REPORT

Retaining Wall Foundation Exploration

Morgan Falls Road Improvements Wall No. 10 P.I. No. 0010652 Fulton County Sandy Springs, GA

Project Number 2013.3559.02

January 14, 2016
Rev. April 29, 2016

We're here for you

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Fulton County
P.I. No. 0010652

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January 14, 2016
Rev. April 29, 2016

Mr. William "Marty" Martin
City of Sandy Springs
Public Works Department
7840 Roswell Road
Building 500
Sandy Springs, Georgia 30350

Via E-Mail: MMartin@sandyspringsga.gov

RE: Report of Retaining Wall Foundation Exploration
Morgan Falls Road Improvements – Wall No. 10
Sandy Springs, Fulton County, Georgia
UC Project No. **2013.3559.02**

Dear Mr. Martin:

United Consulting is pleased to submit this Report of Retaining Wall Foundation Exploration for the above-referenced project site. This revision is based on an email from Georgia Department of Transportation – Office of Material Research dated April 28, 2016. 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

Rafael I. Ospina, P.E.
Senior Geotechnical Engineer

LR/MM/RIO/nj

http://ucblade10/sites/Geotechenv/10549/2013.3559.02/Geotechnical Documents/2013.3559.02 WFl..doc

Rev April 29, 2016

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RETAINING WALL FOUNDATION EXPLORATION
Morgan Falls Road Improvements – Wall No. 10
Fulton County
P.I. No. 0010652

1. Location/ Description

The project is associated with construction of retaining wall number 10 close to the eastern boundary of Morgan Falls Park. The proposed retaining wall will either be constructed as a Mechanically Stabilized Earth (MSE) wall requiring excavation of material for construction of the wall, or soil nail wall as a top down construction system. The wall will be approximately 235 feet long and 14.5 feet maximum height. The project lies within the city limits of Sandy Springs in Fulton County, Georgia.

2. Geology

This project is geologically sited in the Factory Shoals Formation of the Georgia Piedmont Region.

3. Subsurface Information

Two (2) Standard Penetration Test SPT borings and two (2) offset straight auger borings were drilled on this project site. The boring at Station 0+25 encountered about 3 feet of fill, and the boring at Station 1+50 encountered about 13 feet of fill. Residual soils were encountered below the fill soils in both of the borings. Partially Weathered Rock (PWR) was encountered in the borings drilled at Station 0+25 and Station 1+50 at depths of 28 feet and 29 feet, respectively. There was also a lens of PWR at a depth from 24 feet to 26 feet in the boring drilled at Station 0+25. The soils consisted generally of sand with varying amounts of silt, clay, mica, root hairs, and rock fragments. There were thin layers of silt with varying amounts of sand and trace amounts of clay and mica in the boring.

Auger refusal indicating presence of hard rock occurred in the boring drilled at Station 1+50 at the depth of 37 feet (Elev. 861.5 feet).

No groundwater was encountered in the borings at the time of drilling.

Please refer to the attached boring logs for additional information.

4. Proposed Wall

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

Wall	Station to Station	Location	Type	Approx. Max. Ht (ft)
10	0+00 to 2+34.83	CL	MSE, Soil Nail, or GDOT PW-1	14

5. Soil Parameters for Retaining Wall

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

MSE (Retained In-Situ Soils) or Soil Nail Wall:

Depth of 0 to 15

Cohesion	C = 0 psf
Soil Unit Weight	γ = 120 pcf
Soil Angle of Internal Friction	ϕ = 30°
Coefficient of Sliding Friction (MSE)	μ= 0.36 (includes FS=1.5)

Depth of below 15 feet

Cohesion	C = 0 psf
Soil Unit Weight	γ = 125 pcf
Soil Angle of Internal Friction	ϕ = 32°
Coefficient of Sliding Friction (MSE)	μ= 0.39 (includes FS=1.5)

6. Recommendations

- We recommend a maximum allowable soil bearing pressure of 3,000 psf be used in design of the proposed MSE retaining wall.
- The soil within the top 15 feet is considered as Type C. Type C soils should be sloped with a maximum slope of 1.5(H): 1(V) for temporary condition during construction. If the proposed wall will be an MSE retaining wall, the retained soils should be properly sloped during construction.
- Internal Drainage through the wall should be included as part of the design and construction.
- The final ground surface should be design to drain away from the face of the MSE wall.
- Penetration of storm sewer pipes through the MSE or soil nail walls should be avoided at all possible.

