SUBSURFACE EXPLORATION AND GEOTECHNICAL ENGINEERING EVALUATION

FREEDOM PARK RENOVATIONS
MACON, GEORGIA
GEC PROJECT NO. 160471.210

PREPARED FOR

MR. MACK CAIN
MACK CAIN DESIGN STUDIO
4317 PARK DRIVE, SUITE 400
NORCROSS, GEORGIA 30093

PREPARED BY

GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS, INC.
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JULY 11, 2016

July 11, 2016

Mr. Mack Cain
Mack Cain Design Studio
4317 Park Drive, Suite 400
Norcross, Georgia 30093

SUBJECT: Subsurface Exploration and Geotechnical Engineering Evaluation
Freedom Park Renovations
Macon, Georgia
GEC Project No. 160471.210

Dear Mr. Cain:

Geotechnical & Environmental Consultants, Inc. (GEC) is pleased to present this report of our subsurface exploration and geotechnical engineering evaluation for the above site. The purpose of this exploration was to obtain data to evaluate the site and subsurface conditions in order to provide recommendations relative to the geotechnical aspects of the project.

We greatly appreciate the opportunity to provide these services to you. If you have any questions, or if we can be of further assistance, please do not hesitate to call.

Sincerely,

GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS, INC.

Geoffrey A. Madrazo, P.E.
Project Engineer
Ga. Reg. #40568

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FREEDOM PARK RENOVATIONS
MACON, GEORGIA
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1.0 EXECUTIVE SUMMARY

The following summary highlights our pertinent findings and recommendations concerning this project.

- Site preparation will include the removal of fencing and structures, trees and vegetation, and any soft/loose near-surface soils in the planned construction areas. All stripped materials and debris should be disposed off-site or in non-structural areas.

- The on-site materials appear to be suitable for use as structural fill.

- Refusal to the auger process was not encountered within the depths evaluated. Based on the proposed development, difficulties in excavation due to rock are not anticipated at the site.

- Groundwater was encountered at depths ranging 6 to 15 feet at the time of drilling. We anticipate groundwater may impact construction activities.

- We recommend using conventional shallow foundations for support of the proposed buildings. A uniform net allowable soil bearing pressure of 2,500 psf may be used for design of shallow foundations bearing on virgin soils or new fill material.

- The light poles will likely consist of concrete poles bearing at depths of less than 20 feet below grade. The light poles can be designed for an allowable bearing pressure of 3,000 psf.

- The concrete slab-on-grade floor for the proposed structures may be designed using a modulus of subgrade reaction of 125 pci for the soil types encountered at the site.

This executive summary has been prepared solely to provide a general overview of the report. The executive summary should not be relied upon for any purpose except for a general overview. Please rely on the full report for information concerning the findings, recommendations and other concerns at the site.

2.0 PROJECT INFORMATION

Our understanding of the project is based on conversations with Mr. Mack Cain with Mack Cain Design Studio. The proposed renovation will occur within Freedom Park, a recreational facility located at 3301 Roff Avenue in Macon, Georgia, as shown on the *Site Location Map* in the Appendix.

We understand the proposed development will consist of the redevelopment of the recreational fields within the park, the construction of a new field house/concession stand, the addition of light poles, and the construction of a splash pad and adjacent facilities building near the existing gymnasium. The proposed development is shown on the *Boring Location Plan* in the Appendix.

Structural and grading plans have not been provided to GEC at this time. Based on our site reconnaissance and project information, we anticipate cut and fill sections on the order of 5 feet or less. For the purpose of this report, we assume that the structural loads for the buildings will be typical for the proposed type of development, and that the maximum column loads will not exceed 100 kips and maximum wall loads will not exceed 2 to 3 kips per linear foot. Structural loads for the light poles are undetermined, but we understand that the design of the poles will be performed by the light pole contracting team.

3.0 METHOD OF EXPLORATION

3.1 Site Conditions

GEC performed a general review of the proposed project site and surrounding areas prior to the performance of our subsurface exploration activities. The review was performed to evaluate surface conditions that could impact our exploration techniques or the proposed construction.

The locations and depths of the borings were selected by GEC based on the site plans provided. The boring locations were marked in the field using a handheld GPS and by measuring from existing features.

3.2 Soil Test Borings

A total of 17 soil test borings were performed at the project site. Borings designated B-1 through B-14 were performed at or near new light pole locations, boring B-15 was performed in the area of the new field house, and borings B-16 and B-17 were drilled in the area of the new splash pad. The approximate locations of the borings are presented on the *Boring Location Plan* located in the Appendix.

All borings were backfilled with the auger cuttings prior to site demobilization. The split-spoon samples were returned to our laboratory and were manually and visually examined and classified. The samples were classified according to the Unified Soil Classification System (USCS). Detailed records of the soil test borings, indicating the N-values (blow counts) obtained from the Standard Penetration Testing (SPT) and a more detailed description of the drilling and sampling processes, are presented in the Appendix.

4.0 SITE AND SUBSURFACE CONDITIONS

4.1 Site Description

The area of Freedom Park to undergo renovation at this time is located on the south side of Roff Avenue in Macon, Ga. The site includes a number of softball and baseball fields, as well as a gymnasium and out of use pool facility. The site is relatively flat and level in most areas and drains to the southwest.

4.2 Local Geology

The site is located in the Coastal Plain Physiographic Province of Georgia. Soils in the Coastal Plain are the result of deposition of sediments in a former marine environment. Coastal Plain sedimentary deposits make up about 60 percent of Georgia's surface area, and consist of a southwardly thickening wedge of sediments, which are bordered on the north by the parent rocks of the Piedmont Physiographic Province. The border between these provinces is known as the "Fall-Line." The Coastal Plain sediments range in age from the Cretaceous to the recent, with the oldest exposed along the "Fall-Line" and the youngest along the coast. Typically, the surface soils consist of complexly interbedded sands, silts, and clays of various mixtures. Sandstones, shales, and limestones comprise the characteristic lithology of the Coastal Plain. These formations are usually found at depths greater than fifty feet, but can also be found at or near the ground surface. They are not known to occur near the surface in the site area. Topography in this region of the Coastal Plain is generally flat to gently rolling.

4.3 Subsurface Conditions

Details of the subsurface conditions encountered by the soil test borings are shown on the *Soil Boring Records* in the Appendix of this report. These records represent an estimate of the subsurface conditions based on our interpretation of the boring data using normally accepted engineering judgment. Stratification lines on the *Soil Boring Records* represent approximate boundaries between soil types. However, the in-situ transition is typically more gradual. Although individual test borings are representative of the subsurface conditions at the boring locations on the dates shown, they are not necessarily indicative of the subsurface conditions at

other locations or at other times. The general soil conditions and their pertinent characteristics are discussed in the following paragraphs.

General Stratigraphy

The general subsurface stratigraphy of the site consisted of Coastal Plain Sediment soils extending to the maximum depths explored. A topsoil layer thickness of 3 to 5 inches was encountered in most areas of the site. Boring B-16, located in a parking area, encountered a 2-inch layer of asphalt at the surface, underlain by 3 inches of graded aggregate base material.

Coastal Plain Sediment Soils

The Coastal Plain soils encountered in all of the borings generally consisted of loose to dense silty sands (SM) and firm to very stiff sandy silts (ML). The SPT N-values in these soils generally ranged from 5 to 20 blows per foot (bpf), with only a few samples falling outside of that range.

