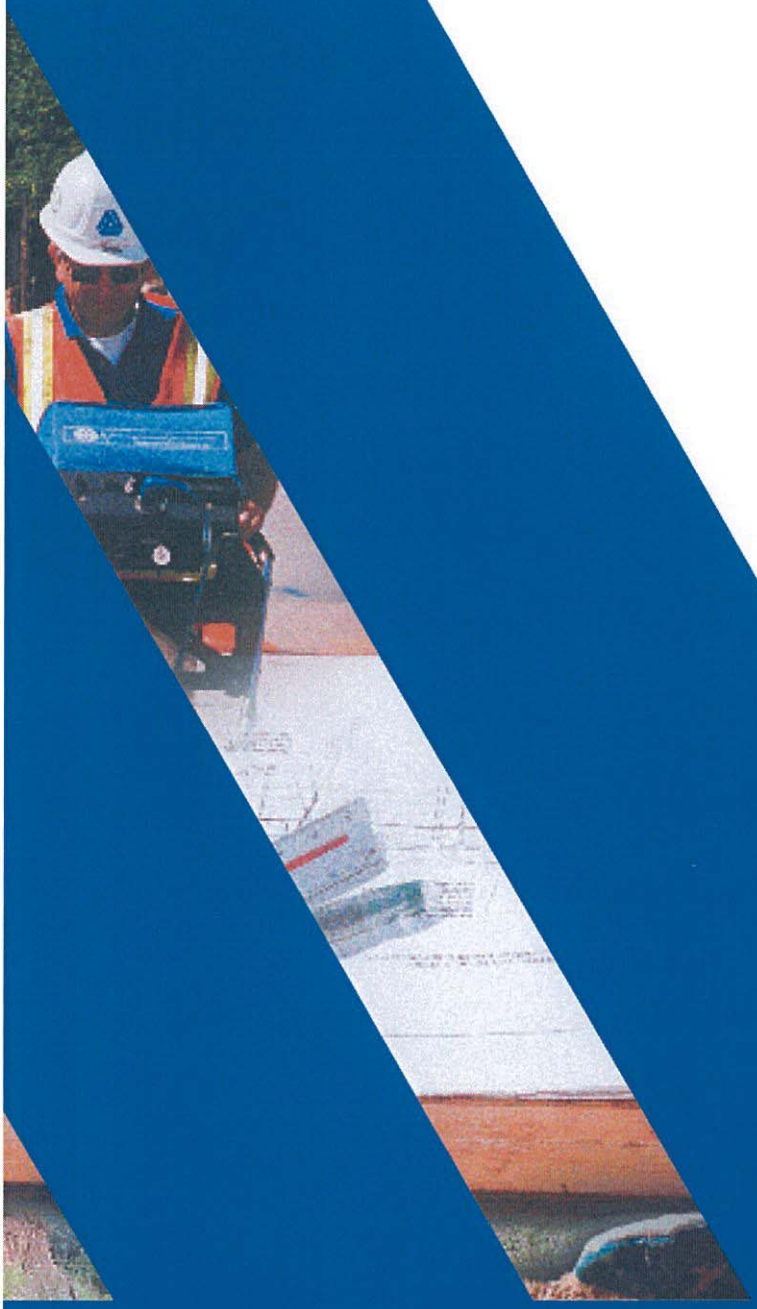

REPORT

Preliminary Geotechnical Exploration City of Atlanta / Grant Park Mobility Solution Study Atlanta, Georgia

Project Number
2015.1250.01

January 21, 2016

We're here for you
UNITED CONSULTING

We're here for you
UNITED CONSULTING

January 21, 2016

Mr. John J. Funny
President / CEO
Grice Consulting Group, LLC
One Atlantic Center
1201 West Peachtree Street
Suite 600, 6th Floor
Atlanta, Georgia 30309

Via Email: Jfunny@thegricegroup.com

RE: Report of Preliminary Geotechnical Exploration
City of Atlanta/Grant Park Mobility Solution Study
Atlanta, Georgia
Project No. 2015.1250.01

Dear Mr. Funny:

United Consulting is pleased to submit this report of our Preliminary Geotechnical Exploration for the above-referenced project. We appreciate the opportunity to assist you with this project. Please contact us if you have any questions or if we can be of further assistance.

Sincerely,

UNITED CONSULTING

REGISTERED PROFESSIONAL ENGINEER
AARON C. EPSTEIN
GEORGIA

Aaron C. Epstein, P.E.
Senior Geotechnical Engineer

Chris L. Roberds
Senior Executive Vice President

AJR/ACE/CLR/nj

http://ucblade10/sites/Geotechenv/7373/2013.3799.01/Geotechnical Documents/2013.3799.01 pre.geo parking deck.doc

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EXECUTIVE SUMMARY

United Consulting has completed a Preliminary Geotechnical Exploration on the City of Atlanta/**Grant Park Mobility Solution project** in Atlanta, Fulton County, Georgia. The results from this assessment and exploration are briefly summarized below. The text of the report should be reviewed for a discussion of these items.