7. Groundwater

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

8. Special Problems

A. All temporary sloped should comply with applicable OSHA regulations.

B. An existing underground storm drain culvert exists to the west of the proposed wall.

C. A paddle storage area is located very close to the construction limits of this project. Vibrations from construction may cause some distress of the storage area.

LIMITATIONS

This report is for the exclusive use of the **City of Sandy Springs**, 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.

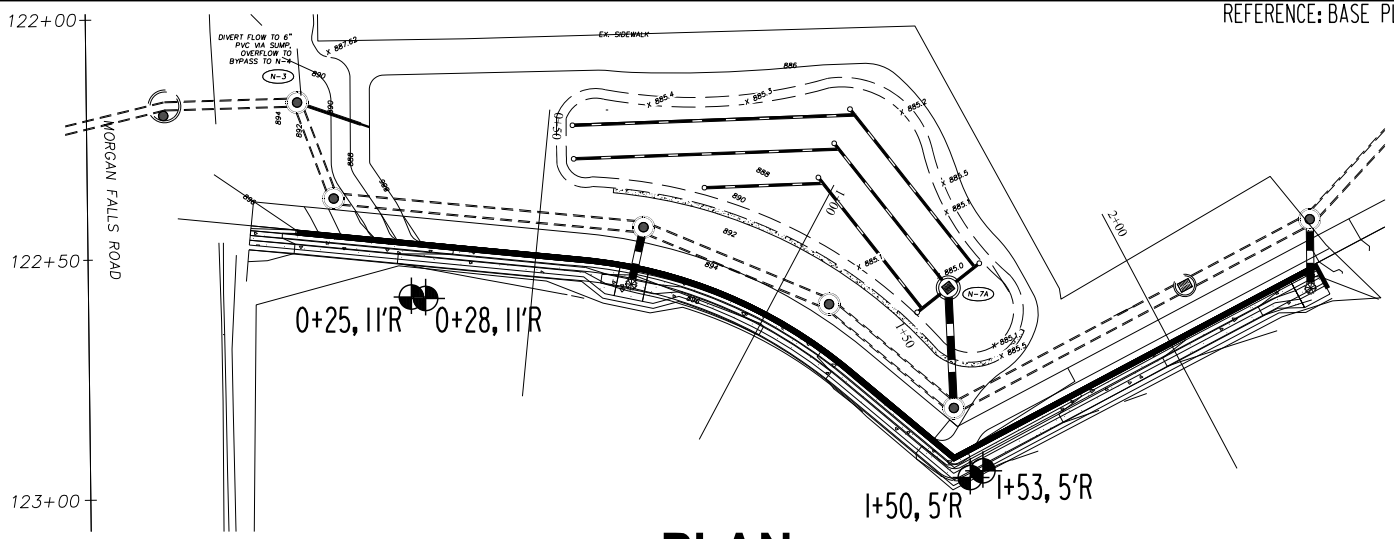
If the design or location of the project is changed, the recommendations contained herein, must be considered invalid unless our firm reviews the changes and our recommendations are either verified or modified in writing.

Prepared By Lonnie Rucker, E.I.T.

