 78 + 10± encountered about 3 feet of fill. The fill consisted of sandy silt and traces clay and gravel.

Below the fill in the above referenced boring and below the surficial layers in borings drilled at Stations 79+45±, 79+50±, and 8+50±, the borings encountered residual soils to boring termination depth, top of Partially Weathered Rock (PWR), or auger refusal. The residual soils generally consisted of very stiff sandy silt or loose to very dense sand with varying amounts of silt, clay, and mica.

PWR was encountered in borings at Stations 80+50± at depths of about 13 feet. A lens of PWR was also encountered in boring at Station 79+50± at depths from 7 to 8 feet.

Auger refusal indicating presence of rock or large boulders occurred in borings at Stations 79+45± Rt, 79+50± Rt. corresponding to elevations of 1048 feet and 1051 feet, respectively.

Groundwater was not encountered in the borings at the time of drilling. For additional information, see the boring layout and boring logs.

SITE CLASSIFICATION We recommend a site class of C per AASHTO LRFD 3.10.3.1. Calculations for seismic site classification using SPT N-values are included in the Appendix.

WALL DESCRIPTION This project consists of a Parapet Wall P1 with a height range of 4 to 17 feet. The wall begins at station 78+00, 44’ RT and ends at station 80+63±, 78’ RT for a total length of 294± feet. The purpose of the wall is to widen the road.

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1.1 – RETAINED SOIL PARAMETERS

Wall # (Station Range)	Unit Weight (pcf)	Internal Friction Angle (degrees)	Cohesion (psf)
78+00 to 80+63	120	30	0

E

1.2 – FOUNDATION SOIL PARAMETERS

Wall # (Station Range)	Unit Weight (pcf)	Internal Friction Angle (degrees)	Cohesion (psf)
78+00 to 78+80	129	40	0
78+80 to 80+63	129	43	0

We note that the above unit weights and internal friction angles for foundation soils were computed based on the soil type and Standard penetration test resistances input using GDOT spreadsheet.

1.3 -- DESIGN DATA

				Strength Limit State		Service Limit State	
Wall #	Wall Height (ft)	Wall Location Description	Base Width, B (ft)	Bearing Pressure (ksf)	Effective Base Width/Strap Length, B' (ft)	Bearing Pressure (ksf)	Effective Base Width/Strap Length, B' (ft)
G	10.5	78+00 to 78+80	8.5	4.30	5.46	2.93	5.92
G	15.5	78+80 to 79+60	10.0	5.10	6.92	3.50	7.45
G	17	79+60 to 80+37.48	10.0	5.83	6.52	3.96	7.10
G	12.5	80+37.48 to 80+62.14	8.50	5.10	5.20	3.42	5.69

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2.0 -- FOUNDATION RECOMMENDATIONS

2.1 – BEARING RESISTANCE AND SETTLEMENT

Wall Height (ft)	Base Width/Strap Length, B (ft)	Nominal Bearing Resistance (ksf)	Factored Bearing Resistance (ksf)	Total Settlement (inches)
10.5	8.5	8.27	4.55	1.00
15.5	10.0	10.11	5.56	1.0
17	10.0	11.27	6.20	0.80
12.5	8.5	10.47	5.76	0.80

3.0 -- GENERAL NOTES

Elevations All elevations are based on a Benchmark Elevation of 1081.4 feet located at SVX03 as shown on plan entitled "Construction Layout – Sandy Springs Circle Streetscape", prepared by Michael Baker International, dated September 19, 2018, drawing 11-001.

As Built Foundation Information The as built foundation information should be forwarded to the Geotechnical Engineering Bureau upon completion of the foundation system.

3.1 – SHALLOW FOUNDATION NOTES

Bearing Resistance and Settlement Bearing Resistance and Settlement have been computed in accordance with AASHTO LRFD 2014 and GDOT Research Project 14-26 – Implementation of AASHTO LRFD Specifications: Bearing Capacity and Settlement Calculations for Shallow Foundations of Bridges and Walls. A LRFD Shallow Foundations Spreadsheet developed by Georgia Institute of Technology and GDOT's Geotechnical Bureau was used to evaluate these parameters. The factored bearing resistance vs. footing width vs. settlement curves generated using this spreadsheet are attached to this report.

Bearing Resistance Factor of Footings at the Strength Limit State Bearing resistance factors recommended by Paikowsky et al. (2010) were used in lieu of those recommended by AASHTO LRFD 2014. This was done to overcome the wide applicability of the AASHTO values since they do not properly represent all grades of soil types, the loading conditions or the strength characteristics. The following table shows the recommended resistance factors for shallow foundations on natural deposits of granular soil (after Paikowsky et al., 2010):

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<table>
<tr><th rowspan="3">Soil Friction Angle, ϕ'</th><th colspan="4">Loading Conditions</th></tr>
<tr><th rowspan="2">Vertical – Centric or Eccentric</th><th rowspan="2">Inclined - Centric</th><th colspan="2">Inclined - Eccentric</th></tr>
<tr><th>Positive</th><th>Negative</th></tr>
<tr><td>30° - 34°</td><td>0.40</td><td rowspan="3">0.40</td><td rowspan="2">0.35</td><td>0.65</td></tr>
<tr><td>35° - 36°</td><td>0.45</td><td rowspan="2">0.70</td></tr>
<tr><td>37° - 39°</td><td>0.50</td><td rowspan="2">0.40</td></tr>
<tr><td>40° - 44°</td><td>0.55</td><td>0.45</td><td rowspan="2">0.75</td></tr>
<tr><td>> 45°</td><td>0.65</td><td>0.50</td><td>0.45</td></tr>
</table>

The resistance factor used is automatically selected from this table in the LRFD Shallow Foundations Spreadsheet based on the soil's effective friction angle and the Vertical – Centric or Eccentric loading condition. It is then used to compute the Factored Bearing Resistance.

Footing Excavation

The footing excavations should be protected from standing water and surface run-off. Footings should be poured as soon as practical after excavation.

Temporary Shoring

Shoring may be required to construct the wall footings if the excavations cannot be safely sloped back due to presence of existing road.

Differential Settlement Analyses

Differential settlement analyses have been performed in accordance with AASHTO LRFD 2014 requirements –C11.6.2.2 for Rigid Retaining Walls.

The wall system meets the AASHTO LRFD requirements. The results of these analyses are attached to this report.

Global Stability Analyses

Global stability analyses have been performed in accordance with AASHTO LRFD 2014, 11.6.2.3 requirements. The software used for the analyses is SLIDE by Rocscience. Factor of safety was evaluated using the Bishop methods and circular failure analyses were performed.

The wall system meets the AASHTO LRFD requirements. The results of these analyses are attached to this report.

Global Stability Analyses will be required after final construction plans, shop drawings and design notes have been developed, and before the wall is constructed. This work shall be done in accordance with Special Provision 999 – Global Stability of Walls on Construction.

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Groundwater Groundwater was not encountered in the borings. Groundwater should not be problematic during foundation excavation.

Drainage through the wall shall be included as part of the design and construction for all walls.

Settlement Monitoring Monitoring of settlement will not be required.

Special Problems

1. Heavy traffic shall be anticipated along Sandy Springs Circle during rush hours. The contractor shall be made aware of this.

2. Both overhead and underground utilities exist along the main roads and across the wall alignments.

3. All temporary slopes should comply with applicable OSHA regulations.

4. A few businesses are located very closed to the construction limits of this project. Vibrations from the construction may cause some concern with property owners. We recommend that the Project Engineer contact Fulton County Department of Transportation prior to the construction to evaluate the need for crack surveys and vibration monitoring.

LIMITATIONS

This report is for the exclusive use of **Michael Baker, City of Sandy Springs, and Georgia Department of Transportation**, its agents, and the designers of the project described herein, and may only be applied to this specific project. Our conclusions and recommendations have been prepared using generally accepted standards of Geotechnical Engineering practice in the State of Georgia. No other warranty is expressed or implied. Our firm is not responsible for conclusions, opinions or recommendations of others.

The scope of this evaluation was limited to an evaluation of the load-carrying capabilities and stability of the subsoils. Oil, hazardous waste, radioactivity, irritants, pollutants, molds, or other dangerous substance and conditions were not the subject of this study. Their presence and/or absence is not implied or suggested by this report, and should not be inferred.

Our conclusions and recommendations are based upon design information furnished us, data obtained from the previously described exploration and testing program and our past experience. They do not reflect variations in subsurface conditions that may exist intermediate of our borings and in unexplored areas of site. Should such variations become apparent during construction, it will be necessary to re-evaluate our conclusions and recommendations based upon “on-site” observations of the conditions.

If the design or location of the project is changed, the recommendations contained herein, must be considered invalid unless our firm reviews the changes and our recommendations are either verified or modified in writing.

Prepared By Mehdi Moazzami, P.E.

Reviewed By Santanu Sinharoy, P.E.

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DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

SPECIAL PROVISION

PROJECT NO. CC-0010, Fulton
P.I. NO. 0010385

SECTION 999 - GLOBAL STABILITY OF RETAINING WALLS ON CONSTRUCTION

999.1 General Description

This work consists of performing the global stability analyses of applicable retaining walls after final construction plans, shop drawings and design notes have been developed, reviewed and approved. Perform this work before the wall is constructed. This work shall be performed by a Professional Engineer licensed in the state of Georgia who is experienced in this type of work. This can be an employee of the wall contractor or someone hired by the wall contractor.

999.2 Applicable Wall Types

This specification applies to the following wall types:

1. Rigid/Cantilever Retaining Walls
2. Gravity Walls
3. Mechanically Stabilized Embankment Retaining Walls
4. Mechanically Stabilized Embankment Retaining Wall – Contractor Design
5. Soldier Pile Walls with or without Anchors
6. Soil Nail Walls

999.3 Criteria for Global Stability Requirement

Perform global stability analyses on construction for Walls that meet any of the following criteria:

1. Wall Height is 10 feet or greater.
2. Wall is being constructed on a slope.
3. Wall will have a slope, structure (including structures attached directly to the top of the wall such as sound walls), or traffic loading above it.
4. Wall footing is being constructed on weak underlying soils with the following conditions:
    - Soils within 10 feet of the bottom of footing are single digit blow count soils based on SPT tests.
    - Groundwater is within 5 feet of the bottom of the wall.

999.4 Requirements

Develop the shop drawings for the wall, and submit the drawings to the Department for review and approval prior to performing field global stability analyses.

Use the subsurface investigation data from the approved Wall Foundation Investigation (WFI) report for global stability analyses. Any additional borings performed on construction may be used for global stability analyses.

For MSE Walls, use the properties of the backfill material as well as the strap lengths shown on the shop drawings for global stability analyses, even if they differ from that which was specified on the approved WFI.

Model the wall in the global stability analysis program using the exact wall configuration to be built on construction.

Identify all critical sections of the Wall such as the tallest sections, sections on slopes, sections with a slope, structure or traffic loading above the wall, and sections on the weakest soils, and analyze these sections for global stability.

All global runs shall meet the requirements of AASHTO LRFD Specifications, Seventh Edition, 2014 – Section 11.6.2.3. For walls that do not meet the requirements, provide recommendations to mitigate the problem, and submit global stability analyses that incorporate the recommended solution(s). All global runs that incorporate the solutions shall meet the AASHTO LRFD requirements. Prior to implementing a solution on construction, receive approval from the Geotechnical Bureau.