Groundwater

Groundwater was encountered at depths ranging 6 to 15 feet at the time of drilling. The presence of groundwater may impact construction activities and dewatering techniques may be required.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Site and Subgrade Preparation

The initial step in site preparation should consist of the removal of the fences and other structures, trees and vegetation, and any soft/loose near-surface soils in the planned construction areas. Any utility lines in the project area should be removed and relocated. Excavations or holes resulting from the removal of utilities or trees should be backfilled with structural fill to the compaction requirements presented in Section 5.2, *Earthwork*. A topsoil stripping depth of five (5) inches is recommended for planning and budgeting purposes.

Care should be taken with near-surface soils containing fine-grained particles (particles passing the 200 sieve) during grading. When exposed to moisture, the workability and strength of these near-surface soils deteriorates significantly, and the need for undercutting and other construction delays may result. We recommend that construction grades be maintained throughout this project in such a manner so to establish positive drainage away from working surfaces and subgrades.

Following site stripping, we recommend that all proposed fill areas or areas at-grade be proofrolled in the presence of a geotechnical engineer or his representative to evaluate subgrade stability. Proofrolling should be performed with a fully loaded tri-axle dump truck, 20-ton roller, or similar equipment in an overlapping pattern to detect any soft or loose areas. Any areas that pump or rut excessively and cannot be densified by continued rolling should be undercut to a depth to be determined in the field by the geotechnical engineer, and be replaced with structural fill. It is not anticipated that significant undercutting will be required at the site.

In general, if loose/soft soils are encountered in structural areas, the soils will need to be reworked or undercut to a point 10 feet outside of the structural areas. We anticipate that the majority of these soils can be compacted in place. Some undercutting of localized areas may be necessary, but it is not anticipated that undercutting will be significant. The extent of the reworking necessary will depend on the final grading plans and the climatic conditions at the time of construction. All undercut areas should be backfilled with structural fill as described in Section 5.2, *Earthwork*, of this report.

Prior to fill placement, the subgrade should be scarified, moisture-conditioned to slightly above the optimum moisture content, and compacted to at least 95 percent of the standard Proctor maximum dry density (ASTM D698) in all structural or paved areas. All at-grade areas and cut surfaces should be scarified, moisture conditioned to slightly above the optimum moisture content, and compacted to at least 98 percent of the same criteria.

5.2 Earthwork

The soil test borings indicate the near-surface soils at the site can be graded with conventional earthmoving equipment such as self-loading or pusher-assisted pans and tracked dozers. The near-surface soils appear to be suitable for use as fill material. Wetting or drying of the soils at the site may be necessary to achieve the required compaction criteria. The contractor should be required to have equipment available on site for both wetting and drying of the soils.

All fill placed at the site, including on-site soils, should not contain rocks or lumps larger than four (4) inches in greatest dimension and contain no more than 15 percent larger than 2.5 inches. Structural fill soils should have a liquid limit less than 50, plastic index less than 30 and a standard Proctor maximum dry density (ASTM D698) greater than 90 pcf. Generally, soils classified as SP, SM, SC, ML or CL according to the Unified Soil Classification System are considered suitable for fill providing they meet the above criteria.

Structural fill should be moisture-conditioned to slightly above the optimum moisture content, spread in relatively thin lifts (8-inch maximum loose lifts) and methodically compacted with heavy compaction equipment to at least 95 percent of the standard Proctor maximum dry density (ASTM D698). The upper one-foot of fill material should be compacted to a 98 percent compaction criterion. Additionally, the upper one-foot of material in areas at-grade or cut

surfaces should be scarified and compacted to the 98 percent criteria. Structural fill criteria should be utilized beneath proposed and future structural areas.

Structural fill should extend horizontally beyond the outer edge of the building foundations at least ten feet or a distance equal to the height of the fill to be placed, whichever is greater. In paved areas, fill slopes should extend horizontally at least five feet beyond the edge of pavement prior to sloping.

Utility trenches should be backfilled with materials satisfying the criteria described above for general fill, placed in lifts of approximately eight (8) inches in uncompacted thickness. However, thicker lifts may be used provided the method of compaction is approved by the project geotechnical engineer and the required minimum degree of compaction is achieved.

5.3 Foundations

Building Areas

The proposed structures can be constructed on conventional shallow foundations bearing on the in-place soils, reworked soils, or structural fill meeting the compaction requirements of Section 5.2, *Earthwork*. Based on the soils encountered during our exploration, we recommend a uniform net allowable soil bearing pressure of **2,500 psf** be used for shallow foundation design of the proposed building foundations bearing on the in-place or properly compacted new fill soils. Exterior foundations should bear at a minimum of 18 inches below external grades to preclude damage due to frost penetration.

Using assumed structural loads, we estimate that total post-construction settlement of up to one (1) inch will occur. Differential settlement should be approximately 50% of the total settlement over a distance of 30 feet. Individual spread footings should have a minimum dimension of 24 inches and strip footings should have a minimum lateral dimension of 20 inches.

A Geotechnical Engineer or his representative should examine footing subgrades immediately prior to rebar placement to confirm that the foundation conditions are as anticipated and the design bearing pressure is available. Auger and hand-held dynamic cone penetrometer testing, augmented by hand probing, should be used to determine whether conditions within these areas are consistent with those encountered by the borings.

Light Poles

The light pole foundations are expected to be concrete poles buried at depths less than twenty feet below existing grade. The light pole foundations should be sized and designed for an allowable bearing pressure of **3,000 psf**.

5.4 Slab Design

Assuming that the upper 12 inches of subgrade consist of properly compacted and proofrolled existing soil or newly installed fill material compacted to a minimum of 98% of standard Proctor maximum dry density, concrete slab-on-grade floors for the proposed building may be designed using a modulus of subgrade reaction of 125 pci. A modulus of subgrade reaction of 200 pci may be used if at least 6 inches of No. 57 stone or compacted graded aggregate base is provided below the slab. A durable vapor barrier should be provided beneath soil supported slabs to reduce dampness due to soil moisture.

5.5 Slopes

Based on our experience with soils similar to those encountered during our exploration, we recommend excavated slopes less than 10 feet be laid back at least to a 2H:1V (Horizontal to Vertical) slope. Permanent fill slopes placed on suitable subgrade may be constructed at 2.5:1 or flatter. All fill slopes should be adequately compacted as recommended in this report. Permanent slopes of 3:1 or flatter may be used to facilitate mowing. All sloped surfaces should be protected from erosion by grassing or other means. All confined excavations should conform to the latest OSHA Regulations.

5.6 Pavement Recommendations

A general analysis for flexible and rigid pavements was performed in general accordance with the American Association of State Highway and Transportation Officials (AASHTO) "Guide for Design of Pavement Structures", 2006. The AASHTO method considers the effects of traffic by equating the traffic loading to an Equivalent Single Axle Load (ESAL) of 18 kips. This is done by Equivalent Axle Load Factors (EALF), which are applied to each axle that crosses the pavement in order to consider its individual effect on the life of the pavement. EALF's range from 0.004 for normal passenger cars to 2.15 for a 40-kip tandem axle load (two tandem axles for an 80-kip truck).

Traffic patterns were not available at this time. It is extremely important to remember that if the actual traffic loads are anticipated to exceed those presented above, the design sections should be re-evaluated for the actually design conditions. Our analysis assumes the pavement subgrades are prepared in accordance with the recommendations outlined in Section 5.1, *Site and Subgrade Preparation*.