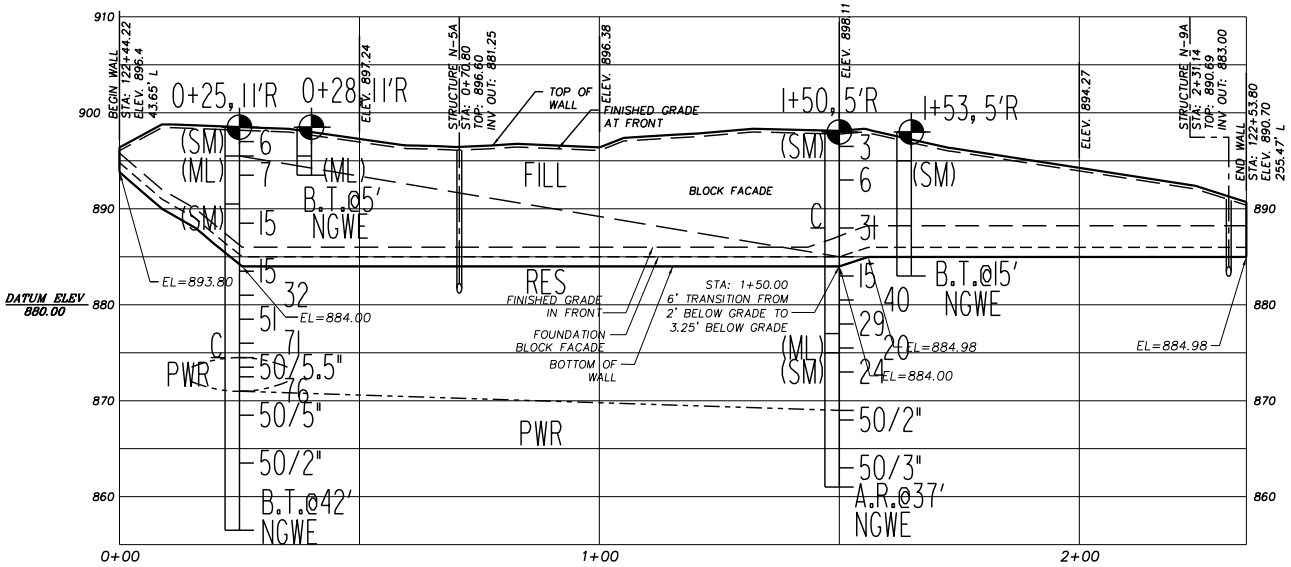
Reviewed By Mehdi Moazzami, Ph.D., P.E.

SCALE: NTS	DATE: 01/05/2016	PROJECT NO: 2013.3559.02	TITLE: **PROJECT LOCATION MAP**	**FIG. A**
PREPARED: LR	CHECKED:	REVISIONS:	MORGAN FALLS ROAD IMPROVEMENTS – WALL NO. 10 Fulton County, Georgia, P.I. No. 0010652	
CLIENT: **CITY OF SANDY SPRINGS**			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 SOUTHEASTERN ENGINEERING, INC. ON 1-7-16.



PLAN



PROFILE

(LOOKING AT BACK FACE OF WALL)
HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=10'

LEGEND

⌖	BORING LOCATION
C	BORING CAVED
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

SCALE: AS SHOWN	DATE: 1-11-16	PROJECT NO: 2013.3559.02	TITLE: BORING LOCATION PLAN & SUBSURFACE PROFILE MORGAN FALLS ROAD - WALL NO. 10 SANDY SPRINGS, FULTON COUNTY, GEORGIA, P.I. NO. 0010652
PREPARED: VPV	CHECKED:	REVISIONS:	
CLIENT: CITY OF SANDY SPRINGS			

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FIG. 1

APPENDIX

General Notes/Description of Drilling Operations
Field Exploration Procedures
Laboratory Testing Procedures
Log of Borings (4)
Summary of USCS Tests (1 page)
Triaxial Shear Test Reports (1)
Site Photographs (2 Pages)

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

SPT Borings

Two (2) SPT borings, designated 0+25, 11'R and 1+50, 5'R, and two (2) offset auger borings, designated 0+28, 11'R and 1+53, 5'R, were drilled near the proposed walls. The depths of borings ranged from 5 feet to 42 feet below the existing grades. The approximate locations of the borings are shown on the attached Boring Location Plan and Profile (Figure 1) provided in The Appendix of this report.

Boring locations were established in the field by the Project Engineer using a measuring tape and hand held compass based on the existing site features and the location of the stakes at the bottom of the existing slope. 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-2488-00). A narrative of field operations is also included in The Appendix.

LABORATORY TESTING PROCEDURES

Moisture Content and In-Situ Density

The moisture content was determined for selected soil samples. A representative portion of each sample was weighed and then placed in an oven and dried at 110 degree 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 the 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 content for which proper compaction may be achieved. The moisture content results are indicated on the boring logs.

In situ density is a useful index for classification. If the soil is to be used as fill, the in situ density can be used for earthwork estimations. The tests are performed on relatively undisturbed samples.

Undisturbed Sampling

Split-barrel samples and/or auger cuttings are suitable for visual examination and classification tests, but are not sufficiently intact for quantitative laboratory testing. Alternate sample methods are required.

For quantitative laboratory testing, relatively undisturbed samples were obtained by pushing sections of three inch O.D., 16 gauge, steel or brass tubing (Shelby tube) into the soil at the desired sampling levels, as described in ASTM D 1587. Each tube, together with the encased soil, was carefully removed from the ground, made airtight, and transported to the laboratory. Locations and depths of undisturbed samples were recorded on each "Log of Boring".