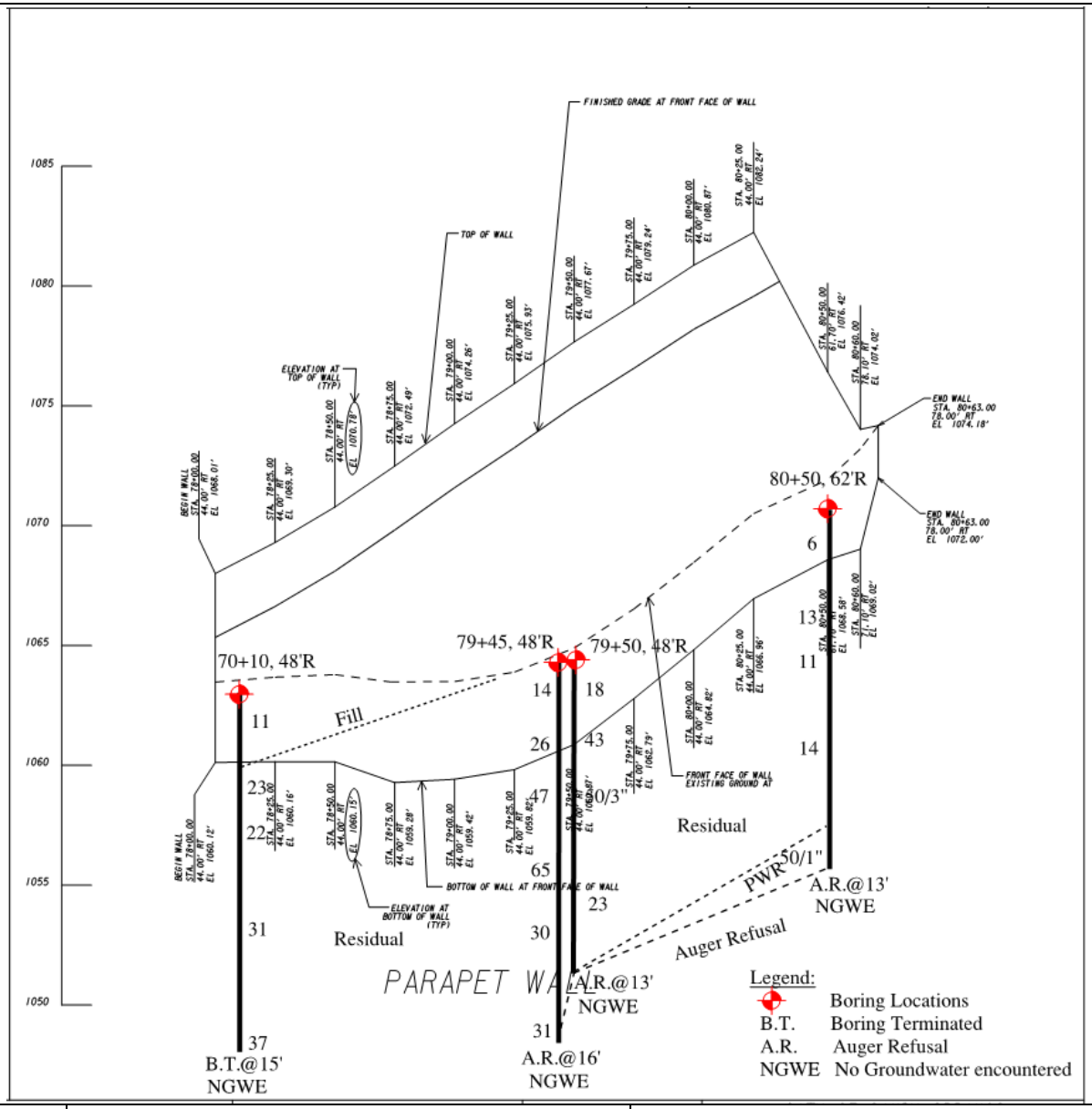
Submit a global stability analyses report with analyses and recommendations (if warranted) to the Office of Materials and Testing's Geotechnical Bureau for review and approval before wall construction commences. Allow seven (7) calendar days for review and approval.

Provide global stability analyses and recommendations (if warranted) using the services of a Professional Engineer licensed in the state of Georgia who is experienced in this type work.

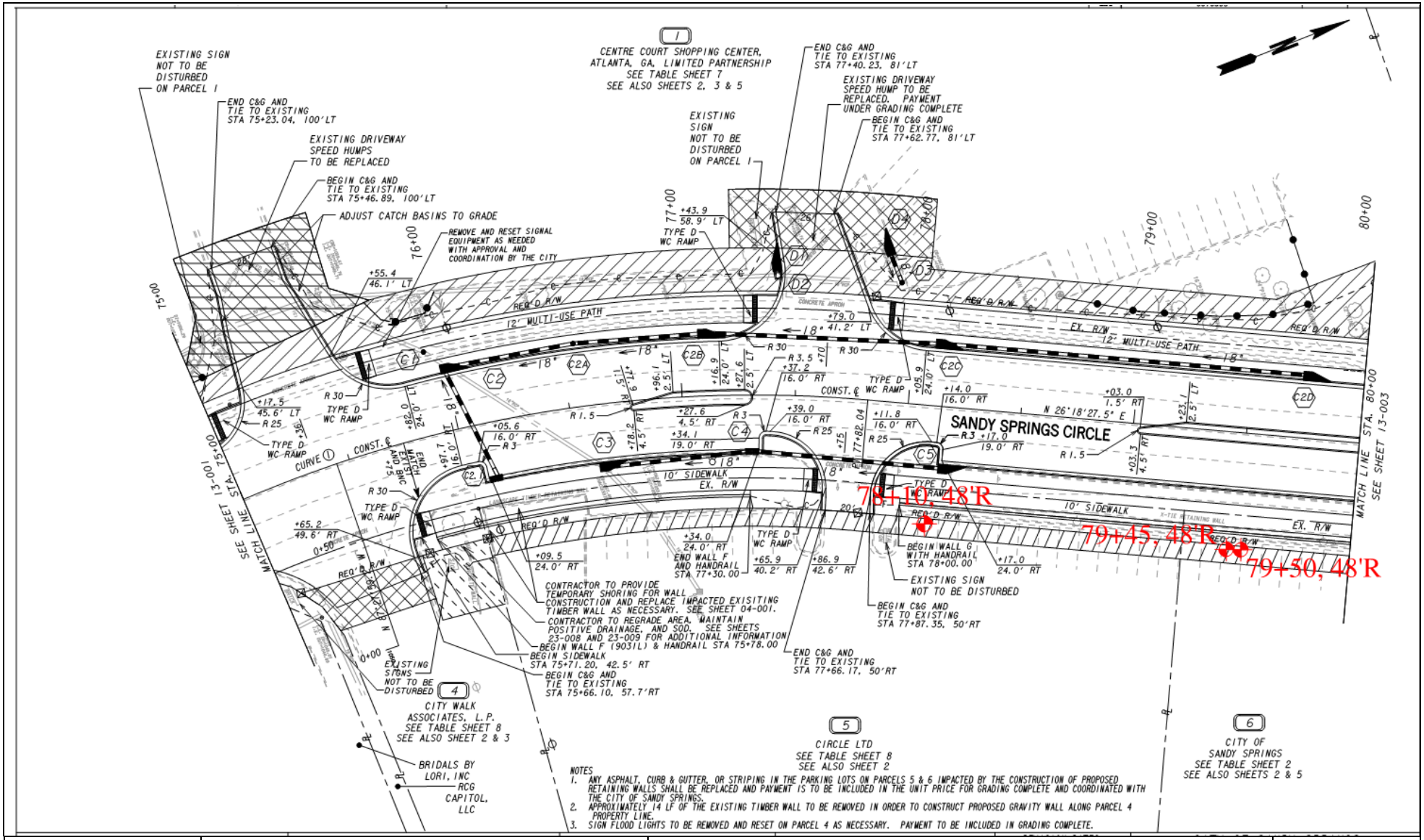
999.5 Payment

No separate payment will be made for performing global stability analyses or any associated tasks deemed necessary such as additional investigation or report preparation. Include the cost of this work in the contract bid price for the retaining wall.

SCALE: NTS	DATE: 7/20/2016	PROJECT NO: 2015.0839.03	**TITLE: PROJECT LOCATION MAP** **SANDY SPRINGS CIRCLE STREETSCAPE** **FULTON COUNTY, P.I. NO. 0010385**	**FIG. A**
PREPARED: NP	CHECKED: NP	REVISIONS:		
CLIENT: MICHAEL BAKER		N	UNITED CONSULTING 625 Holcomb Bridge Road, Norcross, GA 30071 Tel. 770/209-0029 FAX 770/582-2900 www.unitedconsulting.com We're here for you UNITED CONSULTING	



SCALE: NTS	PROJECT NO.: MBLPA-19-GA-03072-04		TITLE: SUBSURFACE PROFILE	
PREPARED: NP	CHECKED:	DATE: 2/19/2019	SANDY SPRING CIRCLE STREETSCAPE – WALL G	**FIG. 1**
CLIENT: MICHAEL BAKER			UNITED CONSULTING 625 Holcomb Bridge Road, Norcross, GA 30071 Tel. 770/209-0029 FAX 770/582-2900 www.unitedconsulting.com We're here for you UNITED CONSULTING	



SCALE: NTS	PROJECT NO.: MBLPA-19-GA-03072-04		TITLE: BORING LOCATION PLAN	**FIG. 2**
PREPARED: NP	CHECKED:	DATE: 2/19/2019	SANDY SPRING CIRCLE STREETSCAPE – WALL G	
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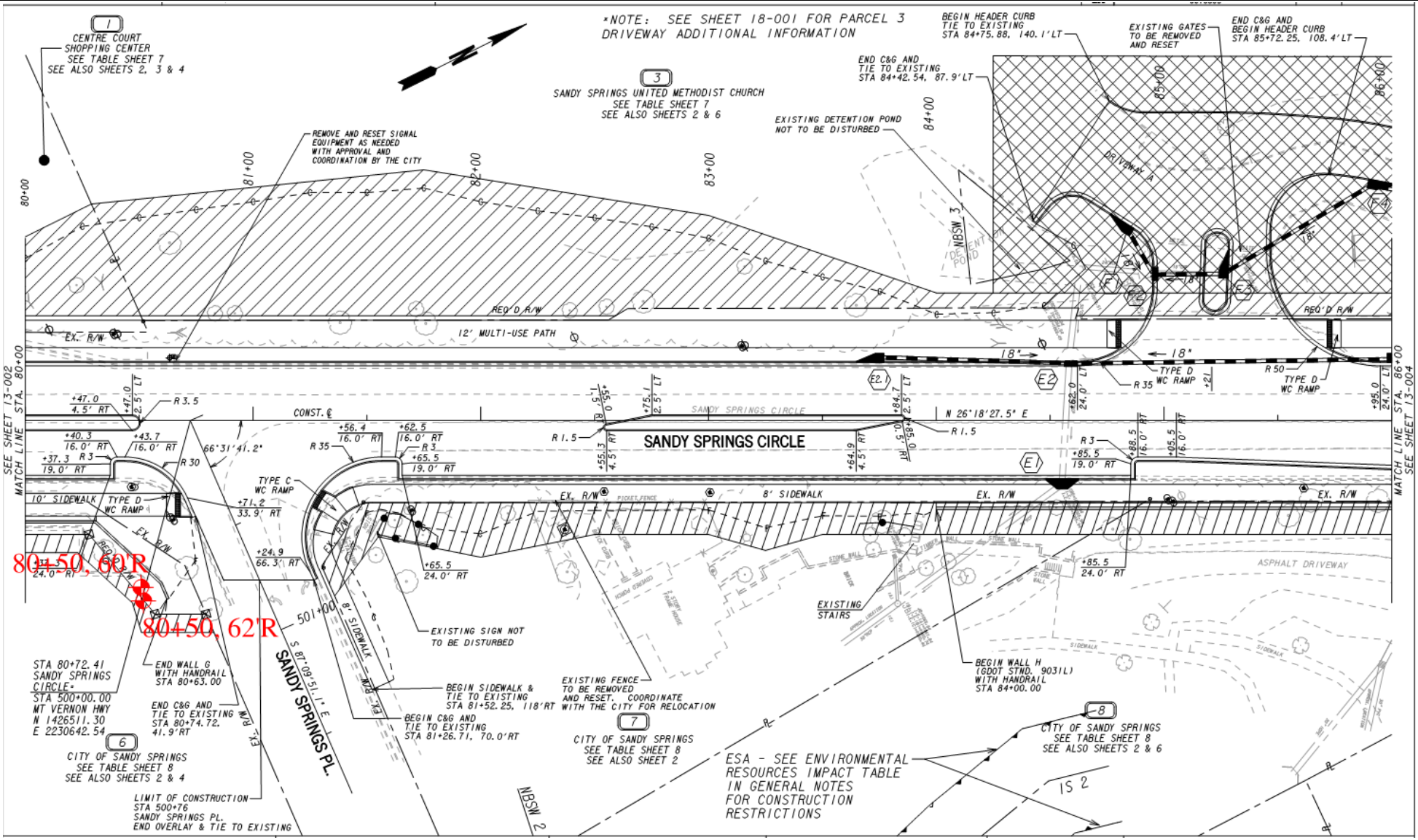