1. Most of the borings encountered fill ranging in depth from about 3 to 8 feet. Boring B-10 encountered about 18 feet of fill. The fill/disturbed soils generally appeared to be clean and compacted. However, it is not uncommon to find soft soils, pits of buried trash, topsoil, boulders, or other unsuitable materials within undocumented fill or previously disturbed soils. We envision most of the fill will be removed during excavation of the site. However, existing fill that will remain below the planned construction must be evaluated by the geotechnical engineer at the time of construction and soft or otherwise unsuitable materials, if encountered, should be excavated or treated per the geotechnical engineer's recommendations.

2. Partially Weathered Rock (PWR) was encountered in each of the borings, except of B-6, B-8 and B-10 at depths ranging from 29 feet to 73 feet. Auger refusal occurred in the borings at depths ranging from 36 feet to 81 feet below the existing grade. We do not generally envision significant excavation difficulties associated with massive PWR or rock for this project unless excavations of about 30 feet or more are planned.

3. We envision that a deep foundation system or a shallow foundation underlain by a Geopiers/Vibropiers ground improvement system will be required for support of the planned improvements. Preliminary recommendations for various foundation options including auger-cast piles, drilled piers and Geopiers/Vibropiers are included in the text.

4. Groundwater was encountered in the borings at depths ranging from 27 feet to 46 feet. Groundwater is not expected to significantly impact the planned construction for excavations of about 25 feet or less; however, if the lowest FFE is set more than 20 feet below the existing grade, a more comprehensive groundwater evaluation will be required to assess the need for a permanent under-slab drainage system and waterproofing the structure.

5. Once final grades, finished floor elevations and foundation loads are determined, the preliminary recommendations in this report should be re-evaluated and, and additional geotechnical exploration might be required to finalize our preliminary recommendations.

SITE AND PROJECT INFORMATION

The project site is located southwest of the intersection between Boulevard SE and Confederate Ave SE in Atlanta, Fulton County, Georgia. More specifically, the project site consists of an asphalt parking lot located on the east side of Grant Park and Atlanta Zoo in Atlanta, Fulton County, Georgia. The client provided a GIS map showing the boundaries of the proposed improvements. This GIS map was used as a guide to locate the boundaries of the project site. The general location of the site and borings are shown on the attached boring location plan (Figure 1).

At the time of our site visit, the site was mainly accessed via Boulevard SE by an entrance driveway to the east of the project site. The project site was bound to the north by Grant Park, a Centennial Research Building and farther north by Berne Street SE, to the east by Boulevard SE, to the south by Grant Park and farther south by Atlanta Ave SE, and to the west by Grant Park and Zoo Atlanta. The project site is currently used as an asphalt parking lot. Lighting poles, storm drain drop inlets, brick retaining walls (eastern area), and typical landscaping were observed within the project site. Existing overhead lines, storm drains, sewer manholes and fire hydrants were identified along Boulevard SE and at the western and southern area of the project site.
Based on our visual observations, the topography at the site generally sloped down from the east to the west across the area of the site. Based on the 1993 *Southeast Atlanta, GA* USGS topographic map, the approximate existing site topographic conditions vary generally from a high elevation of 1010± feet above msl near the southeastern area of the site to low elevation of 965± feet near the northwestern area of the site. Total relief across the site is approximately 55 feet.

We understand that the project is at a preliminary stage of the design and the proposed development will consist of mobility improvements with one level at the approximate ground surface elevation, and the remaining levels mostly below ground. The existing parking lot within the proposed development will be demolished prior to the new construction.

No topographic information, structural loads, building FFE's or final grading plan was available at the time of this report. Based on previous projects, we anticipate that the maximum column loads will be on the order of about 900 to 1,100 kips for the proposed improvement structure.

Once design plans are further along, United Consulting should be consulted to provide a final geotechnical exploration specific to the actual planned development and grading scheme.

PURPOSE

The purpose of this preliminary exploration was to determine the general type and condition of the subsurface materials at the project site, and to provide preliminary recommendations regarding potential foundation types and general information regarding soil types, fill

availability and suitability, depth to groundwater and rock, and other geotechnical considerations that may impact site development plans.

SCOPE

The scope of our Geotechnical Exploration has included the following items:

1. A visual reconnaissance of the Site from a geotechnical standpoint;
2. Drilling ten (10) Standard Penetration Test (SPT) borings to determine the nature and condition of the subsurface soils, and the depths to auger refusal;
3. A visual evaluation of soil samples obtained during our field exploration program for further identification and classification;
4. Analyzing subsurface conditions with respect to the proposed construction; and
5. Preparing this report to document the results of our fieldwork, engineering analysis, and to provide preliminary recommendations and comments pertinent to the proposed development.