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 sieve 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 a #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

The triaxial Shear test is performed in accordance with ASTM test method D4767. This method provides for the calculation of total and effective stresses and axial compression of test specimens, by measuring of axial load, axial deformation and pore water pressure.

Testing is performed in a triaxial chamber. Three cylindrical specimens with a 2:1 height to diameter ratio are prepared from the UD sample or are remolded based on proctor values. For insufficient recovery, multistage triaxial shear on one specimen may be performed. After preparation, the test specimens is encased in a rubber membrane and placed in the triaxial cell. The specimens are then saturated by applying increasing back pressure to the specimen pore water, forcing the air into solution. The back pressure is increased simultaneously with the chamber pressure to assure a steady pressure differential, typically 2 psi. To avoid undesirable prestressing, the pressures must be applied incrementally, with adequate time between increments to permit equalization of pore-water throughout the sample. The saturation of the sample is verified by measuring the B coefficient.

Once a minimum of 95 % saturation is obtained, the desired confining pressure (effective stress) is applied and the sample is allowed to consolidate.

Once the consolidation of the samples is completed, the triaxial chamber is placed in the axial loading device. Axial load is applied to the specimen using a rate of axial strain that will produce approximate equalization of pore pressure throughout the specimen at failure. This is calculated using the t_{50} of primary consolidation and an estimated % strain at failure. The axial load is increased until the specimen fails in shear or of 15% strain is achieved. Pore pressures are measured for CU tests to help determine total and effective stresses during testing. Strength and deformation properties are determined through the Mohr's strength envelope.

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BORING LOG

CONTRACTED WITH: CITY OF SANDY SPRINGS
BORING NO.: 0+25, 11'R
PROJECT NAME: MORGAN FALLS ROAD-WALL NO. 10
DATE: 01/04/2016
JOB NO.: 2013.3559.02 DRILLER: JOHN DODD RIG: CME 55 LOGGED BY: LR

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W%	NOTES
	NO TOPSOIL	0						
900	Sand-silty, some clay, trace mica, root hairs, and rock fragments; loose; brown-tan (Fill) (SM)		1		2-3-3	11		
	Silt-sandy, some clay, trace mica and rock fragments; firm; tan-brown (Residual) (ML)	5	2		3-2-5	12		
895								
	Sand-some silt, trace clay, mica, and rock fragments; firm; gray-tan (SM)	10	3		6-7-8	18		
890								
		15	4		4-7-8	12		
885								
BoW=884.0	-dense		5		18-15-17	18		
	-very dense	20	6		15-23-28	12		
880								
			7		26-33-38	18		
	Partially weathered rock sampled as Sand-silty, trace clay, mica, and rock fragments; very dense; gray-white (SM)	25	8		43-50/5.5	11		No groundwater encountered at time of boring, borehole caved- in at 24'
875								
			9		24-39-37	18		
	Sand-silty, trace clay, mica, and rock fragments; very dense; gray-white (Residual) (SM)	30	10		50/5	5		
870	Partially weathered rock sampled as Sand-silty, trace clay, mica, and rock fragments; very dense; gray (SM)							
		35	11		50/2	0		No recovery. Split spoon was stuck inside augers.
865	Straight auger to 42' due to split spoon stuck inside augers							
		40						BoW=Approximate Bottom of Wall
860								FULTON COUNTY P.I. No. 0010652

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BORING LOG

CONTRACTED WITH: CITY OF SANDY SPRINGS BORING NO.: 0+25, 11'R
PROJECT NAME: MORGAN FALLS ROAD-WALL NO. 10 DATE: 01/04/2016
JOB NO.: 2013.3559.02 DRILLER: JOHN DODD RIG: CME 55 LOGGED BY: LR

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W%	NOTES
	BORING TERMINATED AT 42'							Boring terminated due to drill rig overheating and split spoon stuck inside augers
855		45						
850		50						
845		55						
840		60						
835		65						
830		70						
825		75						
820		80						
								FULTON COUNTY P.I. No. 0010652

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BORING LOG

CONTRACTED WITH: CITY OF SANDY SPRINGS
BORING NO.: 0+28, 11'R
PROJECT NAME: MORGAN FALLS ROAD-WALL NO. 10
DATE: 01/04/2016
JOB NO.: 2013.3559.02 DRILLER: JOHN DODD RIG: CME 55 LOGGED BY: LR