SCALE: NTS	PROJECT NO.: MBLPA-19-GA-03072-04		TITLE: BORING LOCATION PLAN
PREPARED: NP	CHECKED:	DATE: 2/19/2019	SANDY SPRING CIRCLE STREETSCAPE – WALL G
CLIENT: MICHAEL BAKER			UNITED CONSULTING 625 Holcomb Bridge Road, Norcross, GA 30071 Tel. 770/209-0029 FAX 770/582-2900 www.unitedconsulting.com We're here for you UNITED CONSULTING

FIG. 3

APPENDIX A

General Notes/Description of Drilling Operations
Field Exploration Procedures
Boring Logs (5)

GENERAL NOTES

The soil classifications noted on the Boring Logs are visual classifications unless otherwise noted. Minor constituents of a soil sample are termed as follows:

Trace	0 - 10%
Some	11 - 35%
Suffix "y" or "ey"	36 - 49%

LEGEND

Split Spoon Sample obtained during Standard Penetration Testing

Relatively Undisturbed Shelby Tube Sample

Groundwater Level at Time of Boring Completion

Groundwater Level at 24 hours (or as noted) after Termination of Boring

w	Natural Moisture Content	
LL	Liquid Limit	
PL	Plastic Limit	Atterberg Limits
PI	Plasticity Index	
PF	Percent Fines (Percent Passing #200 Sieve)	
γ_d	Dry Unit Weight (Pounds per Cubic Foot or PCF	
γ_m	Moist or In-Situ Unit Weight (PCF)	
γ_{sat}	Saturated Unit Weight (PCF)	

BORING LOG DATA NARRATIVE OF DRILLING OPERATION

The test borings were made by mechanically advancing helical hollow stem augers into the ground. Samples were collected at regular intervals in each of the borings following established procedures for performing the Standard Penetration Test in accordance with ASTM Specification D 1586. Soil samples were obtained with a standard 1.4" I.D. x 2.0" O.D. split barrel sampler. The sampler is first seated 6" to penetrate any loose cuttings and then driven an additional foot with the blows required of a 140-pound hammer freely falling a distance of 30 inches. The number of blows required to drive the sampler the final foot is designated the "standard penetration resistance." The driving resistance, known as the "N" value, can be correlated with the relative density of granular soils and the consistency of cohesive deposits.

The following table describes soil consistency and relative densities based on standard penetration resistance values (N) determined by the Standard Penetration Test (SPT).

	"N"	Consistency
Clay and Silt	0-2	Very Soft
	3-4	Soft
	5-8	Firm
	9-15	Stiff
	16-30	Very Stiff
	Over 31	Hard

	"N"	Relative Density
Sand	0-4	Very Loose
	5-10	Loose
	11-19	Firm
	20-29	Medium Dense
	30-49	Dense
	50+	Very Dense

FIELD EXPLORATION PROCEDURES

Soil Borings

Four (4) SPT borings were drilled near/along the proposed walls. The depths of SPT borings ranged from 13 to 16 feet below the existing grades. Also, one boring was drilled to a depth of 7 feet to obtain undisturbed sample. The approximate locations of the borings and subsurface profiles are shown on the attached Boring Location Plan and Subsurface Profile (Figures 1 and 2) provided in Appendix of this report.

Boring locations were established in the field by the Project Engineer with use of measuring tape, provided plan, and compass from the proposed road centerline and existing site features. The drilling and sampling were performed in general accordance with ASTM Standard D-1586. Soil samples obtained were observed by a Geotechnical Engineer and classified according to the visual manual procedures (ASTM D-2488). A narrative of field operations is also included in The Appendix.

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BORING LOG

CONTRACTED WITH: MICHAEL BAKER
BORING NO.: 78+10, 48'R
PROJECT NAME: SANDY SPRINGS CIRCLE STREETSCAPE PHASE II
DATE: 6/29/2016
JOB NO.: 2015.0839.03
DRILLER: CALEB
RIG: GEOPROBE
LOGGED BY: RJ

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	2" Asphalt	0						Wall G
	Silt-sandy, trace clay and gravel; stiff; brown (Fill) (MH)		1		2-4-7	14	19.7	LL=60, PI=27
BOF=1060 1060	Silt-sandy, trace clay and gravel; medium dense; very stiff; brown (Residual) (MH)	5	2		8-10-13	18	19.5	LL=54, PI=18
	Sand-silty, trace clay and mica; medium dense; reddish brown (SM)		3		8-11-11	18		
1055	-trace gravel; dense; brown	10	4		8-15-16	18		
1050		15	5		15-17-20	12		
	BORING TERMINATED AT 15 FEET.							No groundwater encountered at the time of drilling.
1045		20						
1040		25						
1035		30						Hammer Efficiency = 97.0%
1030		35						LL = Liquid Limit PI = Plasticity Index
1025		40						BOF = Bottom of Footing Fulton County PI No. 0010385

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BORING LOG

CONTRACTED WITH: MICHAEL BAKER
BORING NO.: 79+45, 48'R
PROJECT NAME: SANDY SPRINGS CIRCLE STREETSCAPE PHASE II
DATE: 6/29/2016
JOB NO.: 2015.0839.03
DRILLER: CALEB
RIG: GEOPROBE
LOGGED BY: RJ

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
1065	2" Asphalt	0						Wall G
	Sand-silty, some clay, trace mica; firm; brown (Residual) (SM)		1		6-7-7	12		
BOF=1061	-trace gravel; medium dense		2		5-12-14	18	13.0	LL=40, PI=13
1060		5						
	-trace clay; dense; purple		3		22-27-20	12		
	-very dense		4		30-33-32	12		
1055		10						
	-dense; tan		5		13-14-16	14		
1050		15	6		20-20-11	14		
	AUGER REFUSAL AT 16 FEET.							No groundwater encountered at the time of drilling.
1045		20						
1040		25						
1035		30						Hammer Efficiency = 97.0%
1030		35						LL = Liquid Limit PI = Plasticity Index
1025		40						BOF = Bottom of Footing Fulton County PI No. 0010385

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BORING LOG

CONTRACTED WITH: MICHAEL BAKER
BORING NO.: 79+50, 48'R
PROJECT NAME: SANDY SPRINGS CIRCLE STREETSCAPE PHASE II
DATE: 6/29/2016
JOB NO.: 2015.0839.03
DRILLER: CALEB
RIG: GEOPROBE
LOGGED BY: RJ

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
1065	2" Asphalt	0						Wall G
	Sand-silty, some clay, trace gravel and mica; firm; brown (Residual) (SM)		1		4-8-10	12		
BOF=1061	-dense							
1060		5	2		16-21-22	16		
			3		25-45-50/3	12		
	Partially weathered rock sampled as: sand-silty, trace clay and mica; very dense; tan		4		9-11-12	18	24.5	LL=55, PI=21
1055	Sand-silty, trace clay and gravel; medium dense; red and brown (Residual) (SM)	10						
	AUGER REFUSAL AT 13 FEET.							No groundwater encountered at the time of drilling.
1050		15						
1045		20						
1040		25						
1035		30						Hammer Efficiency = 97.0%
1030		35						LL = Liquid Limit PI = Plasticity Index
1025		40						BOF = Bottom of Footing Fulton County PI No. 0010385

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NORCROSS, GEORGIA 30071
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BORING LOG

CONTRACTED WITH: MICHAEL BAKER
BORING NO.: 80+50, 60'R
PROJECT NAME: SANDY SPRINGS CIRCLE STREETSCAPE PHASE II
DATE: 6/29/2016
JOB NO.: 2015.0839.03
DRILLER: CALEB
RIG: GEOPROBE
LOGGED BY: RJ

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	2" Asphalt	0						Wall G
1070	Straight Auger to 5 feet.							
BOF=1068.5		5						
1065	Sand-some silt, trace clay; brown (Residual) (SM)		1				22.0	Undisturbed sample obtained from 5' to 7'. LL=56, PI=19
	BORING TERMINATED AT 7 FEET.							No groundwater encountered at the time of drilling.
		10						
1060								
		15						
1055								
		20						
1050								
		25						
1045								
		30						
1040								
		35						
1035								LL = Liquid Limit PI = Plasticity Index
		40						BOF = Bottom of Footing Fulton County PI No. 0010385

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NORCROSS, GEORGIA 30071
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BORING LOG

CONTRACTED WITH: MICHAEL BAKER
BORING NO.: 80+50, 62'R
PROJECT NAME: SANDY SPRINGS CIRCLE STREETSCAPE PHASE II
DATE: 6/29/2016
JOB NO.: 2015.0839.03
DRILLER: CALEB
RIG: GEOPROBE
LOGGED BY: RJ

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	2" Asphalt	0						Wall G
1070	Sand-some silt and clay; loose; brown (Residual) (SM)		1		2-3-3	10		
BOF=1068.5	-firm	5	2		4-6-7	14		
1065	-trace clay; red and brown		3		4-5-6	18	25.4	LL=56, PI=15
		10	4		4-6-8	18		
1060								
	Partially weathered rock sampled as: sand-some silt, trace clay; very dense; brown	15	5		50/1	1		
1055	BORING TERMINATED AT 15 FEET.							No groundwater encountered at the time of drilling.
		20						
1050								
		25						
1045								
		30						Hammer Efficiency = 97.0%
1040								
		35						LL = Liquid Limit PI = Plasticity Index
1035								
								BOF = Bottom of Footing Fulton County PI No. 0010385
		40						

APPENDIX B

Laboratory Testing Procedures
Summary of USCS Tests (2 Pages)
Particle Size Distribution Report (1)
Consolidation Test Report (1)

LABORATORY TESTING PROCEDURES

Moisture Content

The moisture content was determined for selected soil samples obtained in the split-barrel sampler. A representative portion of each sample was weighed and then placed in an oven and dried at 110 degrees Centigrade for at least 15 to 16 hours. After removal from the oven, the soil was again weighed. The weight of the moisture lost during drying thus was determined. From this data, the moisture content of the sample was then calculated as the weight of moisture divided by dry weight of soil, expressed as a percentage. This test was conducted according to ASTM D 2216.

Moisture content is a useful index of a soil's compressibility. If the soil is to be used as fill, the moisture content may be compared to the range of water contents for which proper compaction may be achieved. The moisture content results are indicated on the boring logs attached and on the Summary of USCS Tests.