SUBSURFACE CONDITIONS

SPT Borings

The borings initially encountered 4 to 7 inches of asphalt and 3 to 7 inches of graded aggregate base (GAB). Below the asphalt, borings B-1, B-4, B-5, B-7, B-8, B-9 and B-10 encountered fill ranging in depth from about 3 to 8 feet. Boring B-10 encountered about 18 feet of fill. The fill generally consisted of firm to very stiff clay with varying amounts of silt, sand and traces of mica and gravel. The standard penetration test resistance (N-values) in the fill ranged from 5 to 17 blows per foot (bpf).

Residual soils typical of the Piedmont Physiographic Region were encountered below the fill. The residual soils generally consisted of firm to very stiff silt with varying amounts of sand, clay, and trace of mica and rock fragments with the standard penetration test resistance (N-values) ranging from 5 to 44 blows per foot (bpf) or very loose to medium dense silty sand with varying amounts of clay, and trace of mica and rock fragments with N-values ranging from 12 to 29 bpf.

Partially Weathered Rock (PWR) was encountered in each of the borings, except B-6, B-8 and B-10 at depths ranging from 40 to 70 feet. PWR is a term for the residuum that can be penetrated by soil drilling techniques and has standard penetration resistance values (N-values) in excess of 100 bpf. Auger refusal occurred in the borings at depths ranging from 38 to 81 feet below the existing grade. Auger refusal indicates the depth at which the boring can no longer be advanced

with conventional soil drilling equipment. Auger refusal levels may represent the top of massive bedrock, a boulder or other obstruction.

Groundwater was encountered in the borings at the time of drilling at depths ranging from 27 to 46 feet. Groundwater levels should be anticipated to fluctuate with the change of seasons, during periods of very low or high precipitation, or due to changes in the floodplain or watershed upstream from the area.

The borings were backfilled with the auger cuttings upon completion of drilling for safety considerations. For a more precise description of the subsurface conditions encountered within the soil test borings, we refer you to the Boring Logs included in The Appendix.

DISCUSSION AND PRELIMINARY RECOMMENDATIONS

The following preliminary recommendations are based on our understanding of the proposed construction, the data obtained from our soil test borings, a site reconnaissance, and our experience with soils and subsurface conditions similar to those encountered at this site. We recommend that United Consulting review the grading scheme once the information has been finalized.

Since the design drawings were not provided and the finished floor elevations (FFE) and foundation loads were not available at the time of completion of this report, the recommendations presented in this report should be considered preliminary. Once building locations, FFE, and foundation loads are finalized, we recommend a Final Geotechnical Exploration, which would include drilling of additional borings and rock corings, in order to finalize our recommendations and to provide allowable soil bearing capacity, settlement estimates, and other issues that cannot be determined at this preliminary stage with the limited information.

Existing Fill Consideration

Below the groundcover, borings B-1, B-4, B-5, B-7, B-8, B-9 and B-10 encountered fill ranging in depth from about 3 to 8 feet. Boring B-10 encountered about 18 feet of fill. The fill/disturbed soils generally appeared to be clean and compacted. However, it is not uncommon to find soft soils, pits of buried trash, topsoil, boulders, or other unsuitable materials within undocumented fill or previously disturbed soils. SPT borings alone are not well suited to evaluate existing fill. The only true way to determine the condition of an existing fill is to completely remove and replace the fill as engineered fill. Based on the understanding that the proposed mobility improvements might include levels set below the existing grade, we envision most of the fill will be removed during grading and excavation. However, if not removed during mass grading, existing fill should be further evaluated by a geotechnical engineer at the time of construction. United Consulting also recommends that the project budget include contingency funds in the event that soft soils, buried trash, or other unsuitable materials requiring removal are encountered during construction.

Excavation Conditions

As previously mentioned, Partially Weathered Rock (PWR) was encountered in each of the borings, except B-6, B-8 and B-10 at depths ranging from 29 feet to 70 feet. Auger refusal occurred in the borings at depths ranging from 36 to 81 feet below the existing grade. We do not generally envision significant excavation difficulties associated with massive PWR or rock for this project unless excavations greater than about 30 feet or so are planned.

Due to the geology of the area, depth to bedrock can vary significantly over short horizontal distances. Therefore, it is not uncommon to encounter PWR and rock at shallower depths than those encountered in the borings. Pinnacles, boulders or lenses of PWR or rock could therefore be present at higher elevations, between or away from the areas explored. The actual extent of difficult excavation conditions will depend on the final grading plan, building FFEs and utility profiles, and should be reevaluated once this information is available.