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W%	NOTES
	NO TOPSOIL	0						
900	Straight auger to 3'							
	Silt-sandy, some clay, trace mica and rock fragments; tan-brown (Residual) (ML)	5		X			23.5	Undisturbed sample taken from 3' to 5'
895	BORING TERMINATED AT 5'							No groundwater encountered at time of boring
		10						
890								
		15						
885								
BoW=884								
		20						
880								
		25						
875								
		30						
870								
		35						
865								
		40						
860								

BoW=Approximate Bottom of Wall

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P.I. No. 0010652

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BORING LOG

CONTRACTED WITH: CITY OF SANDY SPRINGS
BORING NO.: 1+50, 5'R
PROJECT NAME: MORGAN FALLS ROAD-WALL NO. 10
DATE: 01/04/2016
JOB NO.: 2013.3559.02 DRILLER: JOHN DODD RIG: CME 55 LOGGED BY: LR

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W%	NOTES
	NO TOPSOIL	0						
	Sand-some silt and clay, trace mica, root hairs, and rock fragments; very loose; tan-brown (Fill) (SM)		1		2-1-2	16		
895	-loose	5	2		3-3-3	16		
890	-some rock fragments; dense; tan-gray	10	3		10-12-19	12		
885	Sand-some silt, trace clay and mica; firm; tan-brown (Residual) (SM)	15	4		7-6-9	13		
BoW=884.0	-dense; brown-gray		5		9-18-22	18		
880	-medium dense	20	6		10-14-15	9		No groundwater encountered at time of boring, borehole caved- in at 20'
	Silt-some sand, trace clay and mica; very stiff; tan-gray (ML)		7		6-8-12	12		
875	Sand-silty, trace clay and mica; medium dense; brown-black (SM)	25	8		8-10-14	12		
870	Partially weathered rock sampled as Sand-silty, trace clay and mica; very dense; gray-brown (SM)	30	9		31-50/2	8		
865	-trace rock fragments	35	10		24-50/3	9		
860	AUGER REFUSAL AT 37'	40						BoW=Approximate Bottom of Wall FULTON COUNTY P.I. No. 0010652

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BORING LOG

CONTRACTED WITH: CITY OF SANDY SPRINGS
BORING NO.: 1+53, 5'R
PROJECT NAME: MORGAN FALLS ROAD-WALL NO. 10
DATE: 01/04/2016
JOB NO.: 2013.3559.02 DRILLER: JOHN DODD RIG: CME 55 LOGGED BY: LR

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W%	NOTES
	NO TOPSOIL	0						
	Straight auger to 3'							
895	Sand-some silt and clay, trace mica and rock fragments; tan-brown (Fill) (SM)	5		X			21.2	Undisturbed sample taken from 3' to 5'
	Straight auger from 5' to 13'							
890		10						
885	Sand-some silt, trace clay and mica; tan-brown (Residual) (SM)	15		X			23.5	Undisturbed sample taken from 13' to 15'
BoW=884.0	BORING TERMINATED AT 15'							No groundwater encountered at time of boring
880		20						
875		25						
870		30						
865		35						
860		40						BoW=Approximate Bottom of Wall