The top 12 inches of soil subgrade should be compacted to at least 98% of the maximum dry density as determined by the standard Proctor (ASTM D698). The base course should be graded aggregate (GAB) compacted to at least 100% of the maximum dry density as determined by the modified Proctor (ASTM D1557). The exposed subgrade soils and GAB course should be thoroughly proofrolled and any unstable areas repaired prior to pavement installation.

An assumed CBR value of four (4) was used for design purposes. Based on the given loadings, the following pavement sections are recommended for this site:

RECOMMENDED PAVEMENT DESIGN SECTION				
Pavement Type	Anticipated Pavement Use	Pavement Components		Total Thickness (inches)
		Asphalt Concrete (inches)	Aggregate Base (inches)	
Flexible	Light-Duty	2*	6	8
Flexible	Heavy-Duty	3**	8	11

* The light-duty pavement sections should consist of 2 inches of 9.5 mm Superpave
** The heavy-duty surface course should consist of 1 inch of 9.5 mm Superpave over a 2-inch binder course of 19 mm Superpave.

Based on our analysis, the flexible pavement design for the paved areas will yield approximate ESAL values of 12,800 (SN=1.72) and 104,900 (SN=2.44) for the light-duty and heavy-duty paving sections, respectively. Our analysis assumes the pavement subgrades are prepared in accordance with the recommendations outlined in this report.

5.7 Seismic Design Criteria

The seismic site classification for the proposed project was evaluated using the criteria given in the 2012 International Building Code (IBC 2012) section 1613. Based on the project information and soil test borings, we recommend the following parameters be used in design:

- Site Classification — Class D
- Maximum Considered Earthquake (MCE) spectral response acceleration for short period — S_{MS} = 0.256 g
- MCE spectral response acceleration for 1-second period — S_{M1} = 0.195 g
- Design spectral response acceleration for short period — S_{DS} = 0.171 g
- Design spectral response acceleration for 1-second — S_{D1} = 0.130 g

5.8 Geotechnical Controls

1. The Geotechnical Engineer should be provided the opportunity for a general review of the final design documents in order to assess proper interpretation of the earthwork and foundation recommendations.

2. The Geotechnical Engineer, or his qualified representative, should observe undercutting and proofrolling operations.

3. A qualified engineering technician, under the supervision of the Geotechnical Engineer, should observe fill operations and perform a minimum of one field density test per 2,500 square feet of area for each one-foot thickness of fill.

4. The Geotechnical Engineer, or his qualified representative, should check each foundation excavation utilizing hand probing and auger and dynamic cone penetrometer testing. This will reduce the risk of unsuitable or soft materials directly underlying the footings, which may be detrimental to the integrity of the structures.

5.9 Limitations

This report is for the exclusive use of Mack Cain Design Studio, Macon-Bibb County, the engineers, owner, and subcontractors for the project described herein, and may only be applied to this specific project. The analyses, conclusions and recommendations presented in this report are based on the preceding project information, and the results of this evaluation. Conditions may vary from those observed in the borings.

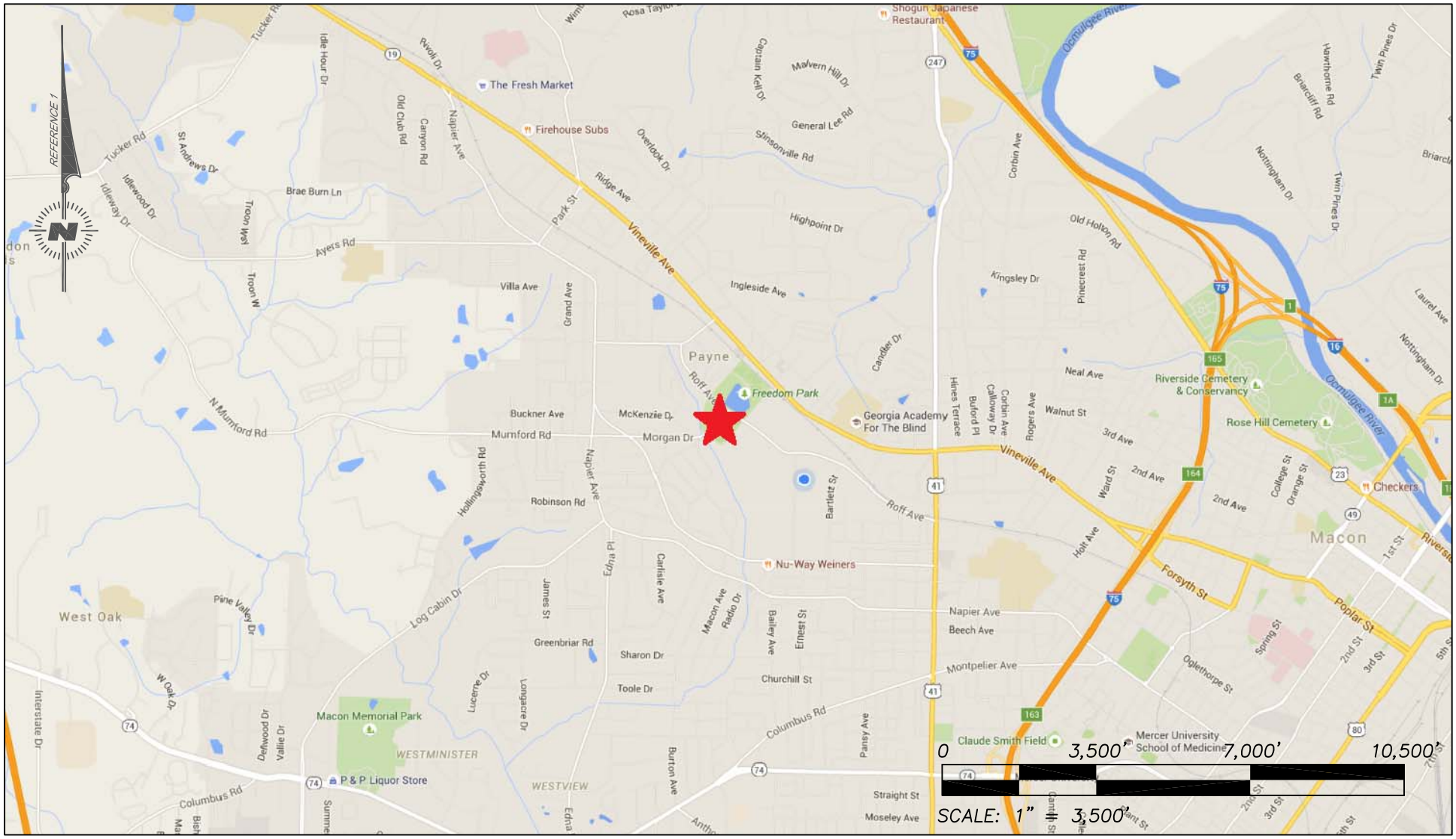
If it becomes apparent during construction that soil conditions differing from those discussed in this report are encountered, Geotechnical and Environmental Consultants, Inc. should be notified at once so that the effects may be determined and any remedial measures necessary may be prescribed.

This report has been prepared in accordance with 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 the written permission of Geotechnical and Environmental Consultants, Inc. If the design or location of the structure is changed, the recommendations contained herein must be considered invalid, unless our firm reviews 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 plans, grading plans and applicable portions of the specifications to determine if they are consistent with the intent of our recommendations.