Unified Soil Classification System (USCS)

Soils to be classified as per Unified Soil Classification System (USCS) are generally required to perform grain size analysis (particle size distribution), liquid limit and plasticity index tests when precise classification is required. After performing the required tests, the classification is generally performed in accordance with ASTM D 2487. These classification tests are also required by GDOT in the areas of construction of new pavement over existing paved shoulders, areas of muck, swamp, lake/pond bottom, etc.

Grain Size (Sieve) Analysis with or without Hydrometer

Grain Size Analysis tests were performed to determine the particle size distribution of selected samples tested. The grain size distribution of soils coarser than a number 200 sieve was determined by passing the samples through a standard set of nested sieves. Materials finer than the number 200 sieves were suspended in water and the grain size distribution computed from the time rate of settlement of the different size particles. Air-dried soil passed through #200 sieve. 50 grams of that must soak in s/c agent for a minimum of 8 hours. Soil is then put in graduated cylinder with a hydrometer. Readings are taken at specified times. A graph is drawn from data. These tests were similar to those described by ASTM D 421 and D 422. The data obtained are summarized on the enclosed Summary of USCS Test Data.

Liquid and Plastic Limits (Atterberg Limits)

Liquid Limit and Plastic Limit tests aid in the classification of the soils and provide an indication of the soil behavior with moisture change. The Plasticity Index is calculated by subtracting the Plastic Limit (PL) from the Liquid Limit (LL). The Liquid Limit is the moisture content at which the soil will flow as a heavy viscous fluid and is the upper limit of the plastic range, as determined in accordance with ASTM D 4318. The Plastic Limit is the moisture content at which the soil begins to lose its plasticity, as determined in accordance with ASTM D 4318. The Liquidity Index is the ratio of the difference between the in-place moisture and the plastic limit to the Plasticity Limit. The data obtained are summarized on the enclosed Summary of USCS Test Data.

Consolidation

A section of a selected undisturbed sample was extruded from its sampling tube for consolidation testing. The section was trimmed into a disc 2.5 inches in diameter and 1.0 inch thick. The disc was confined in a stainless steel ring and sandwiched between porous stone plates. After being submerged in water, the sample was then subjected to incrementally increasing vertical loads and the resulting deformations measured with a micrometer dial gauge. This test procedure is described by ASTM D 2435.

SUMMARY OF USCS TESTS

Project No.: 2015.0839.03
Project Name: Sandy Springs Circle Streetscape

Sandy Springs Project No.: CC – 0010
P.I. No.: 0010385
County: Fulton

Sample No.	1	2	3	4
Lab Sample No.	4	5	6	7
Station	78 + 10, 48'R	78 + 10, 48'R	79 + 45, 48'R	79 + 50, 48'R
Location	Wall G	Wall G	Wall G	Wall G
Depth (ft)	1.0 – 2.5	3.5 – 5.0	3.5 – 5.0	8.5 – 10.0
PHYSICAL TESTS				
2-1/2" Sieve	100	100	100	100
1-1/2" Sieve	100	100	100	100
#10 Sieve	97.1	93.2	91.9	92.2
#40 Sieve	81.1	76.0	60.4	67.8
#60 Sieve	72.7	68.5	49.9	61.1
#200 Sieve	57.0	51.5	31.4	43.3
Liquid Lmt. (%)	60	54	40	55
Plast. Index (%)	27	18	13	21
Moisture (%)	19.7	19.5	13.0	24.5
Organics (%)	-	-	-	-
Unified Soil Classification	MH	MH	SM	SM
TESTING DATES				
Date Sampled	6/29/2016	6/29/2016	6/29/2016	6/29/2016
Date Completed	7/12/2016	7/12/2016	7/12/2016	7/12/2016
Date Received	7/19/2016	7/19/2016	7/19/2016	7/19/2016

Remarks: _____

Respectfully Submitted: Mahvand Salehi

SUMMARY OF USCS TESTS

Project No.: 2015.0839.03
Project Name: Sandy Springs Circle Streetscape

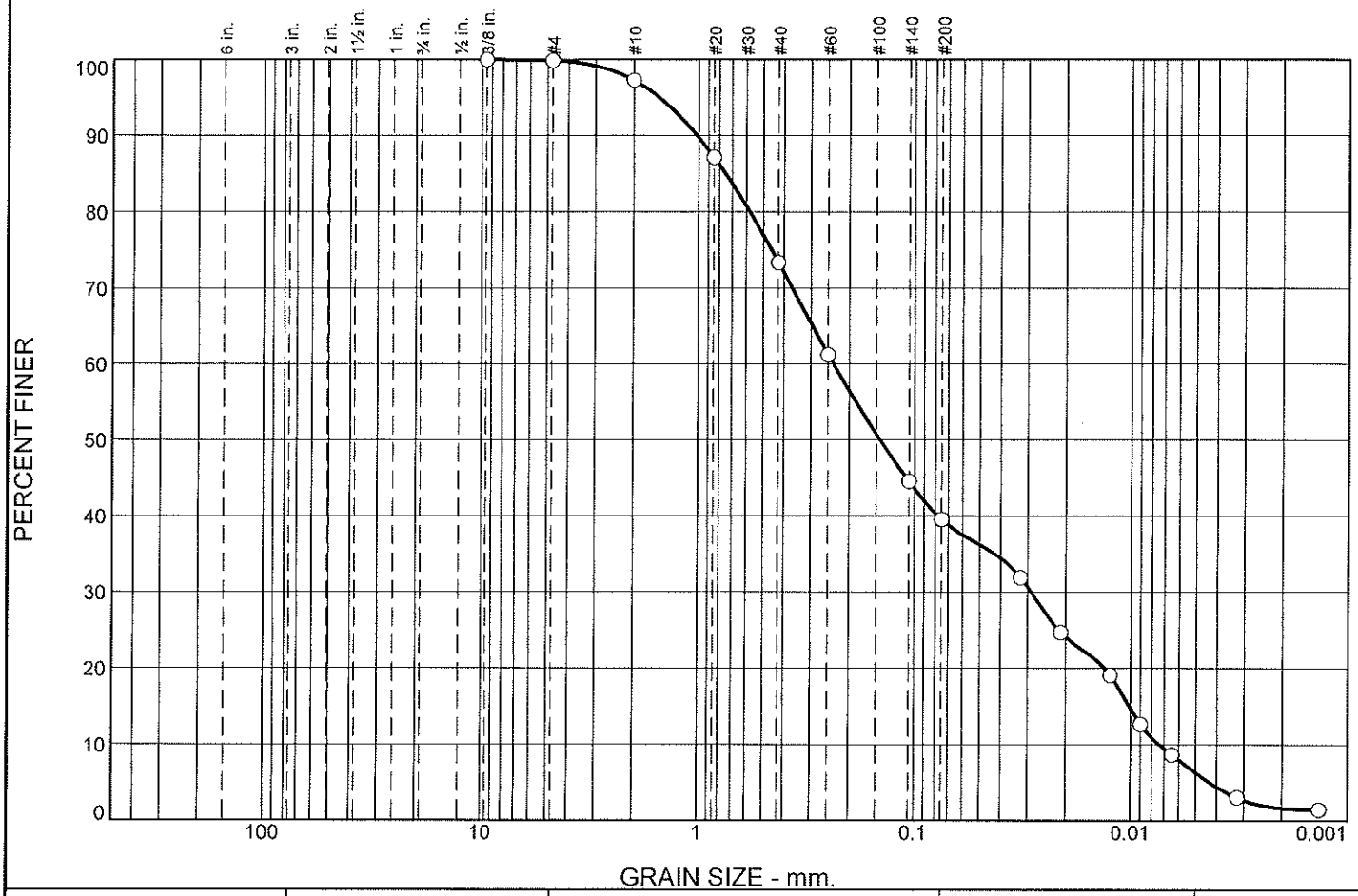
Sandy Springs Project No.: CC – 0010
P.I. No.: 0010385
County: Fulton

Sample No.	5	6	-	-
Lab Sample No.	UD-1	9	-	-
Station	80 + 50, 60'R	80 + 50, 62'R	-	-
Location	Wall G	Wall G	-	-
Depth (ft)	5.0 – 7.0	6.0 – 7.5	-	-
PHYSICAL TESTS				
2-1/2" Sieve	100	100	-	-
1-1/2" Sieve	100	100	-	-
#10 Sieve	97.3	96.9	-	-
#40 Sieve	73.3	74.7	-	-
#60 Sieve	61.2	64.9	-	-
#200 Sieve	39.6	44.2	-	-
Liquid Lmt. (%)	56	56	-	-
Plast. Index (%)	19	15	-	-
Moisture (%)	23.2	25.4	-	-
Organics (%)	-	-	-	-
Unified Soil Classification	SM	SM		
TESTING DATES				
Date Sampled	6/30/2016	6/30/2016		
Date Completed	7/12/2016	7/5/2016		
Date Received	7/19/2016	7/19/2016		

Remarks: _____

Respectfully Submitted: Mahvand Salili

Particle Size Distribution Report



% +3"	% Gravel	% Sand	% Silt	% Clay
0.0	0.1	60.3	33.3	6.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375	100.0		
#4	99.9		
#10	97.3		
#20	87.1		
#40	73.3		
#60	61.2		
#140	44.6		
#200	39.6		

* (no specification provided)

Material Description

Sand, some silt, trace clay and gravel, purple

Atterberg Limits

PL= 37 LL= 56 PI= 19

Coefficients

D_{90}= 1.0198 D_{85}= 0.7513 D_{60}= 0.2367
D_{50}= 0.1443 D_{30}= 0.0289 D_{15}= 0.0101
D_{10}= 0.0074 C_u= 31.97 C_c= 0.48

Classification

USCS= SM AASHTO= A-7-5(4)