FULTON COUNTY
P.I. No. 0010652

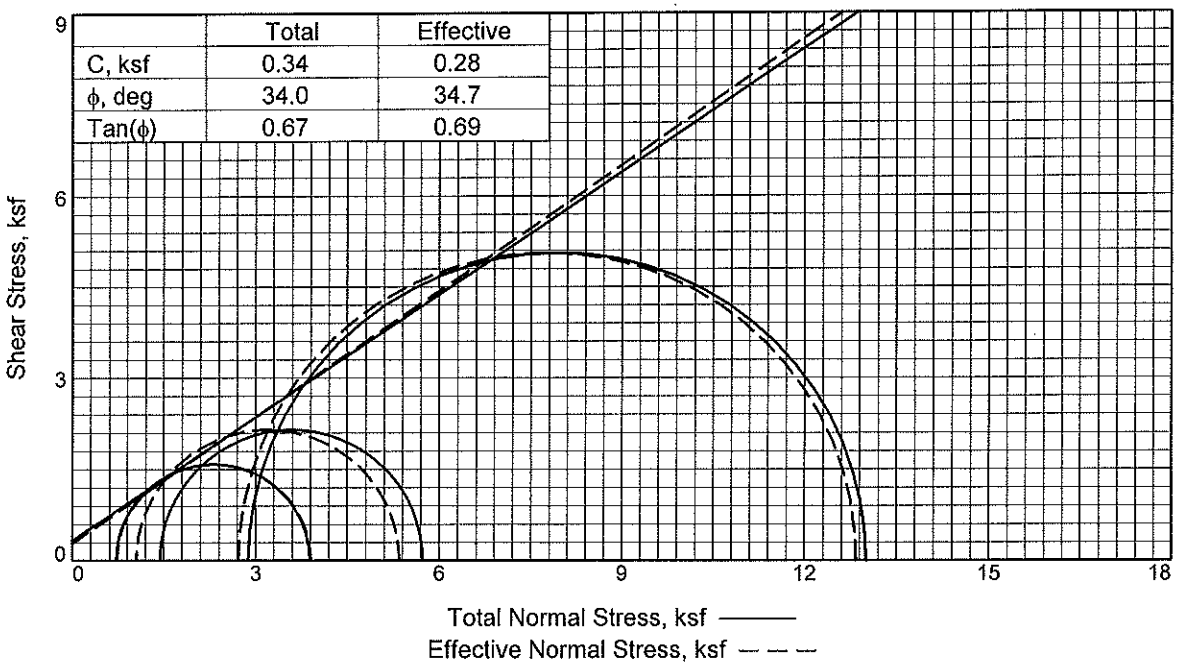
SUMMARY OF USCS TESTS

Project No.:	2013.3559.02	Contract No.:	P.I. No. 0010652
Project Name:	Morgan Falls Road Improvements – Wall No. 10	County:	Fulton

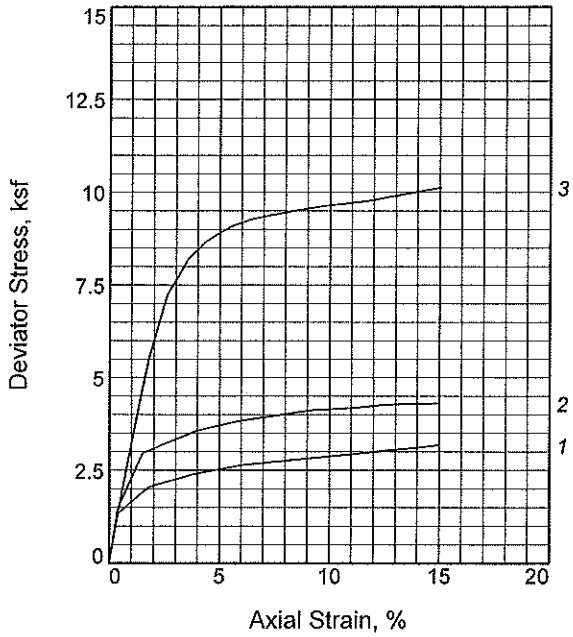
Station	0+28	1+53	1+53	
Location	11' Right	5' Right	5' Right	
Depth (feet)	3-5	3-5	13-15	
2-1/2" Sieve	100	100	100	
1-1/2" Sieve	100	100	100	
#10 Sieve	88.5	86.7	99.8	
#40 Sieve	79.4	65.5	79.8	
#60 Sieve	75.4	52.5	67.9	
#200 Sieve	55.8	36.8	39.3	
Liquid Lmt. (%)	49	41	NP	
Plast. Index (%)	12	13	NP	
Moisture (%)	23.8	21.2	23.5	
Organic	NE	NE	NE	
CLASSIFICATION				
Unified Soil Classification	ML	SM	SM	
TESTING DATES				
Date Sampled	01/04/2016	01/04/2016	01/04/2016	
Date Completed	01/13/2016	01/13/2016	01/13/2016	
Date Received	01/05/2016	01/05/2016	01/05/2016	