Groundwater Conditions

Groundwater was encountered in the borings at depths ranging from 27 feet to 46 feet. Stabilized groundwater levels should be expected to be a few feet shallower than the levels measured at the time of drilling. Due to presence of existing fill and highly variable depths to PWR and rock, the site is also susceptible to formation of perched water. The contactor should be prepared to remove perched or groundwater as needed.

Overall, shallow groundwater is not expected to significantly impact the planned construction for excavations to depths ranging up to about 25 feet. However if the lowest FFE is set more than 20 feet below the existing grade, a more comprehensive groundwater evaluation will be required to assess the need for a permanent under-slab drainage system and waterproofing the structure. The actual impact of the groundwater on the planned development will depend greatly on the final grading plan, utility profiles, and building FFEs. If drilled shaft foundations are to be used, the use of temporary casing and dewatering will likely be required for drilled pier construction below the water table.

Earthwork

The soils encountered at the project site should be generally suitable for re-use as engineered fill. Existing fill containing excessive topsoil, or other unsuitable materials, if encountered, would not be considered suitable for reuse as engineered fill.

Preliminary Foundation Design

Based on the anticipated loads, subsurface data, and our experience with similar structures, we envision that a deep foundation system such as auger-cast piles or drilled piers or a shallow foundation underlain by a Geopiers/Vibropiers ground improvement system will be required for support of the planned structure. United Consulting offers the following preliminary foundation recommendations for the project.

Ground Improvement – Geopiers/Vibropiers

The use of a Geopiers or Vibropiers ground improvement will likely be feasible for support of the planned improvement. Geopiers and Vibropiers are proprietary ground improvement systems consisting of columns of compacted stone. The bearing capacity and settlement of the aggregate pier system are a function of the on-site soils, the strength (modulus) of the compacted aggregate within the piers, the length of the piers, and the percentage of the foundation bearing area that is directly supported by the Geopiers/Vibropiers. Typically, a conventional shallow foundation system bearing on a properly designed and installed Geopier or Vibropier system may be designed for an allowable bearing pressure in the range of 4,000 to 6,000 psf. It should be noted that aggregate pier installation below the groundwater table can be problematic and might require the use of casing to install the piers, which usually increases the cost.

Again, the feasibility and cost of Geopiers or Vibropiers will depend on the actual structural loads/ building configuration and the planned improvement FFEs. If aggregate piers are to be considered we suggest contacting a local licensed aggregate pier design professional to discuss the feasibility of using aggregate piers for support of the planned improvement.

Deep Foundation – Auger Cast Piles

An allowable pile capacity in the range of 70 to 130 tons per is typically available for 14 to 18-inch auger-cast piles installed to practical refusal. Based on the borings, the depth to suitable bearing material varies considerably from about 36 feet to about 81 feet or more below the existing grades. Additional SPT borings, rock coring, and further evaluations will be required in order to finalize the allowable pile capacities and estimated pile tip elevations for this project.

Deep Foundation – Drilled Piers

An allowable end bearing capacity in the range of 60-125 ksf is typically available for drilled shafts bearing in competent rock at or below the auger-refusal elevations encountered at the site. Based on the borings, drilled pier lengths are expected to vary greatly and could range from depths of about 40 to 85 feet or so below the existing grades. Deeper piers might be required if poor quality rock is present below the auger-refusal levels encountered in the borings. Additional SPT borings and rock coring at several locations will be required to assess the quality of the rock and to finalize the bearing elevations and allowable capacities for drilled piers.

Final Geotechnical Exploration

The subsurface data gathered in this preliminary geotechnical exploration should be used to plan the site development, layout and earthwork so that difficult excavation, undercutting, etc., are minimized. A final, comprehensive geotechnical exploration should be performed once the FFEs, structural loads, and utility profiles are known. Additional borings and rock corings would need to be conducted throughout the area of proposed structures to provide final

recommendations. The preliminary subsurface information obtained should be used to develop the scope of the final geotechnical exploration.

LIMITATIONS

This report is for the exclusive use of **Grice Consulting Group, LLC**, and the designers of the project described herein, and may only be applied to this specific project. Our conclusions and preliminary 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 right to rely upon this report and the data within may not be assigned without UNITED CONSULTING'S written permission.

The scope of this geotechnical 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 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 preliminary recommendations contained herein must be considered invalid, unless our firm reviews the changes and our recommendations are either verified or modified in writing. When design is complete, we should be given the opportunity to review the foundation plan, grading plan, and applicable portions of the specifications to see if they are consistent with the intent of our recommendations.