APPENDIX

GEC



SITE LOCATION MAP
FREEDOM PARK GIRLS SOFTBALL
MACON, GEORGIA

GEC PROJECT NO. 160471.210

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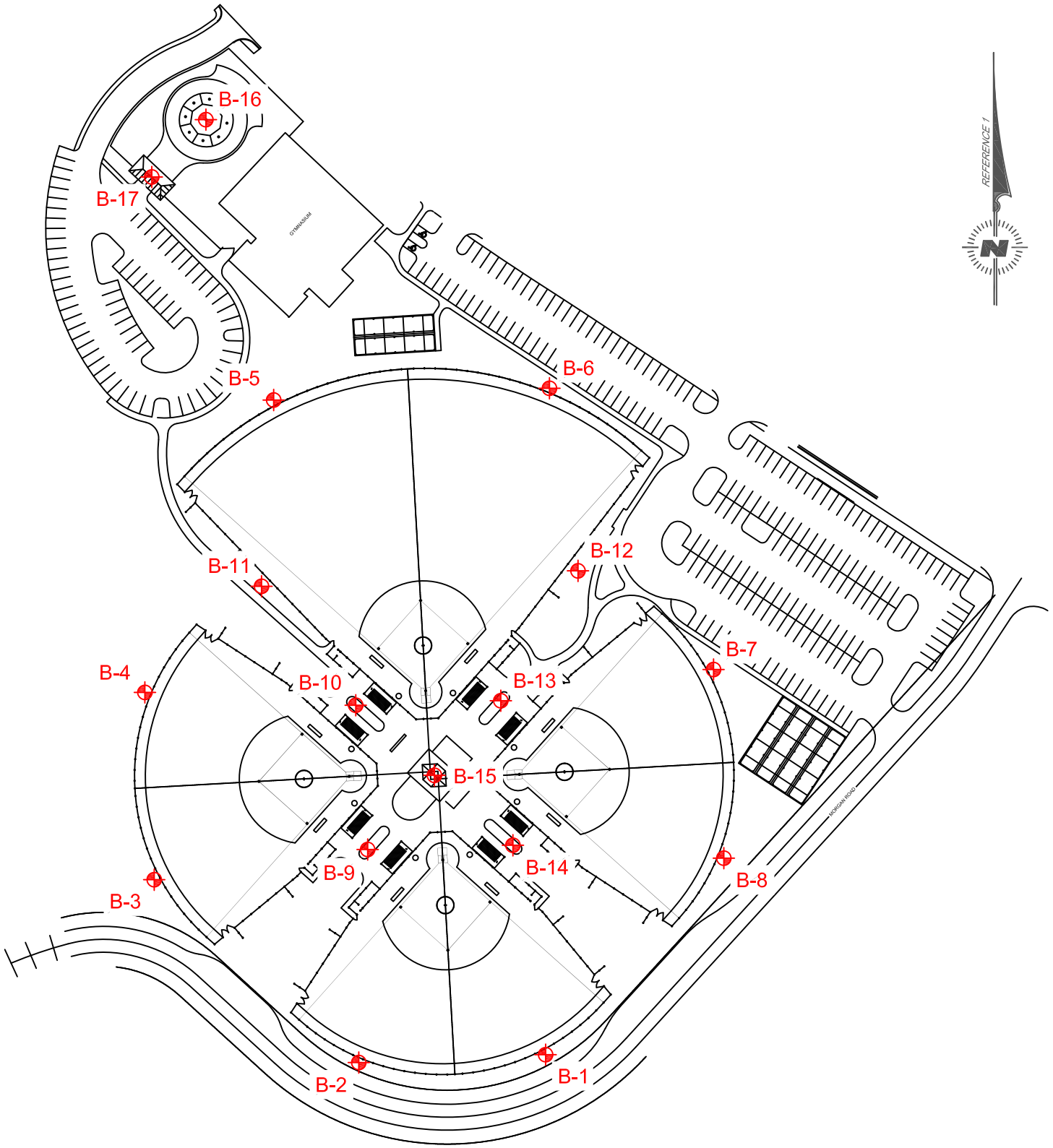

= APPROXIMATE BORING LOCATION

0 135' 270' 405'

SCALE: 1" = 135'

BORING LOCATION PLAN
FREEDOM PARK GIRLS SOFTBALL
MACON, GEORGIA

GEC PROJECT NO. 160471.210

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SOIL TEST BORING PROCEDURES

The borings were advanced by a hollow-stem auger process. At the desired depth in all borings, the borehole was cleaned out and the sample tools inserted through the auger stems. At assigned intervals, soil samples were obtained with a standard 1.4-inch inside diameter, 2-inch outside diameter split tube sampler. The sampler was first seated six inches to penetrate any loose cuttings; then driven an additional foot with blows of a 140-pound hammer falling 30 inches. The number of blows required to drive the sampler the final foot was recorded and is designated as the standard penetration resistance (N-value). The penetration resistance, when properly evaluated, may be used as an index to the soil strength and foundation support capability. Soil sampling and penetration testing were performed in general accordance with ASTM D 1586.

The drilling method is not capable of penetrating material designated as "refusal materials." Refusal, thus indicated, may result from hard cemented soil, soft weathered rock, coarse gravel or boulders, thin rock seams, or the upper surface of sound continuous rock. Core boring procedures are required to determine the character and continuity of refusal materials.

Representative portions of the split tube samples were placed in sample containers and transported to our laboratory. In the laboratory, the samples were examined and the visual classification was confirmed by a geotechnical engineer or geologist.

The final boring records represent our interpretation of the contents of the field records based on the results of the engineering examinations and testing of selected field samples. These records depict subsurface conditions at the specific locations and at the particular time drilled. Soil conditions at other locations may differ from conditions occurring at these boring locations. Also, the passage of time may result in changes in the ground water conditions at these boring locations. The lines designating the interface between strata on the re3cords and on profiles represent approximate boundaries. The transition between materials may be gradual. The final boring records are included with this report.

A record of the sampling operations and the descriptions of the soils encountered in each boring are shown on the following Soil Boring Record sheets.

CORRELATION OF PENETRATION RESISTANCE WITH RELATIVE DENSITY AND CONSISTENCY

SOIL TYPE	BLOWS PER FOOT (bpf)[1]	RELATIVE DENSITY / CONSISTENCY DESCRIPTION
SANDS and GRAVELS	0 – 4	Very Loose
	5 - 10	Loose
	11 - 20	Firm
	21 - 30	Very Firm
	31-50	Dense
	Over 50	Very Dense
SILTS and CLAYS	0 – 1	Very Soft
	2 – 4	Soft
	5 – 8	Firm
	9 - 15	Stiff
	16-30	Very Stiff
	31-50	Hard
	Over 50	Very Hard

[1] Standard Penetration Resistance blow count, N, which is equal to the sum of the second and third six-inch increments of the SPT test.

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LABORATORY TESTING PROCEDURES

SOIL CLASSIFICATION

Soil classifications provide a general guide to the engineering properties of various soil types and enable the engineer to apply his past experience to current problems. In our evaluations, samples obtained during drilling operations are examined in our laboratory and visually classified by an engineer or geologist. The soils are classified according to consistency (based on number of blows from standard penetration tests), color and texture. These classification descriptions are included on our “Soil Boring” records.