Remarks: _____ Respectfully Submitted: Mahnaz Salehi

NE=Not encountered
NP=Non-plastic



	Total	Effective
C, ksf	0.34	0.28
ϕ, deg	34.0	34.7
Tan(ϕ)	0.67	0.69



Sample No.		1	2	3
Initial	Water Content, %	27.0	27.3	25.3
	Dry Density, pcf	82.7	81.4	98.1
	Saturation, %	70.2	69.0	95.0
	Void Ratio	1.0380	1.0697	0.7179
	Diameter, in.	2.87	2.87	2.87
	Height, in.	5.60	5.60	5.60
At Test	Water Content, %	37.4	37.5	24.1
	Dry Density, pcf	83.9	83.8	102.2
	Saturation, %	100.0	100.0	100.0
	Void Ratio	1.0097	1.0113	0.6495
	Diameter, in.	2.86	2.84	2.83
	Height, in.	5.57	5.55	5.52
Strain rate, in./min.		0.01	0.01	0.01
Back Pressure, psi		90.00	115.00	85.00
Cell Pressure, psi		95.00	125.00	105.00
Fail. Stress, ksf		3.2	4.3	10.1
Total Pore Pr., ksf		12.9	16.9	12.4
Ult. Stress, ksf		3.2	4.3	10.1
Total Pore Pr., ksf		12.9	16.9	12.4
$\bar{\sigma}_1$ Failure, ksf		3.9	5.3	12.8
$\bar{\sigma}_3$ Failure, ksf		0.7	1.1	2.7

Type of Test:
CU with Pore Pressures

Sample Type: UD

Description: Sand, some silt, trace clay, dark tan

LL= NV **PI=** NP

Assumed Specific Gravity= 2.7

Remarks: Big rocks on the bottom of the bottom specimen
Non-homogeneous sample

Figure _____

Client: CITY OF SANDY SPRINGS

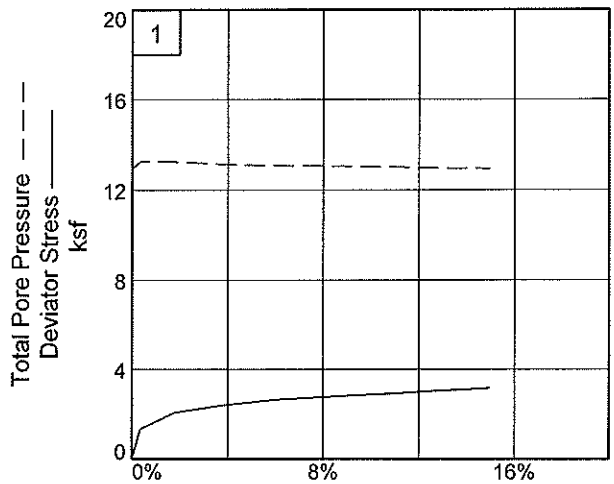
Project: MORGAN FALLS ROAD IMPROVEMENTS - WALL NO. 10

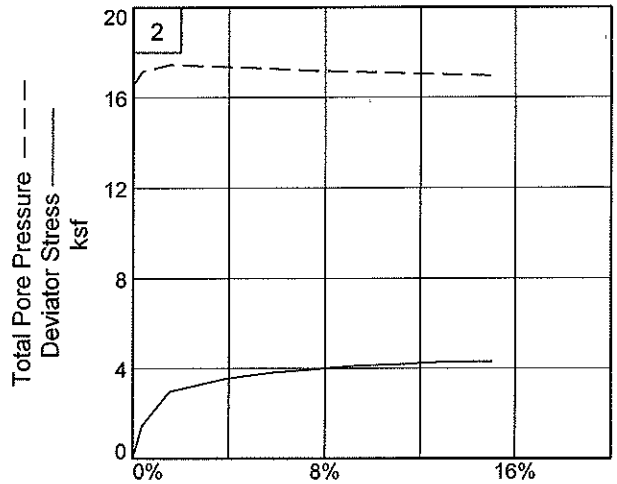
Location: sta 1+53

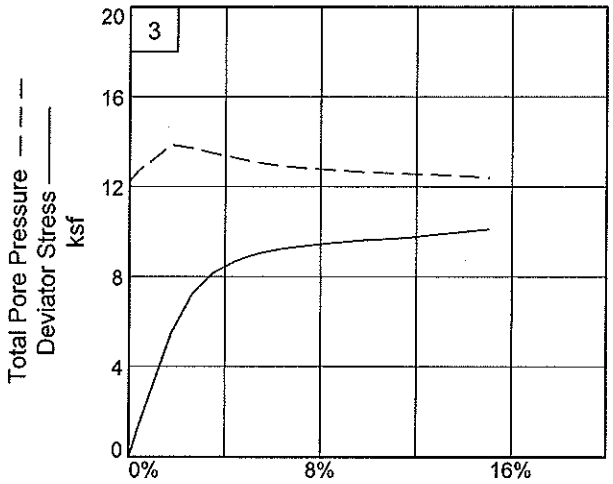
Sample Number: UD1 **Depth:** 13.0'-15.0'