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N

Scale:	NTS	Notes:	Client:	CITY OF ATLANTA
Prepared:	AJR		Site:	CITY OF ATLANTA/ GRANT PARK MOBILITY SOLUTION STUDY
Checked:	ACE			
Project No.:	2015.1250.01		Title:	Borings Location Plan

FIG. 1

APPENDIX

General Notes/Narrative of Drilling Operations
Boring Logs (10)
Exploration Procedures

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: CITY OF ATLANTA
BORING NO.: B-1
PROJECT NAME: CITY OF ATLANTA/GRANT PARK MOBILITY SOLUTION STUDY
DATE: 12/19/15
JOB NO.: 2015.1250.01 DRILLER: KILMAN BROS/BOBBY RIG: CME 45
LOGGED BY: AJR

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	5" ASPHALT/ 5" GAB	0						
	Clay-silty, trace sand and mica; stiff; red (Fill)		1		5-4-6	14		
	-some sand; red-orange	5	2		3-4-5	16		
	Silt-some sand and clay, trace mica; firm; red-orange (Residual)	10	3		2-3-3	12		
	-tan-brown	15	4		2-3-4	14		
	-pink-tan	20	5		3-4-4	16		
	-trace clay; stiff; tan-brown	25	6		4-3-6	18		
	-trace sand; tan	30	7		3-4-5	18		
	-some sand; grey-brown	35	8		3-4-6	18		
	-some clay; trace sand; tan	40	9		5-3-8	18		

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BORING LOG

CONTRACTED WITH: CITY OF ATLANTA
BORING NO.: B-1
PROJECT NAME: CITY OF ATLANTA/GRANT PARK MOBILITY SOLUTION STUDY
DATE: 12/19/15
JOB NO.: 2015.1250.01 DRILLER: KILMAN BROS/BOBBY RIG: CME 45
LOGGED BY: AJR

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
		45	10		3-3-4	18		
	-trace clay; grey-brown	50	11		2-3-5	18		
		55	12		2-3-5	18		Wet sample
		60	13		3-3-7	18		
	-trace rock fragment; very stiff	65	14		5-9-20	18		
		70	15		5-8-9	18		
	Partially weathered rock sampled as silt-some sand, trace clay, mica and rock fragments; hard; grey	75	16		12-50/4	10		
		80	17		50/0	0		Hard drilling at 79 feet
	AUGER REFUSAL AT 81 FEET							No groundwater encountered at time of drilling

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BORING LOG

CONTRACTED WITH: CITY OF ATLANTA — BORING NO.: B-2
PROJECT NAME: CITY OF ATLANTA/GRANT PARK MOBILITY SOLUTION STUDY — DATE: 12/8/15
JOB NO.: 2015.1250.01 — DRILLER: KILMAN BROS/BOBBY — RIG: CME 45 — LOGGED BY: AJR

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	6" ASPHALT/ 3" GAB	0						
	Silt-some clay, trace sand and mica; very stiff; red-orange (Residual)		1		5-8-8	18		
	-stiff	5	2		5-6-6	1		
		10	3		4-4-5	18		
		15	4		3-4-5	18		
	-firm; tan	20	5		3-3-4	18		
	-some sand; tan-brown	25	6		2-2-3	18		
		30	7		3-2-3	18		Groundwater at 27 feet at time of drilling Borehole collapsed at 28 feet at time of drilling Wet sample
	-stiff	35	8		5-6-7	18		Wet auger cuttings
		40	9		7-8-8	18		

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BORING LOG

CONTRACTED WITH: CITY OF ATLANTA | BORING NO.: B-2
PROJECT NAME: CITY OF ATLANTA/GRANT PARK MOBILITY SOLUTION STUDY | DATE: 12/8/15
JOB NO.: 2015.1250.01 | DRILLER: KILMAN BROS/BOBBY | RIG: CME 45 | LOGGED BY: AJR

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	-very stiff	45	10		7-10-15	18		
		50	11		10-8-10	18		
		55	12		4-7-10	18		
	-white Partially weathered rock sampled as silt-some clay and sand; trace rock fragments; hard; green-grey	60	13		3-8-50/4	13		Hard drilling at 59 feet
	-mostly rock fragments	65	14		50/1	1		
	AUGER REFUSAL AT 67 FEET	70						
		75						
		80						

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BORING LOG

CONTRACTED WITH: CITY OF ATLANTA — BORING NO.: B-3
PROJECT NAME: CITY OF ATLANTA/GRANT PARK MOBILITY SOLUTION STUDY — DATE: 12/19/15
JOB NO.: 2015.1250.01 — DRILLER: KILMAN BROS/BOBBY — RIG: CME 45 — LOGGED BY: AJR

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	4" ASPHALT/ 4" GAB	0						
	Silt-some sand, trace clay and mica; stiff; tan-brown (Residual)		1		3-4-5	14		
	-trace sand	5	2		2-5-5	18		
	-some sand; grey-brown	10	3		2-4-5	18		
	-some clay; firm	15	4		3-3-5	16		
	Sand-silty, trace clay, mica and rock fragments; firm; tan- brown	20	5		8-11-7	12		
	Silt-some sand, trace clay and mica; stiff; tan-brown	25	6		6-7-7	16		
		30	7		4-6-6	18		
	-sandy; hard; grey-brown	35	8		11-21-23	18		
	Partially weathered rock sampled as silt-some sand, trace clay; hard; tan-brown	40	9		15-50/6	6		