Remarks

Location: 80+50,60'R
Sample Number: UD-1 **Depth:** 5.0-7.0 ft **Date:** 7/5/16

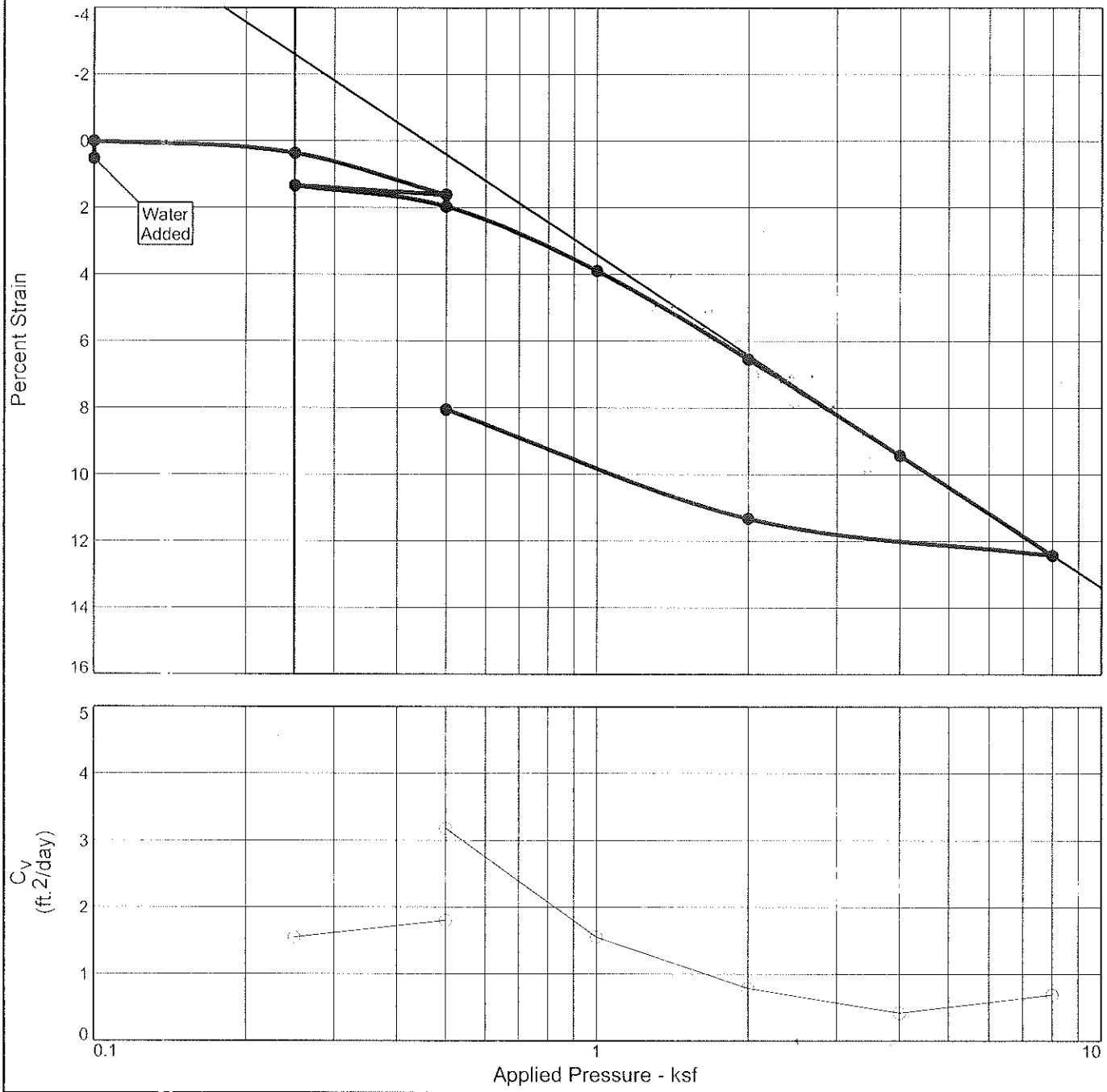
United Consulting

Norcross, Georgia

Client: MICHAEL BAKER INTL.
Project: PI 0010385 SANDY SPRINGS CIRCLE STREETSCAPE

Project No: 2015.0839.03 **Figure**

CONSOLIDATION TEST REPORT-METHOD B



Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_r	Initial Void Ratio
58.8 %	22.0 %	83.1	56	19	2.65	0.5	0.5	0.20	0.05	0.990

MATERIAL DESCRIPTION	USCS	AASHTO
Sand, some silt, trace clay and gravel, purple	SM	A-7-5(4)

Project No. 2015.0839.03 **Client:** MICHAEL BAKER INTL.

Project: PI 0010385 SANDY SPRINGS CIRCLE STREETSCAPE

Location: 80+50,60'R **Depth:** 5.0-7.0 ft **Sample Number:** UD-1

Remarks:

United Consulting

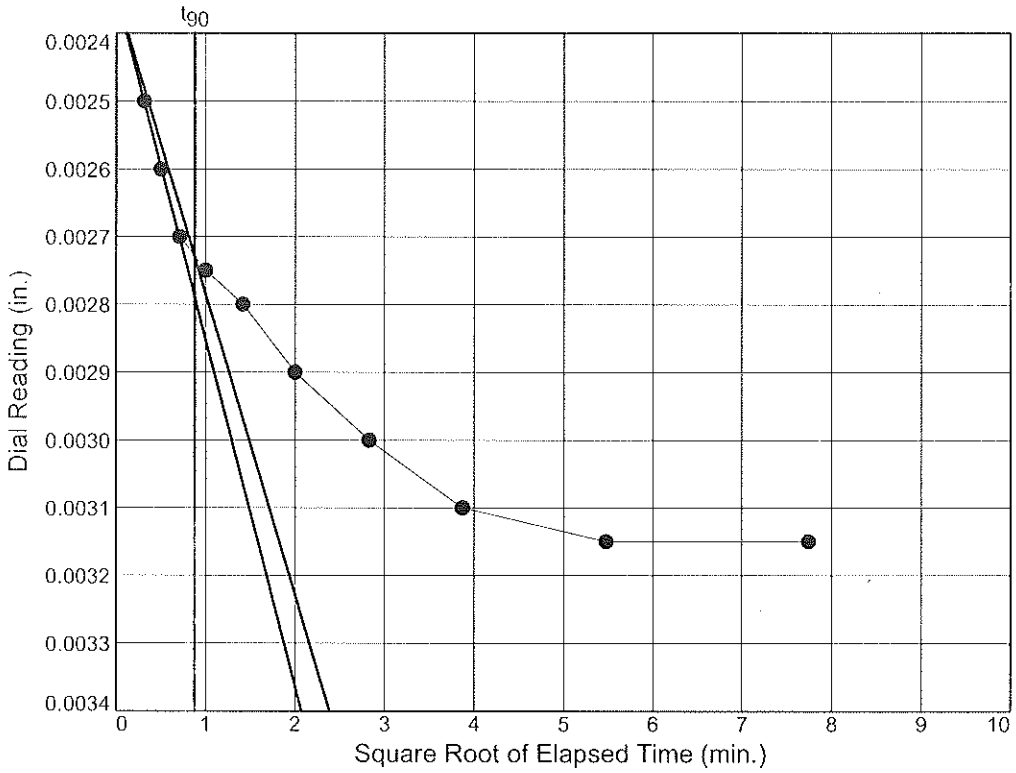
Norcross, Georgia

Figure

Dial Reading vs. Time

Project No.: 2015.0839.03
Project: PI 0010385 SANDY SPRINGS CIRCLE STREETSCAPE

Location: 80+50,60'R Depth: 5.0-7.0 ft Sample Number: UD-1



Load No.= 3

Load= 0.25 ksf

D_0 = 0.0023

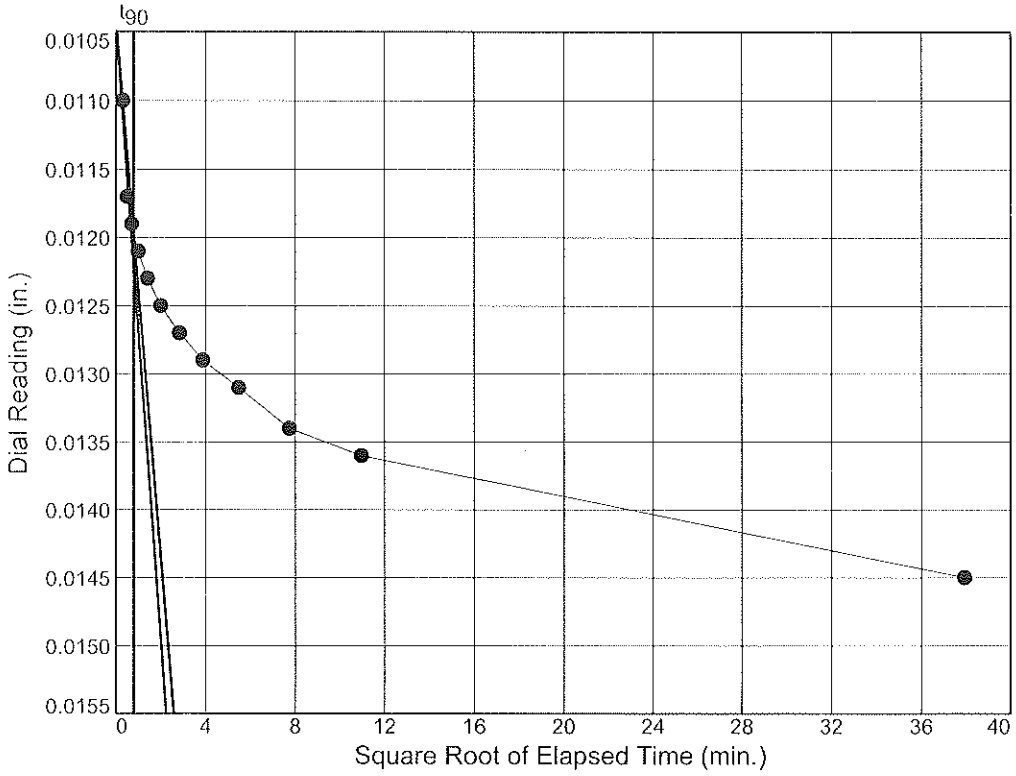
D_{90} = 0.0027

D_{100} = 0.0028

T_{90} = 0.77 min.

C_v @ T_{90}

1.547 ft.^{2}/day



Load No.= 4

Load= 0.50 ksf

D_0 = 0.0104

D_{90} = 0.0120

D_{100} = 0.0121

T_{90} = 0.64 min.