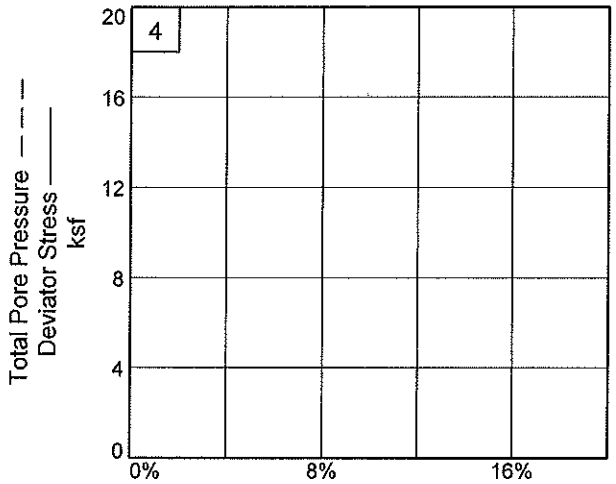
Proj. No.: 2013.3559.02 **Date Sampled:** 1/5/2016

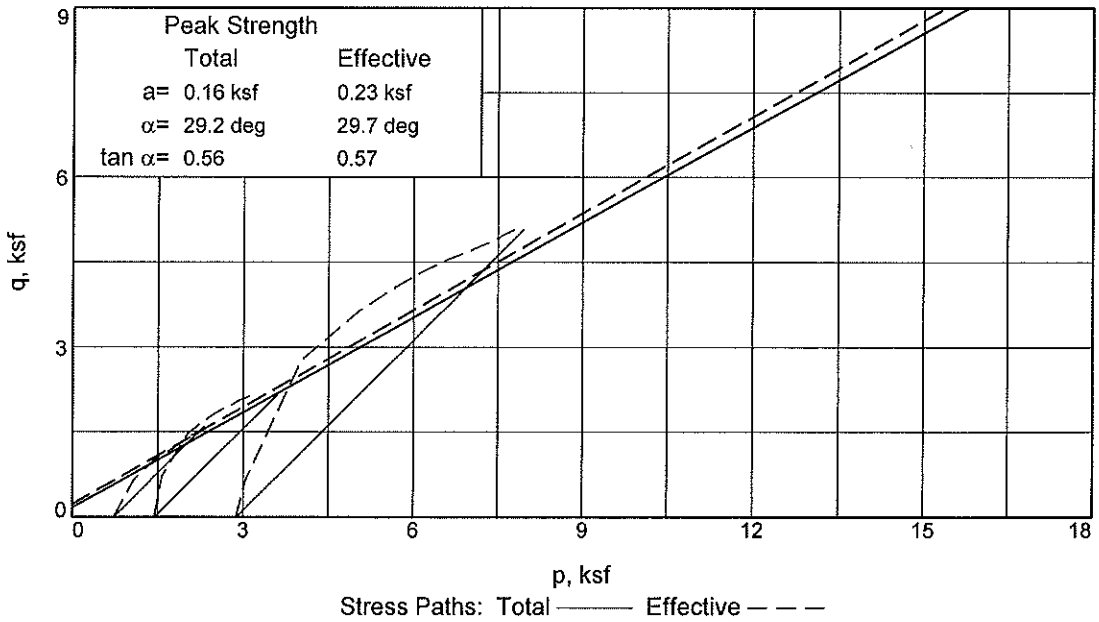
TRIAXIAL SHEAR TEST REPORT
United Consulting
Norcross, Georgia











Client: CITY OF SANDY SPRINGS

Project: MORGAN FALLS ROAD IMPROVEMENTS - WALL NO. 10

Location: sta 1+53 **Depth:** 13.0'-15.0' **Sample Number:** UD1

Project No.: 2013.3559.02 **Figure** _____

United Consulting

Looking downstation from station 0+00, centerline - Wall 10

Looking upstation from station 0+00, centerline - Wall 10

Looking downstation from station 2+10, centerline - Wall 10

Looking upstation from station 2+10, centerline - Wall 10

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

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