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BORING LOG

CONTRACTED WITH: CITY OF ATLANTA
BORING NO.: B-3
PROJECT NAME: CITY OF ATLANTA/GRANT PARK MOBILITY SOLUTION STUDY
DATE: 12/19/15
JOB NO.: 2015.1250.01 DRILLER: KILMAN BROS/BOBBY RIG: CME 45
LOGGED BY: AJR

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	-grey-brown	45	10		50/3	2		Hard drilling Groundwater at 44 feet after 24 hours No groundwater encounted at time of drilling
	AUGER REFUSAL AT 46 FEET	50						
		55						
		60						
		65						
		70						
		75						
		80						

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BORING LOG

CONTRACTED WITH: CITY OF ATLANTA — BORING NO.: B-4
PROJECT NAME: CITY OF ATLANTA/GRANT PARK MOBILITY SOLUTION STUDY — DATE: 12/16/15
JOB NO.: 2015.1250.01 — DRILLER: KILMAN BROS/BOBBY — RIG: CME 45 — LOGGED BY: AJR

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	5" ASPHALT/ 4" GAB	0						
	Clay-silty, trace sand; stiff; red (Fill)		1		4-7-7	18		
	Silt-some clay, trace sand and mica; stiff; red-orange (Residual)	5	2		3-5-6	14		
	-trace clay; red-orange-brown	10	3		2-4-5	16		
	-some sand; firm	15	4		2-3-5	16		
	-trace sand; tan	20	5		2-4-4	16		
	-stiff	25	6		3-4-5	18		
	-clayey; firm; orange	30	7		1-2-3	18		Borehole collapsed to 28 feet after 24 hours
		35	8		1-2-3	8		
	-some sand, trace clay; stiff; white	40	9		2-4-5	18		

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BORING LOG

CONTRACTED WITH: CITY OF ATLANTA — BORING NO.: B-4
PROJECT NAME: CITY OF ATLANTA/GRANT PARK MOBILITY SOLUTION STUDY — DATE: 12/16/15
JOB NO.: 2015.1250.01 — DRILLER: KILMAN BROS/BOBBY — RIG: CME 45 — LOGGED BY: AJR

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
		45	10		3-5-5	18		
		50	11		3-4-6	13		
	Partially weathered rock sampled as sand-trace silt, clay and mica; very dense; black-white	55	12		15-50/4	10		Hard drilling at 54 feet
	AUGER REFUSAL AT 56 FEET	60						Groundwater encountered at 38 feet at time of drilling
		65						
		70						
		75						
		80						

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BORING LOG

CONTRACTED WITH: CITY OF ATLANTA — BORING NO.: B-5
PROJECT NAME: CITY OF ATLANTA/GRANT PARK MOBILITY SOLUTION STUDY — DATE: 12/19/15
JOB NO.: 2015.1250.01 — DRILLER: KILMAN BROS/BOBBY — RIG: CME 45 — LOGGED BY: AJR

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	5" ASPHALT/ 4" GAB	0						
	Clay-some silt, trace sand; stiff; red (Fill)		1		3-5-5	16		
		5	2		3-3-5	0		Auger cuttings same as above
	Silt-sandy, trace clay and rock fragments; stiff; tan (Residual)	10	3		5-7-6	14		
	-some sand, trace mica, no rock fragments	15	4		4-5-6	18		
	-trace sand; very stiff; tan brown	20	5		6-8-9	14		
	-some sand and rock fragments	25	6		8-10-12	12		
	-no rock fragments; grey	30	7		8-13-15	18		
	-grey-brown	35	8		8-8-11	18		
	-trace sand; stiff; grey	40	9		3-5-7	18		

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BORING LOG

CONTRACTED WITH: CITY OF ATLANTA
BORING NO.: B-5
PROJECT NAME: CITY OF ATLANTA/GRANT PARK MOBILITY SOLUTION STUDY
DATE: 12/19/15
JOB NO.: 2015.1250.01 DRILLER: KILMAN BROS/BOBBY RIG: CME 45
LOGGED BY: AJR

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	-some sand; grey-brown-white	45	10		4-5-7	18		Groundwater at 46 feet after 24 hours
	-trace sand; grey-brown Partially weathered rock sampled as mostly black rock fragments	50	11		2-5-50/2	12		Borehole collapsed at 48 feet after 24 hours. Hard drilling at 53 feet
	AUGER REFUSAL AT 54 FEET	55	12		50/1	.5		No groundwater encountered at time of drilling
		60						
		65						
		70						
		75						
		80						