C_v @ T_{90}

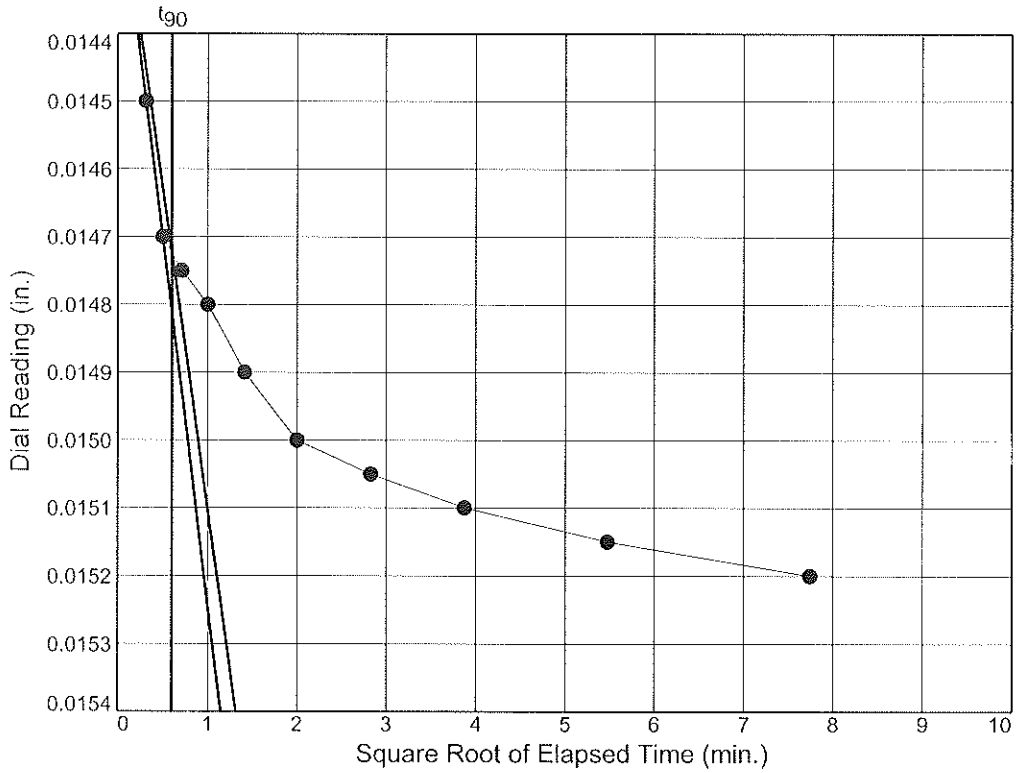
1.800 ft.^{2}/day

Figure

Dial Reading vs. Time

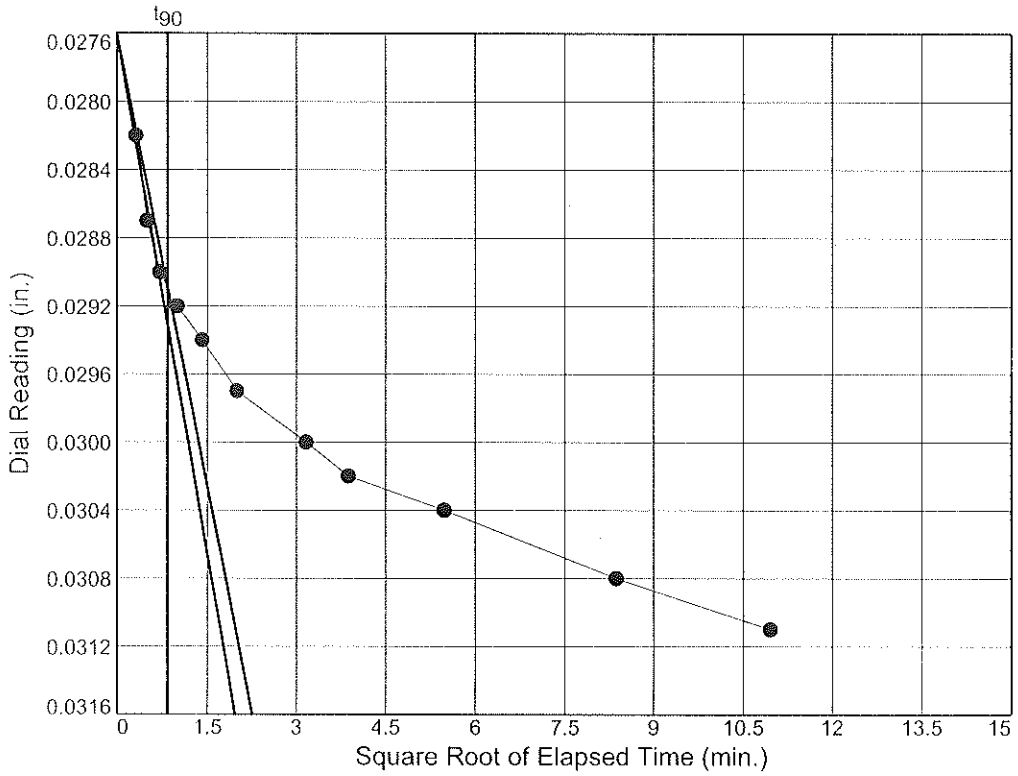
Project No.: 2015.0839.03
Project: PI 0010385 SANDY SPRINGS CIRCLE STREETSCAPE

Location: 80+50,60'R Depth: 5.0-7.0 ft Sample Number: UD-1



Load No.= 6
Load= 0.50 ksf
D_0 = 0.0142
D_{90} = 0.0147
D_{100} = 0.0148
T_{90} = 0.36 min.

C_v @ T_{90}
3.175 ft.^{2}/day



Load No.= 7
Load= 1.00 ksf
D_0 = 0.0276
D_{90} = 0.0291
D_{100} = 0.0293
T_{90} = 0.71 min.

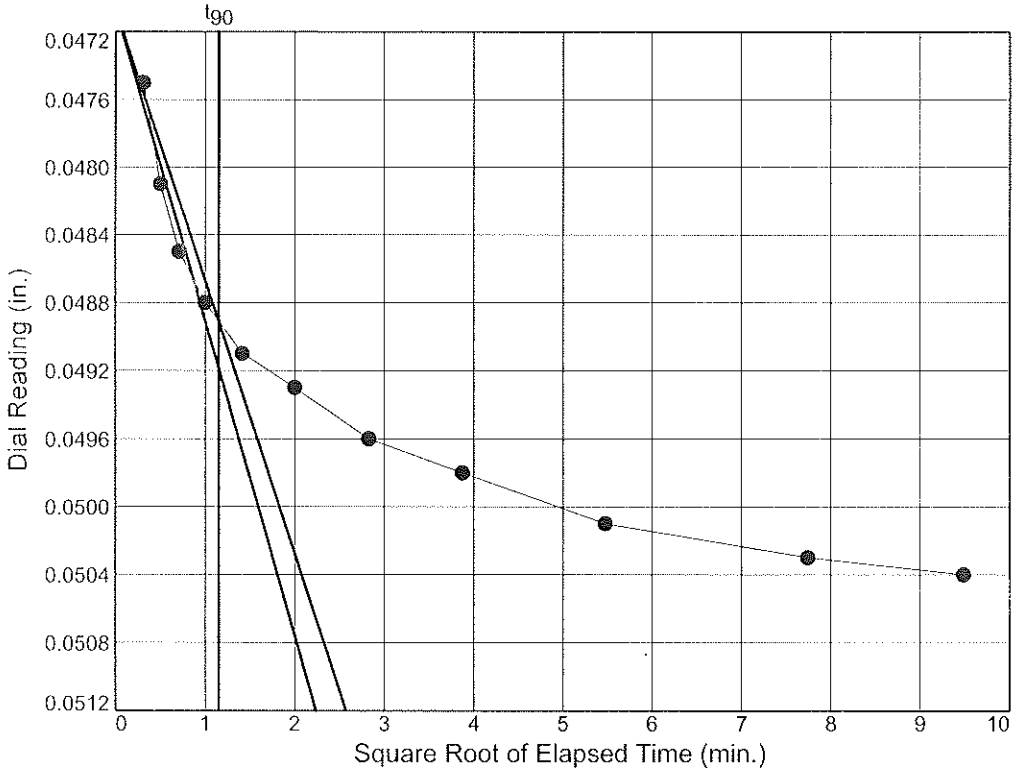
C_v @ T_{90}
1.552 ft.^{2}/day

Figure

Dial Reading vs. Time

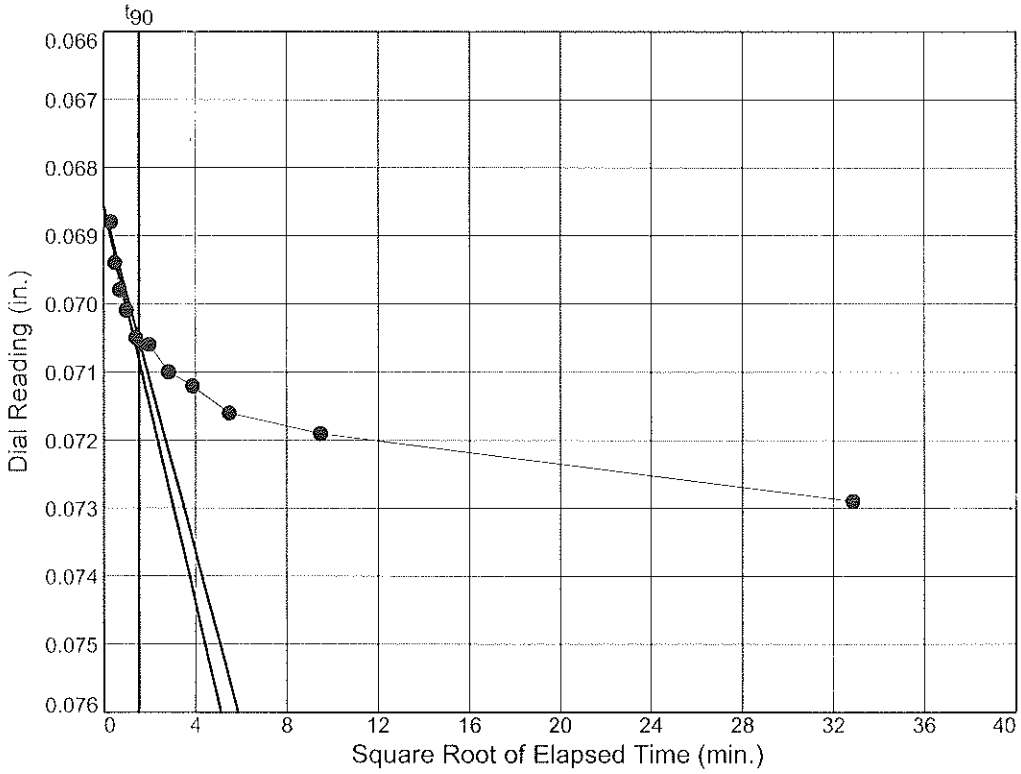
Project No.: 2015.0839.03
Project: PI 0010385 SANDY SPRINGS CIRCLE STREETSCAPE

Location: 80+50,60'R Depth: 5.0-7.0 ft Sample Number: UD-1



Load No.= 8
Load= 2.00 ksf
D_0 = 0.0471
D_{90} = 0.0489
D_{100} = 0.0491
T_{90} = 1.33 min.

C_v @ T_{90}
0.788 ft.^{2}/day



Load No.= 9
Load= 4.00 ksf
D_0 = 0.0686
D_{90} = 0.0705
D_{100} = 0.0707
T_{90} = 2.37 min.

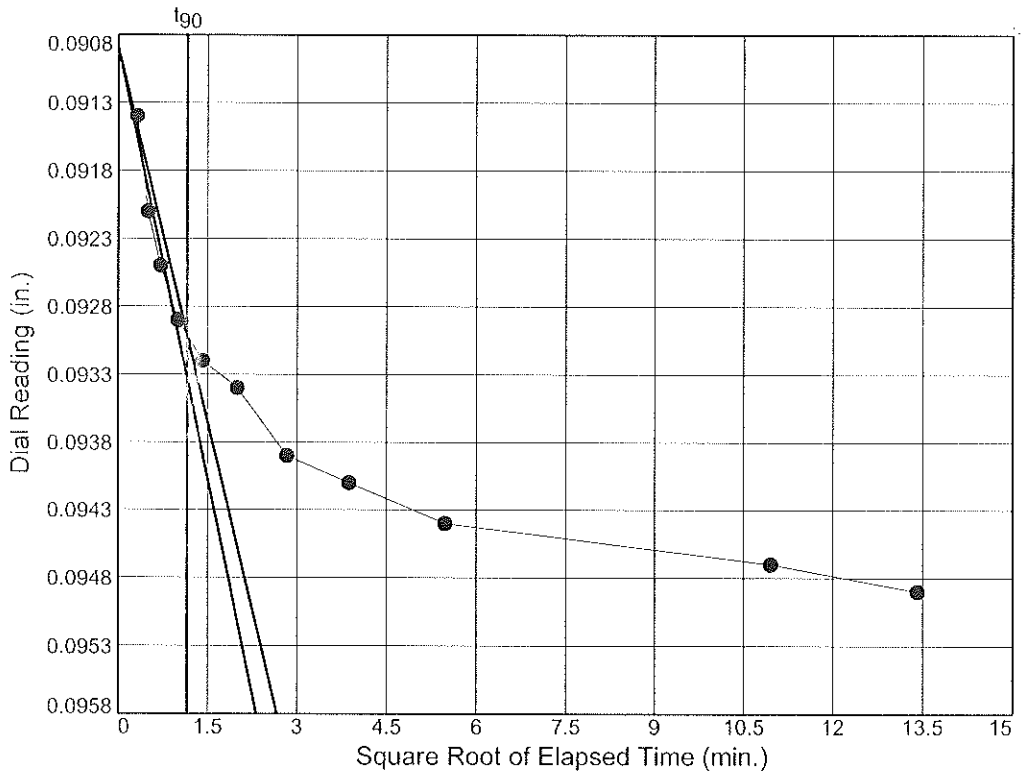
C_v @ T_{90}
0.414 ft.^{2}/day

Figure

Dial Reading vs. Time

Project No.: 2015.0839.03
Project: PI 0010385 SANDY SPRINGS CIRCLE STREETSCAPE

Location: 80+50,60'R Depth: 5.0-7.0 ft Sample Number: UD-1



Load No.= 10

Load= 8.00 ksf

D_0 = 0.0909

D_{90} = 0.0930

D_{100} = 0.0932

T_{90} = 1.33 min.