The classification system discussed above is primarily qualitative. For detailed soil classification, two laboratory tests are routinely performed: grain size tests and Atterberg limits tests. Using these test results, the soil can be classified according to the AASHTO or Unified Classification Systems (ASTM D-2487). Each of these classification systems and the in-place physical soil properties provides an index for estimating the soil's behavior. The soil classification and physical properties obtained are presented in the report.

WATER LEVEL READINGS

Water table readings are normally taken in conjunction with borings and are recorded on the "Soil Boring Records". These readings indicate the approximate location of the hydrostatic water table at the time of our field exploration. Where relatively impervious soils (clayey soils) are encountered, the amount of water seepage into the boring is small, and it is generally not possible to establish the location of the hydrostatic water table through water level readings. The ground water table may also be dependent upon the amount of precipitation at the site during a particular period of time. Fluctuations in the water table should be expected with variations in precipitation, surface run-off, evaporation and other factors.

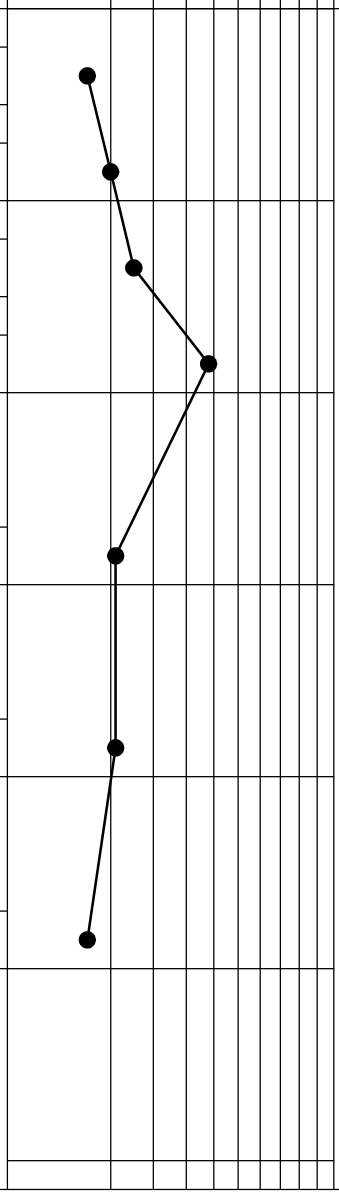
The time of boring (TOB) water level reported on the boring records is determined by field crews immediately after drilling. Additional water table readings may be obtained at least 24 hours after the borings are completed. The time lag of at least 24 hours is used to permit stabilization of the ground water table which has been disrupted by the drilling operations. The readings are taken by dropping a weighted line down the boring or using an electrical probe to detect the water level surface.

Occasionally, the borings will cave-in, preventing water level readings from being obtained or trapping drilling water above the caved-in zone. The cave-in depth is often measured and recorded on the boring records.

SOIL BORING RECORD

Project: **Freedom park Renovations**	Boring No: **B-1**
	Project No: 160471.210
Location: **See Figure 2**	GS Elevation:
Driller/Equipment: JD/ GEC: CME 45; 2.25" HSA; AUTO HAMMER	Drilling Date:
Water Level: 13.0 ft at time of boring	Engineer/Geologist:

Water Level (ft)	Depth (ft)	Soil Symbol	Soil Description	Sample Type	Standard Penetration Test Data (blows/ft)	N-Value
			CULTIVATED SOILS			
			red clay (5 inches)			
			COASTAL PLAIN SEDIMENTS	SS-1		6
			loose, brown, silty, fine to medium **SAND (SM)**	SS-2		10
	5		medium dense, tan, silty, fine to coarse **SAND (SM)**; trace gravel	SS-3		15
			dense, orange tan, silty, fine to coarse **SAND (SM)**	SS-4		38
	10					
▽			medium dense, white, silty, fine to coarse **SAND (SM)**; trace gravel	SS-5		11
	15					
				SS-6		11
	20					
				SS-7		6
	25		**BORING TERMINATED AT 25.0ft**			
	30					



- Boring and sampling performed in accordance with ASTM D 1586.
- Depths are measured from existing ground surface at time of drilling.
- Depths are shown to illustrate general arrangements of the strata encountered at the boring location.
- Do not use depths for determinations of quantities or distances.

NOTES:

GEOTECH BORING LOGS.GPJ GEC.GDT 7/1/16

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SOIL BORING RECORD

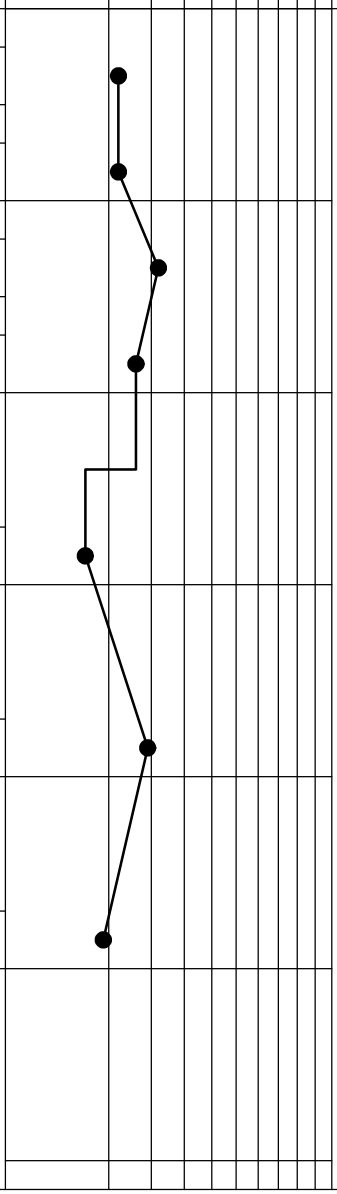
Project: **Freedom park Renovations**	Boring No: **B-2**
	Project No: 160471.210
Location: **See Figure 2**	GS Elevation:
Driller/Equipment: JD/ GEC: CME 45; 2.25" HSA; AUTO HAMMER	Drilling Date:
Water Level: 13.0 ft at time of boring	Engineer/Geologist:

Depth (ft)	Soil Description	Sample Type	N-Value
	TOPSOIL		
	topsoil (4 inches)		
	COASTAL PLAIN SEDIMENTS	SS-1	12
	stiff, brownish red, fine sandy **SILT (ML)**		
	medium dense, orange tan, silty, medium to coarse **SAND (SM)**	SS-2	12
5		SS-3	22
		SS-4	16
10			
	firm, orange white, fine to coarse sandy **SILT (ML)**; trace gravel	SS-5	6
15			
	very stiff, yellowish orange, fine sandy **SILT (ML)**	SS-6	19
20			
	firm, orange grey, slightly clayey, fine sandy **SILT (ML)**	SS-7	9
25	**BORING TERMINATED AT 25.0ft**		
30			

Water Level (ft)

Soil Symbol

Standard Penetration Test Data (blows/ft): 0, 10, 20, 30, 60, 80



- Boring and sampling performed in accordance with ASTM D 1586.
- Depths are measured from existing ground surface at time of drilling.
- Depths are shown to illustrate general arrangements of the strata encountered at the boring location.
- Do not use depths for determinations of quantities or distances.