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BORING LOG

CONTRACTED WITH: CITY OF ATLANTA
BORING NO.: B-6
PROJECT NAME: CITY OF ATLANTA/GRANT PARK MOBILITY SOLUTION STUDY
DATE: 12/14/15
JOB NO.: 2015.1250.01 DRILLER: KILMAN BROS/BOBBY RIG: CME 45
LOGGED BY: AJR

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	7" ASPHALT/ 4" GAB	0						
	Clay-some sand and silt, trace mica; very stiff; red (Residual)		1		4-13-11	18		
	Silt-some clay, trace sand and mica; stiff; red-orange	5	2		5-6-7	6		
	-tan-orange	10	3		4-5-7	18		
	-very stiff	15	4		9-11-10	18		
		20	5		7-8-9	18		
		25	6		18-12-14	18		
	-stiff	30	7		8-6-8	18		
	-very stiff	35	8		8-9-10	18		
	-some sand, trace clay; stiff; grey-tan	40	9		4-5-6	8		Borehole caved to 37 feet 24 hours after drilling

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BORING LOG

CONTRACTED WITH: CITY OF ATLANTA
BORING NO.: B-6
PROJECT NAME: CITY OF ATLANTA/GRANT PARK MOBILITY SOLUTION STUDY
DATE: 12/14/15
JOB NO.: 2015.1250.01 DRILLER: KILMAN BROS/BOBBY RIG: CME 45
LOGGED BY: AJR

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	-trace sand; very stiff; red brown	45	10		4-7-12	18		Wet sample
	-some sand; grey-tan	50	11		4-10-12	16		
	-some clay	55	12		5-7-15	18		
	-mostly rock fragments							Hard drilling at 56 feet Auger cuttings were rock fragments
	AUGER REFUSAL AT 58 FEET	60						
		65						
		70						
		75						
		80						

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BORING LOG

CONTRACTED WITH: CITY OF ATLANTA — BORING NO.: B-7
PROJECT NAME: CITY OF ATLANTA/GRANT PARK MOBILITY SOLUTION STUDY — DATE: 12/16/15
JOB NO.: 2015.1250.01 — DRILLER: KILMAN BROS/BOBBY — RIG: CME 45 — LOGGED BY: AJR

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	4" ASPHALT/ 4" GAB	0						
	Clay-some silt, trace sand; stiff; red-brown (Fill)		1		4-6-6	18		
	Silt-some clay, trace sand and mica; stiff; pink-tan (Residual)	5	2		3-5-7	14		
	Sand-some silt, trace clay; firm; tan	10	3		3-6-6	10		
	-silty, trace mica	15	4		3-6-6	18		
		20	5		4-8-8	18		
	Silt-some sand, trace clay and mica; very stiff; tan	25	6		5-7-9	18		
	-trace sand; brown-grey	30	7		5-7-11	18		
		35	8		6-8-10	18		
	-some sand; hard	40	9		6-12-20	16		

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BORING LOG

CONTRACTED WITH: CITY OF ATLANTA
BORING NO.: B-7
PROJECT NAME: CITY OF ATLANTA/GRANT PARK MOBILITY SOLUTION STUDY
DATE: 12/16/15
JOB NO.: 2015.1250.01 DRILLER: KILMAN BROS/BOBBY RIG: CME 45
LOGGED BY: AJR

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	-very stiff	45	10		4-7-12	18		Groundwater at 44 feet after 24 hours
	-some clay; stiff; red-orange- tan	50	11		4-10-12	16		
	-trace clay ;grey-brown	55	12		5-7-15	18		
	Partially weathered rock sampled as sand-trace silt, clay and rock fragments; very dense; tan	60						Hard drilling at 58 feet Wet sample
	AUGER REFUSAL AT 63 FEET	65						Groundwater encountered at 44 feet at time of drilling
		70						
		75						
		80						

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BORING LOG

CONTRACTED WITH: CITY OF ATLANTA — BORING NO.: B-8
PROJECT NAME: CITY OF ATLANTA/GRANT PARK MOBILITY SOLUTION STUDY — DATE: 12/15/15
JOB NO.: 2015.1250.01 — DRILLER: KILMAN BROS/BOBBY — RIG: CME 45 — LOGGED BY: AJR

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	6" ASPHALT/ 3" GAB	0						
	Clay-some silt, trace sand; stiff; red (Fill)		1		6-7-8	18		
	Silt-some clay and sand, trace mica; stiff; red-orange (Residual)	5	2		5-6-8	18		
	-sandy, trace clay; grey-brown	10	3		4-7-8	12		
	-pink-brown	15	4		4-6-8	16		
	-grey-brown	20	5		5-7-8	16		
	-trace sand; very stiff	25	6		7-8-9	18		
	-sandy; very stiff	30	7		8-9-9	18		
	-some sand	35	8		14-15-14	18		
	-some clay; red-brown	40	9		11-12-14	18		Borehole collapsed to 38 feet after 24 hours