C_v @ T_{90}

0.691 ft.^{2}/day

APPENDIX C

Site Photographs (1 Page)

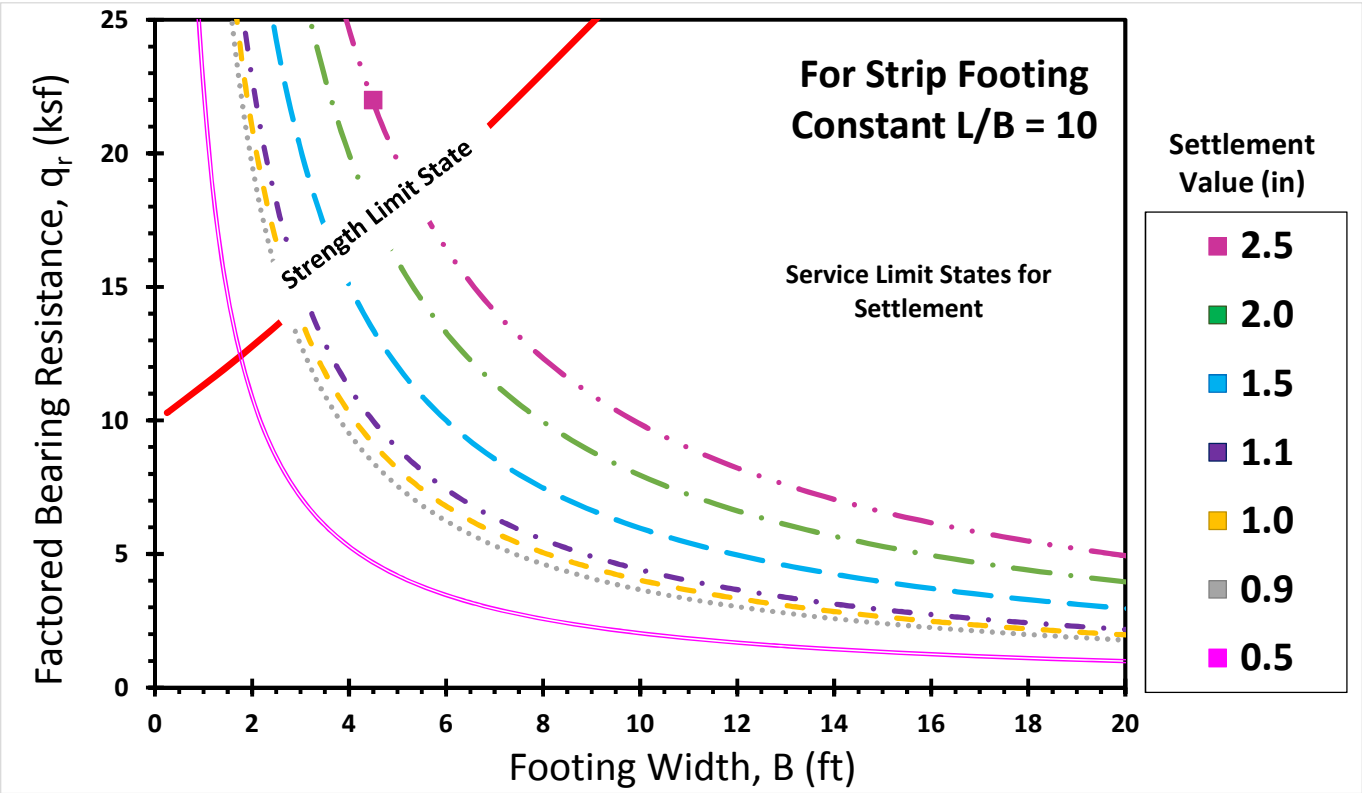
Looking in increasing station from station 77 + 75±, 45’R

Looking in decreasing station from station 80 + 75±, 55’R

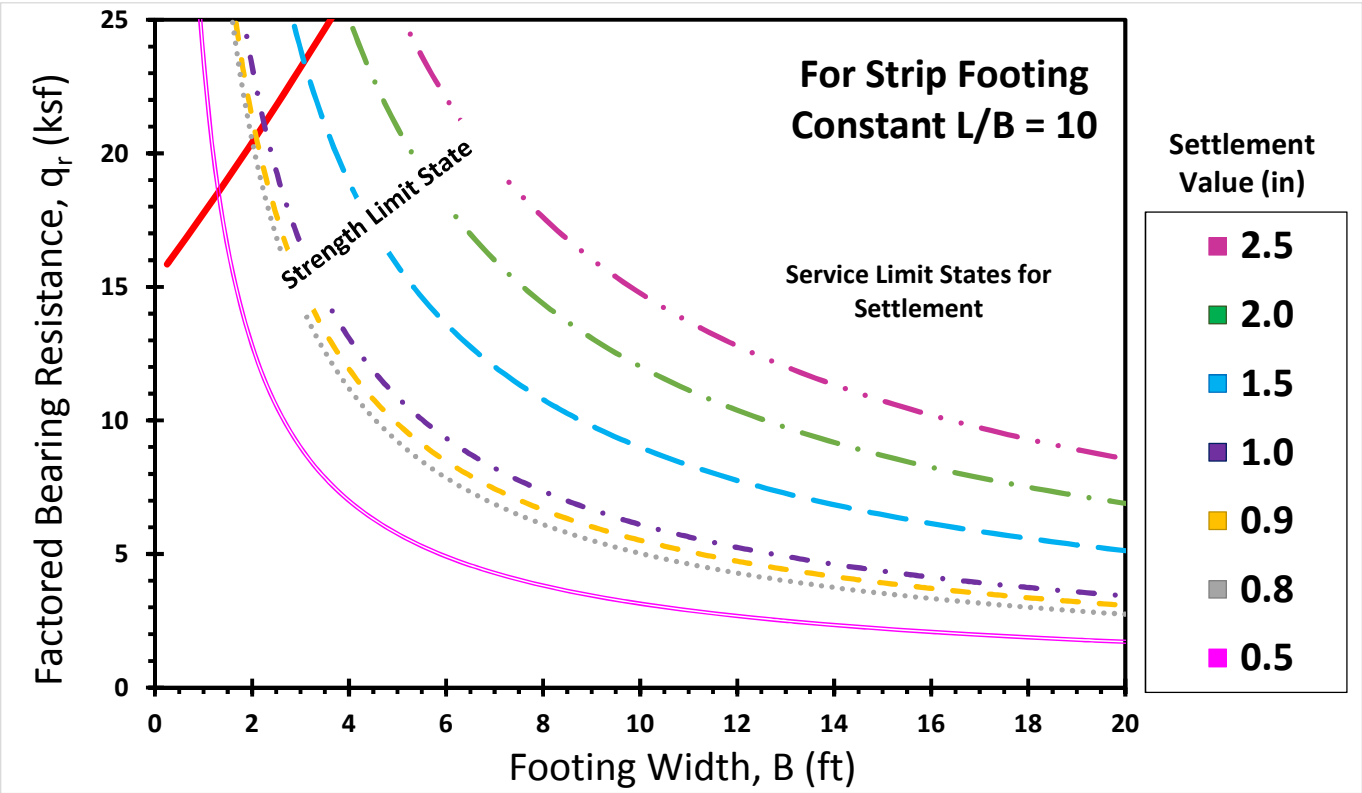
APPENDIX D

Factored Bearing Resistance vs. Footing Width (4-pages)
Global Slope Stability Analysis – Wall G (1-page)
Site Class Calculation (1 -page)