NOTES:

GEOTECH BORING LOGS.GPJ GEC.GDT 7/1/16

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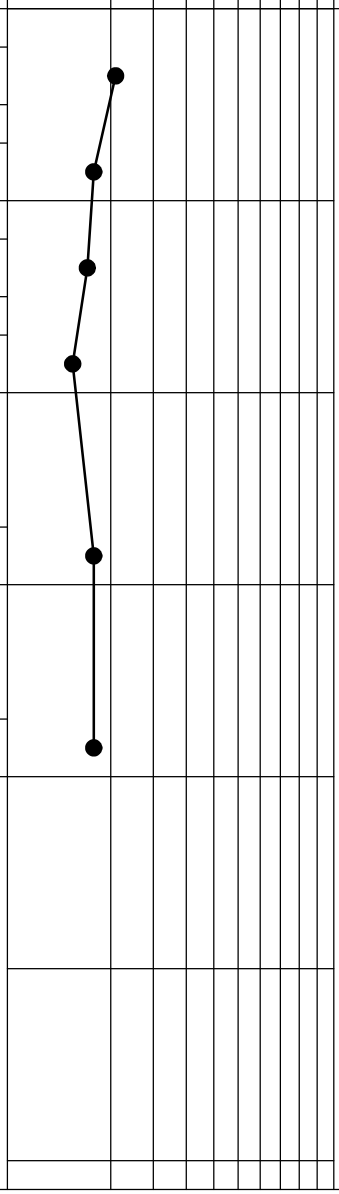
SOIL BORING RECORD

Project: **Freedom park Renovations**	Boring No: **B-3**
	Project No: 160471.210
Location: **See Figure 2**	GS Elevation:
Driller/Equipment: JD/ GEC: CME 45; 2.25" HSA; AUTO HAMMER	Drilling Date:
Water Level: 10.0 ft at time of boring	Engineer/Geologist:

Water Level (ft)	Depth (ft)	Soil Symbol	Soil Description	Sample Type	Standard Penetration Test Data (blows/ft)	N-Value
			TOPSOIL			
			topsoil (4 inches)			
			COASTAL PLAIN SEDIMENTS	SS-1		11
			medium dense, pinkish-grey, silty, fine to medium **SAND (SM)**			
			loose, white grey, silty, fine to coarse **SAND (SM)**; and gravel	SS-2		7
	5			SS-3		6
				SS-4		4
▽	10					
				SS-5		7
	15					
				SS-6		7
	20					
			BORING TERMINATED AT 23.5ft			
	25					
	30					



- Boring and sampling performed in accordance with ASTM D 1586.
- Depths are measured from existing ground surface at time of drilling.
- Depths are shown to illustrate general arrangements of the strata encountered at the boring location.
- Do not use depths for determinations of quantities or distances.

NOTES:

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SOIL BORING RECORD

Project: **Freedom park Renovations**	Boring No: **B-4**
	Project No: 160471.210
Location: **See Figure 2**	GS Elevation:
Driller/Equipment: JD/ GEC: CME 45; 2.25" HSA; AUTO HAMMER	Drilling Date:
Water Level: 14.0 ft at time of boring	Engineer/Geologist:

Water Level (ft)	Depth (ft)	Soil Symbol	Soil Description	Sample Type	Standard Penetration Test Data (blows/ft) 0 10 20 30 60 80	N-Value
			TOPSOIL			
			topsoil (5 inches)			
			COASTAL PLAIN SEDIMENTS	SS-1		6
			loose, tan grey-orange, silty, fine to medium **SAND (SM)**			
			loose, tan white, silty, fine to coarse **SAND (SM)**; and gravel	SS-2		11
	5			SS-3		7
				SS-4		7
	10					
			firm, brown-yellow, slightly clayey, fine sandy **SILT (ML)**			
▽				SS-5		9
	15					
				SS-6		8
	20					
				SS-7		6
	25		**BORING TERMINATED AT 25.0ft**			
	30					

- Boring and sampling performed in accordance with ASTM D 1586.
- Depths are measured from existing ground surface at time of drilling.
- Depths are shown to illustrate general arrangements of the strata encountered at the boring location.
- Do not use depths for determinations of quantities or distances.

NOTES:

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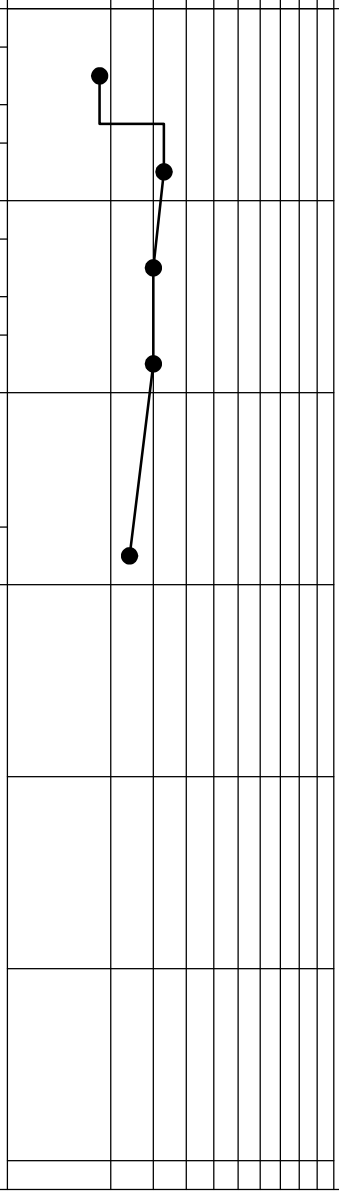
SOIL BORING RECORD

Project: **Freedom park Renovations**	Boring No: **B-5**
	Project No: 160471.210
Location: **See Figure 2**	GS Elevation:
Driller/Equipment: JD/ GEC: CME 45; 2.25" HSA; AUTO HAMMER	Drilling Date:
Water Level: 12.0 ft at time of boring	Engineer/Geologist:

Water Level (ft)	Depth (ft)	Soil Symbol	Soil Description	Sample Type	Standard Penetration Test Data (blows/ft)	N-Value
			TOPSOIL			
			topsoil (3 inches)			
			COASTAL PLAIN SEDIMENTS	SS-1		8
			loose, tan-grey, silty, fine to coarse **SAND (SM)**; trace gravel			
			very stiff, red-tan, fine to medium sandy **SILT (ML)**	SS-2		23
	5		very stiff, white, fine sandy **SILT (ML)**	SS-3		20
			medium dense, yellowish red, silty, fine to medium **SAND (SM)**	SS-4		20
	10					
▽			medium dense, tan pink, silty, fine to coarse **SAND (SM)**; trace gravel			
				SS-5		14
	15					
			BORING TERMINATED AT 18.5ft			
	20					
	25					
	30					



- Boring and sampling performed in accordance with ASTM D 1586.
- Depths are measured from existing ground surface at time of drilling.
- Depths are shown to illustrate general arrangements of the strata encountered at the boring location.
- Do not use depths for determinations of quantities or distances.