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BORING LOG

CONTRACTED WITH: CITY OF ATLANTA
BORING NO.: B-8
PROJECT NAME: CITY OF ATLANTA/GRANT PARK MOBILITY SOLUTION STUDY
DATE: 12/15/15
JOB NO.: 2015.1250.01 DRILLER: KILMAN BROS/BOBBY RIG: CME 45
LOGGED BY: AJR

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	-trace clay; very stiff; grey- brown	45	10		10-13-17	18		
	-trace clay and sand; brown	50	11		5-9-12	18		Wet sample
								Hard drilling at 52 feet
		55	12		5-9-15	18		
	AUGER REFUSAL AT 55.5 FEET	60						No groundwater encountered at time of drilling
		65						
		70						
		75						
		80						

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BORING LOG

CONTRACTED WITH: CITY OF ATLANTA
BORING NO.: B-9
PROJECT NAME: CITY OF ATLANTA/GRANT PARK MOBILITY SOLUTION STUDY
DATE: 12/16/15
JOB NO.: 2015.1250.01 DRILLER: KILMAN BROS/BOBBY RIG: CME 45
LOGGED BY: AJR

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	6" ASPHALT/ 3" GAB	0						
	Silt-sandy, some clay; very stiff; red-orange (Fill)		1		7-9-8	16		
	-trace gravel and clay; firm; tan	5	2		4-4-4	12		
	Silt-sandy, trace clay and mica; firm; tan-orange (Residual)	10	3		3-4-4	14		
		15	4		3-3-4	12		
		20	5		4-5-6	12		
	-some sand; red-orange	25	6		7-9-9	18		Groundwater at 27 feet after 24 hours
	Partially weathered rock sampled as silt-some sand, trace clay and mica; hard; tan-brown	30	7		24-50/2	6		Hard drilling at 30 feet
	-mostly rock fragments	35	8		50/4	2		Borehole caved to 34 feet after 24 hours
	AUGER REFUSAL AT 36 FEET	40						No groundwater encountered at time of drilling

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BORING LOG

CONTRACTED WITH: CITY OF ATLANTA — BORING NO.: B-10
PROJECT NAME: CITY OF ATLANTA/GRANT PARK MOBILITY SOLUTION STUDY — DATE: 12/15/15
JOB NO.: 2015.1250.01 — DRILLER: KILMAN BROS/BOBBY — RIG: CME 45 — LOGGED BY: AJR

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	5" ASPHALT/ 6" GAB	0						
	Clay-some silt, trace sand and mica; firm; red (Fill)		1		3-3-4	18		
	-silty, some sand; red-tan	5	2		4-3-3	18		
	-red-brown	10	3		1-2-3	18		
	-some silt, trace sand; stiff; red	15	4		6-5-8	18		
	Silt-some clay and sand; stiff; red-pink-brown (Residual)	20	5		4-6-7	18		
	Sand-silty, trace clay and mica; firm; grey-tan	25	6		5-6-7	18		
	-medium dense	30	7		10-14-15	18		
		35	8		10-13-16	18		
	Silt-some sand, trace clay and mica; stiff; tan-brown	40	9		9-6-8	18		

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BORING LOG

CONTRACTED WITH: CITY OF ATLANTA
BORING NO.: B-10
PROJECT NAME: CITY OF ATLANTA/GRANT PARK MOBILITY SOLUTION STUDY
DATE: 12/15/15
JOB NO.: 2015.1250.01 DRILLER: KILMAN BROS/BOBBY RIG: CME 45 LOGGED BY: AJR

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	-sandy with rock fragments; very stiff; grey-white-tan	45	10		3-10-18	18		Borehole caved at 45 feet after 24 hours
	AUGER REFUSAL AT 48 FEET	50						Hard drilling at 47 feet No groundwater encountered at time of drilling
		55						
		60						
		65						
		70						
		75						
		80						

EXPLORATION PROCEDURES

SPT Borings

Ten (10) Standard Penetration Test (SPT) borings (designated as B-1 through B-10) were drilled at the approximate locations shown on the attached Boring Location Plan (Figure 1). Soil samples obtained using the split spoon sampler were examined by the Geotechnical Engineer and classified according to the visual-manual procedure described in ASTM D 2488-00. Soil test borings were performed in general accordance with ASTM D 1586. A narrative of field operations is included in The Appendix.

Boring locations were determined in the field by the Geotechnical Engineer who measured distances and estimated angles with the aid of a hand held compass, a measuring tape and existing site features. Therefore, the boring locations shown on the attached boring location plan should be considered approximate. No elevations were provided to 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.

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