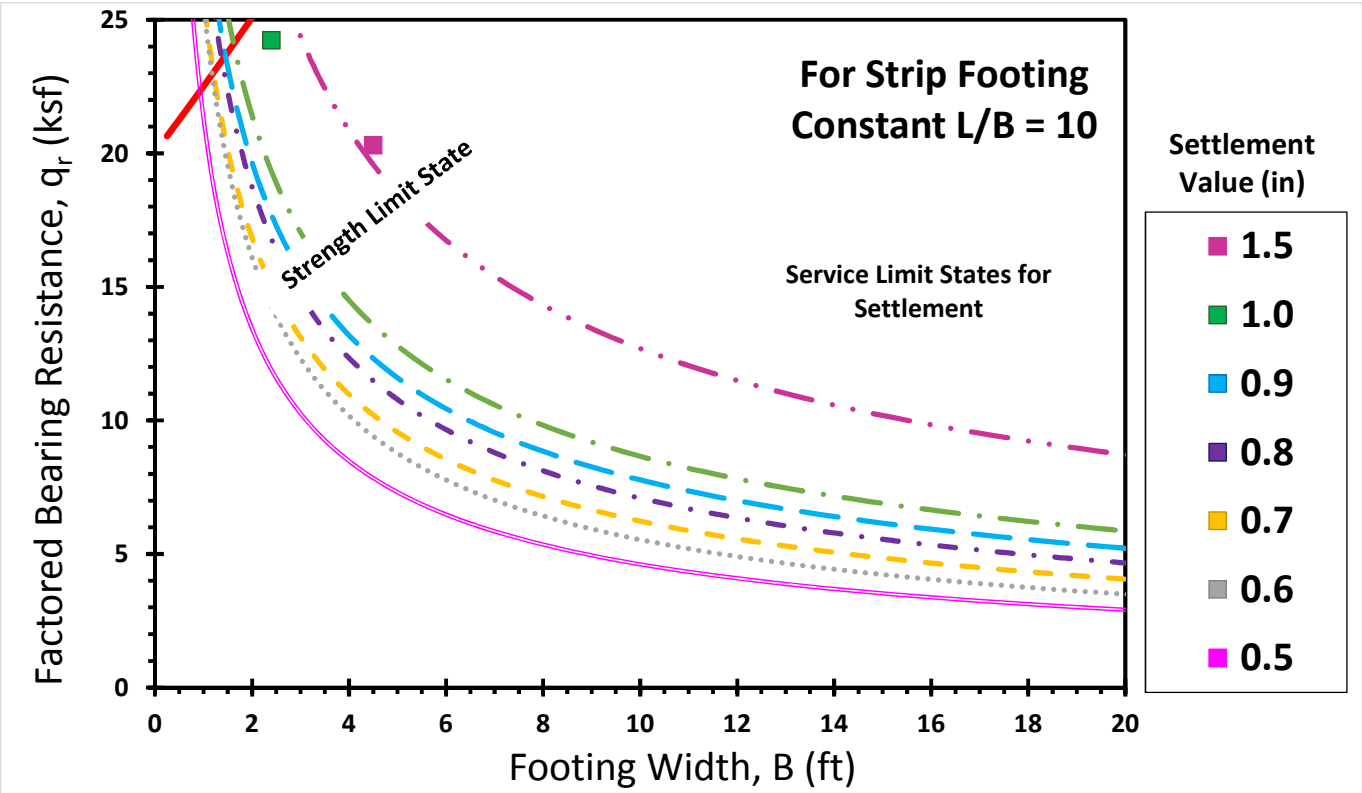
Station 78+00 to Station 78+80, Wall G



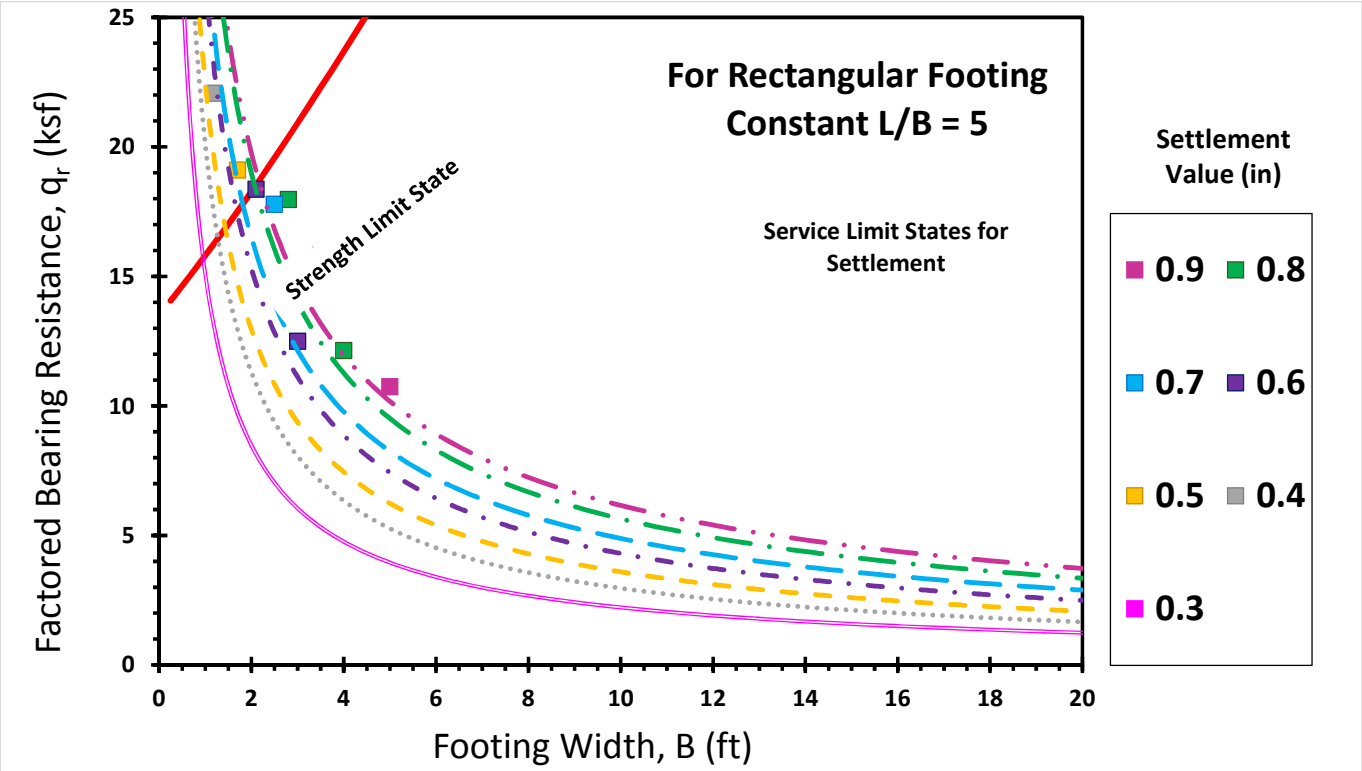
Station 78+80 to Station 79+60, Wall G

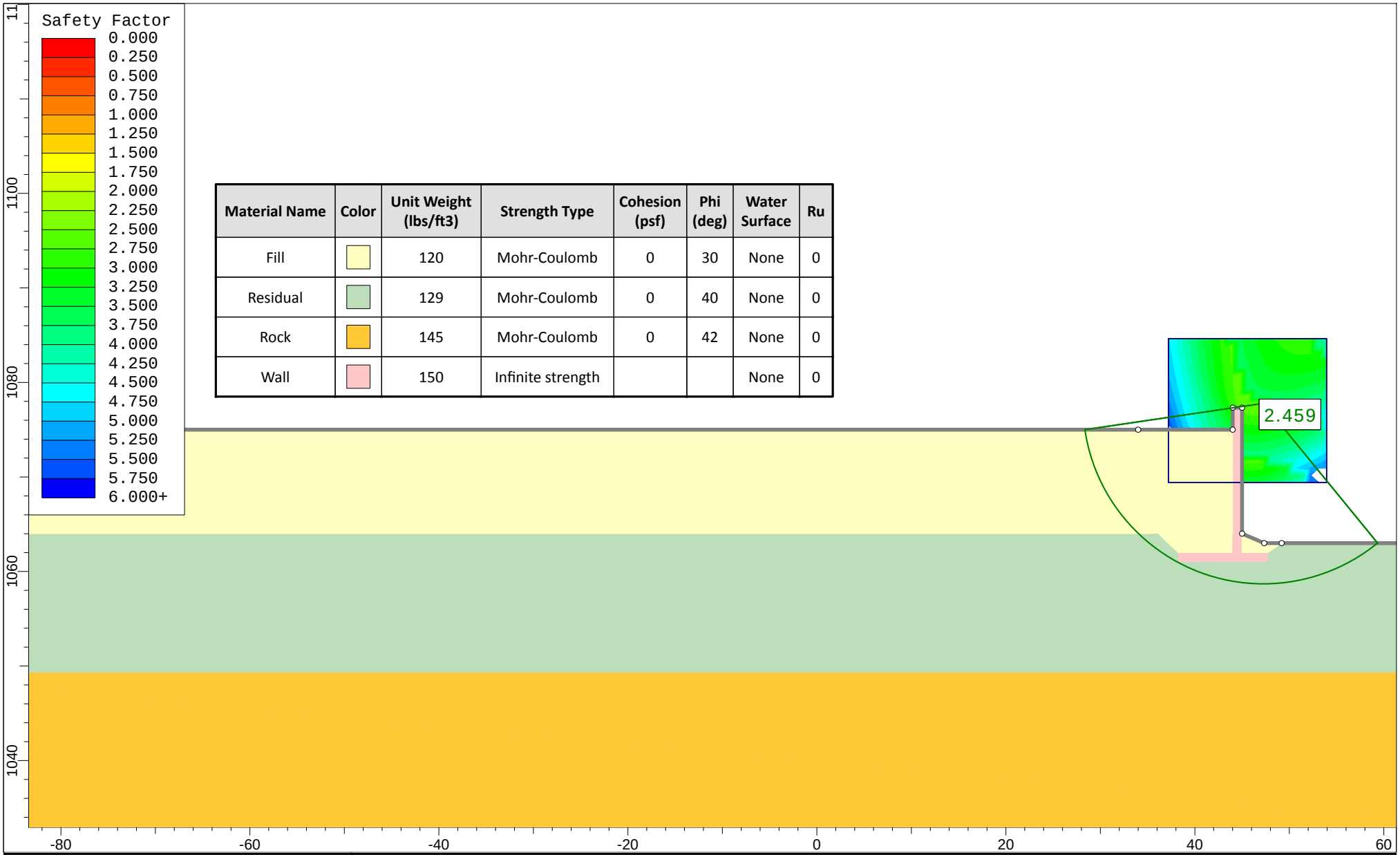


Station 79+60 to Station 80+37, Wall G



Station 80+37 to Station 80+62, Wall G





Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
Fill		120	Mohr-Coulomb	0	30	None	0
Residual		129	Mohr-Coulomb	0	40	None	0
Rock		145	Mohr-Coulomb	0	42	None	0
Wall		150	Infinite strength			None	0

SLIDEINTERPRET 7.022

Project	SANDY SPRINGS CIRCLE STREETSCAPE WALL G - SLOPE STABILITY - STEADY STATE CONDITION		
Analysis Description	Soil's angle of internal friction and unit weight for foundation soils were obtained from GDOT provided spreadsheet		
Drawn By	NP	*Scale* 1:168	*Company* UNITED CONSULTING
Date	7/14/2016, 9:34:54 AM		*File Name* WALL G.sli

Seismic Site Class Analysis

Sandy Springs Circle Streetscape Phase II

Hammer Efficiency= 97 %

			N-Values or Sc						Di/Ni					
			Sta.78+10	Sta.79+45	Sta.79+50	Sta.80+50			Sta.78+10	Sta.79+45	Sta.79+50	Sta.80+50	0	0
Depth			Field	Field	Field	Field	Field	Field	Corrected					
0	to	3	11	14	18	6			0.17	0.13	0.10	0.31		
3	to	6	23	26	43	13			0.08	0.07	0.04	0.14		
6	to	8	22	47	100	11			0.06	0.03	0.02	0.11		
8	to	13	31	62	23	14			0.10	0.05	0.13	0.22		
13	to	18	37	30	100	100			0.08	0.10	0.05	0.05		
18	to	23	37	31	100	100			0.08	0.10	0.05	0.05		
23	to	28	37	100	100	100			0.08	0.05	0.05	0.05		
28	to	33	100	100	100	100			0.05	0.05	0.05	0.05		
33	to	38	100	100	100	100			0.05	0.05	0.05	0.05		
38	to	43	100	100	100	100			0.05	0.05	0.05	0.05		
43	to	48	100	100	100	100			0.05	0.05	0.05	0.05		
48	to	53	100	100	100	100			0.05	0.05	0.05	0.05		
53	to	58	100	100	100	100			0.05	0.05	0.05	0.05		
58	to	63	100	100	100	100			0.05	0.05	0.05	0.05		
63	to	68	100	100	100	100			0.05	0.05	0.05	0.05		
68	to	73	100	100	100	100			0.05	0.05	0.05	0.05		
73	to	78	100	100	100	100			0.05	0.05	0.05	0.05		
78	to	83	100	100	100	100			0.05	0.05	0.05	0.05		
83	to	88	100	100	100	100			0.05	0.05	0.05	0.05		
88	to	93	100	100	100	100			0.05	0.05	0.05	0.05		
93	to	95	100	100	100	100			0.02	0.02	0.02	0.02		
95	to	100	100	100	100	100			0.05	0.05	0.05	0.05		

N-bar =	72.67	79.80	85.42	60.41
Site Class =	C	C	C	C
Average N-bar=	74.57			
Overall Site Class=	C			

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a civil engineer may not fulfill the needs of a constructor — a construction contractor — or even another civil engineer. Because each geotechnical- engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. No one except you should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you* — should apply this report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical-engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

Geotechnical Engineers Base Each Report on a Unique Set of Project-Specific Factors

Geotechnical engineers consider many unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk-management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical-engineering report that was:

- not prepared for you;
- not prepared for your project;
- not prepared for the specific site explored; or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical-engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical-engineering report is based on conditions that existed at the time the geotechnical engineer performed the study. *Do not rely on a geotechnical-engineering report whose adequacy may have been affected by*: the passage of time; man-made events, such as construction on or adjacent to the site; or natural events, such as floods, droughts, earthquakes, or groundwater fluctuations. *Contact the geotechnical engineer before applying this report to determine if it is still reliable.* A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ — sometimes significantly — from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide geotechnical-construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are Not Final

Do not overrely on the confirmation-dependent recommendations included in your report. *Confirmation-dependent recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations *only* by observing actual subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's confirmation-dependent recommendations if that engineer does not perform the geotechnical-construction observation required to confirm the recommendations' applicability.*

A Geotechnical-Engineering Report Is Subject to Misinterpretation

Other design-team members' misinterpretation of geotechnical-engineering reports has resulted in costly

problems. Confront that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Constructors can also misinterpret a geotechnical-engineering report. Confront that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing geotechnical construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical-engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make constructors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give constructors the complete geotechnical-engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise constructors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure constructors have sufficient time* to perform additional study. Only then might you be in a position to give constructors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and constructors fail to recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Environmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform an *environmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold-prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, many mold- prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical- engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; *none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.*

Rely, on Your GBC-Member Geotechnical Engineer for Additional Assistance

Membership in the Geotechnical Business Council of the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you GBC-Member geotechnical engineer for more information.

GEOTECHNICAL BUSINESS COUNCIL
of the Geoprofessional Business Association

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