NOTES:

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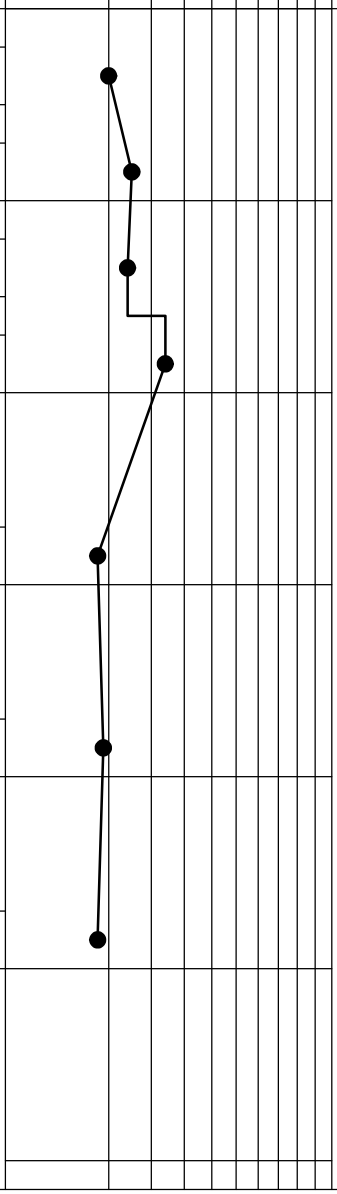
SOIL BORING RECORD

Project: **Freedom park Renovations**	Boring No: **B-6**
	Project No: 160471.210
Location: **See Figure 2**	GS Elevation:
Driller/Equipment: JD/ GEC: CME 45; 2.25" HSA; AUTO HAMMER	Drilling Date:
Water Level: 12.0 ft at time of boring	Engineer/Geologist:

Water Level (ft)	Depth (ft)	Soil Symbol	Soil Description	Sample Type	Standard Penetration Test Data (blows/ft)	N-Value
			TOPSOIL			
			topsoil (4 inches)			
			COASTAL PLAIN SEDIMENTS	SS-1		10
			stiff, tan yellow, fine sandy **SILT (ML)**	SS-2		15
	5		stiff, white, fine to coarse sandy **SILT (ML)**; with gravel	SS-3		14
			medium dense, white orange-tan, silty, fine to coarse **SAND (SM)**; with gravel	SS-4		24
▽	10					
				SS-5		8
	15					
				SS-6		9
	20					
				SS-7		8
	25		**BORING TERMINATED AT 25.0ft**			
	30					



- Boring and sampling performed in accordance with ASTM D 1586.
- Depths are measured from existing ground surface at time of drilling.
- Depths are shown to illustrate general arrangements of the strata encountered at the boring location.
- Do not use depths for determinations of quantities or distances.

NOTES:

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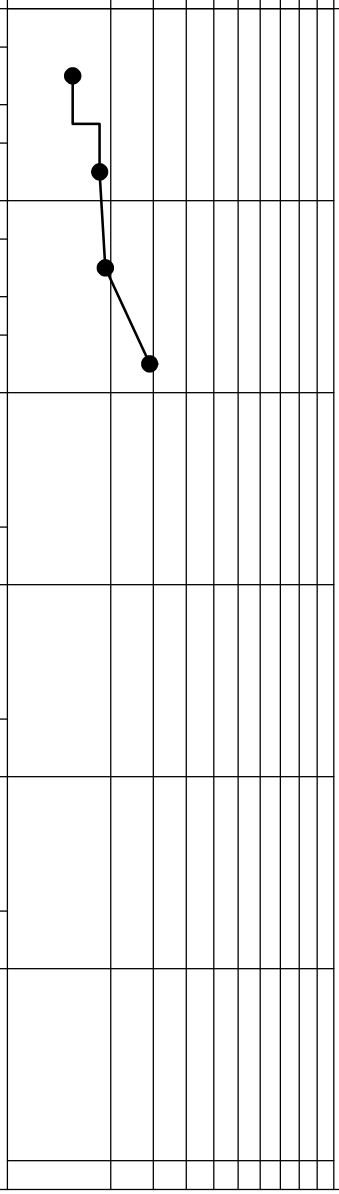
SOIL BORING RECORD

Project: **Freedom park Renovations**	Boring No: **B-7**
	Project No: 160471.210
Location: **See Figure 2**	GS Elevation:
Driller/Equipment: JD/ GEC: CME 45; 2.25" HSA; AUTO HAMMER	Drilling Date:
Water Level: 12.0 ft at time of boring	Engineer/Geologist:

Water Level (ft)	Depth (ft)	Soil Symbol	Soil Description	Sample Type	Standard Penetration Test Data (blows/ft)	N-Value
			TOPSOIL			
			topsoil for 3 inches			
			COASTAL PLAIN SEDIMENTS	SS-1		4
			soft, grey, organic, fine to medium sandy **SILT (ML)**			
			loose, grey, silty, fine to coarse **SAND (SM)**; trace gravel	SS-2		8
	5		loose, white, silty, fine to coarse **SAND (SM)**; and gravel; No blow count recorded	SS-3		9
				SS-4		19
	10					
▽			brown, fine sandy **SILT (ML)**; No blow count recorded			
	15					
			purple, micaceous, fine sandy **SILT (ML)**; No blow count recorded			
	20					
	25		**BORING TERMINATED AT 25.0ft**			
	30					



- Boring and sampling performed in accordance with ASTM D 1586.
- Depths are measured from existing ground surface at time of drilling.
- Depths are shown to illustrate general arrangements of the strata encountered at the boring location.
- Do not use depths for determinations of quantities or distances.

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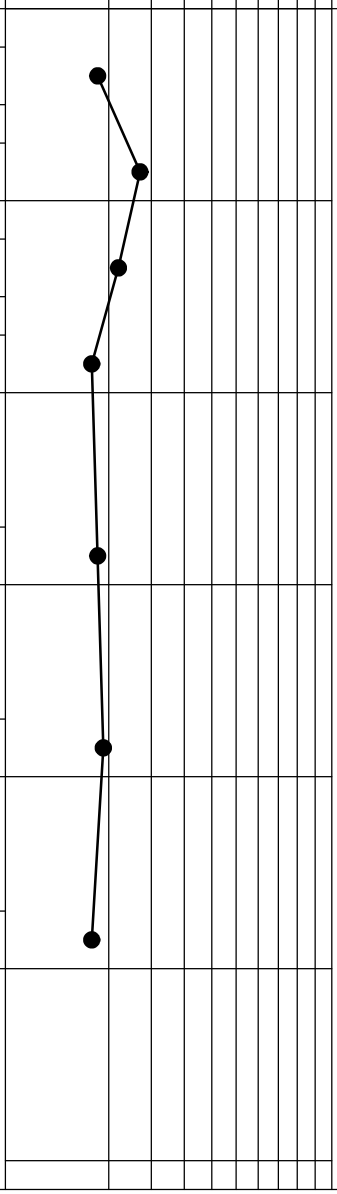
SOIL BORING RECORD

Project: **Freedom park Renovations**	Boring No: **B-8**
	Project No: 160471.210
Location: **See Figure 2**	GS Elevation:
Driller/Equipment: JD/ GEC: CME 45; 2.25" HSA; AUTO HAMMER	Drilling Date:
Water Level: 12.0 ft at time of boring	Engineer/Geologist:

Water Level (ft)	Depth (ft)	Soil Symbol	Soil Description	Sample Type	Standard Penetration Test Data (blows/ft)	N-Value
			TOPSOIL			
			topsoil (8 inches)			
			COASTAL PLAIN SEDIMENTS	SS-1		8
			loose to medium dense, white grey, silty, fine to coarse **SAND (SM)**; with gravel	SS-2		17
	5			SS-3		12
				SS-4		7
	10					
▽				SS-5		8
	15					
				SS-6		9
	20					
				SS-7		7
	25		**BORING TERMINATED AT 25.0ft**			
	30					



- Boring and sampling performed in accordance with ASTM D 1586.
- Depths are measured from existing ground surface at time of drilling.
- Depths are shown to illustrate general arrangements of the strata encountered at the boring location.
- Do not use depths for determinations of quantities or distances.

NOTES:

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SOIL BORING RECORD

Project: **Freedom park Renovations**	Boring No: **B-9**
	Project No: 160471.210
Location: **See Figure 2**	GS Elevation:
Driller/Equipment: JD/ GEC: CME 45; 2.25" HSA; AUTO HAMMER	Drilling Date:
Water Level: 15.0 ft at time of boring	Engineer/Geologist:

Water Level (ft)	Depth (ft)	Soil Symbol	Soil Description	Sample Type	Standard Penetration Test Data (blows/ft)	N-Value
			TOPSOIL			
			topsoil for 4 inches			
			COASTAL PLAIN SEDIMENTS	SS-1		14
			stiff to hard, yellowish brown, fine to medium sandy **SILT (ML)**	SS-2		31
	5		medium dense, white, silty, fine to coarse **SAND (SM)**; with gravel	SS-3		31
				SS-4		18
	10					
▽				SS-5		11
	15					
				SS-6		
	20					
				SS-7		
	25		**BORING TERMINATED AT 20.0ft**			
	30					

Standard Penetration Test Data (blows/ft): 0, 10, 20, 30, 60, 80

- Boring and sampling performed in accordance with ASTM D 1586.
- Depths are measured from existing ground surface at time of drilling.
- Depths are shown to illustrate general arrangements of the strata encountered at the boring location.
- Do not use depths for determinations of quantities or distances.

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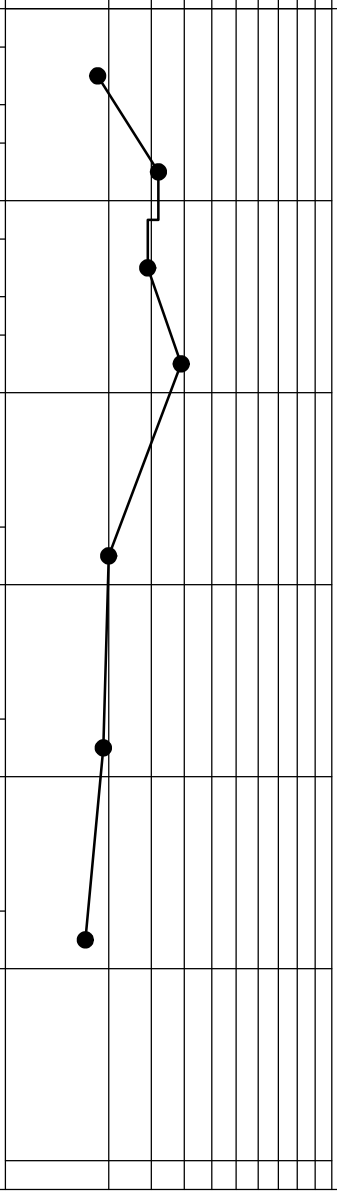
SOIL BORING RECORD

Project: **Freedom park Renovations**	Boring No: **B-10**
	Project No: 160471.210
Location: **See Figure 2**	GS Elevation:
Driller/Equipment: JD/ GEC: CME 45; 2.25" HSA; AUTO HAMMER	Drilling Date:
Water Level: 14.0 ft at time of boring	Engineer/Geologist:

Water Level (ft)	Depth (ft)	Soil Symbol	Soil Description	Sample Type	Standard Penetration Test Data (blows/ft)	N-Value
			TOPSOIL			
			topsoil (3 inches)			
			COASTAL PLAIN SEDIMENTS	SS-1		8
			firm to very stiff, orange grey, fine to medium sandy **SILT (ML)**	SS-2		22
	5		medium dense, white, silty, fine to coarse **SAND (SM)**; and gravel	SS-3		19
				SS-4		29
	10		stiff, orangish-pink, silty, fine to coarse **SAND (SM)**; trace gravel			
▽				SS-5		10
	15					
				SS-6		9
	20					
				SS-7		6
	25		**BORING TERMINATED AT 25.0ft**			
	30					



- Boring and sampling performed in accordance with ASTM D 1586.
- Depths are measured from existing ground surface at time of drilling.
- Depths are shown to illustrate general arrangements of the strata encountered at the boring location.
- Do not use depths for determinations of quantities or distances.

NOTES:

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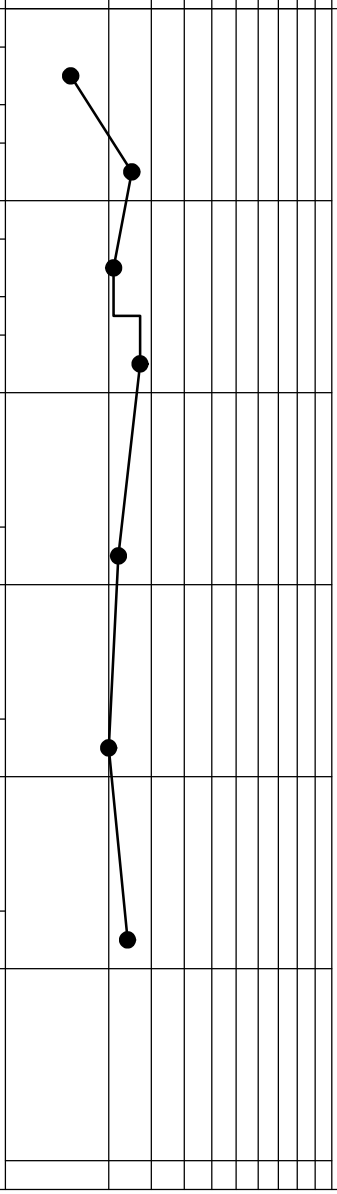
SOIL BORING RECORD

Project: **Freedom park Renovations**	Boring No: **B-11**
	Project No: 160471.210
Location: **See Figure 2**	GS Elevation:
Driller/Equipment: JD/ GEC: CME 45; 2.25" HSA; AUTO HAMMER	Drilling Date:
Water Level: 9.0 ft at time of boring	Engineer/Geologist:

Water Level (ft)	Depth (ft)	Soil Symbol	Soil Description	Sample Type	Standard Penetration Test Data (blows/ft)	N-Value
			TOPSOIL			
			topsoil for 3 inches			
			COASTAL PLAIN SEDIMENTS	SS-1		4
			soft to stiff, tan brown, fine to medium sandy **SILT (ML)**	SS-2		15
	5		stiff, tan orange, fine to coarse sandy **SILT (ML)**; trace gravel; organics	SS-3		11
▽	10		medium dense, pinkish-orange, silty, fine to coarse **SAND (SM)**; and gravel	SS-4		17
	15			SS-5		12
			medium dense, pinkish-white, silty, fine to medium **SAND (SM)**	SS-6		10
	20			SS-7		14
	25		**BORING TERMINATED AT 25.0ft**			
	30					



- Boring and sampling performed in accordance with ASTM D 1586.
- Depths are measured from existing ground surface at time of drilling.
- Depths are shown to illustrate general arrangements of the strata encountered at the boring location.
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NOTES:

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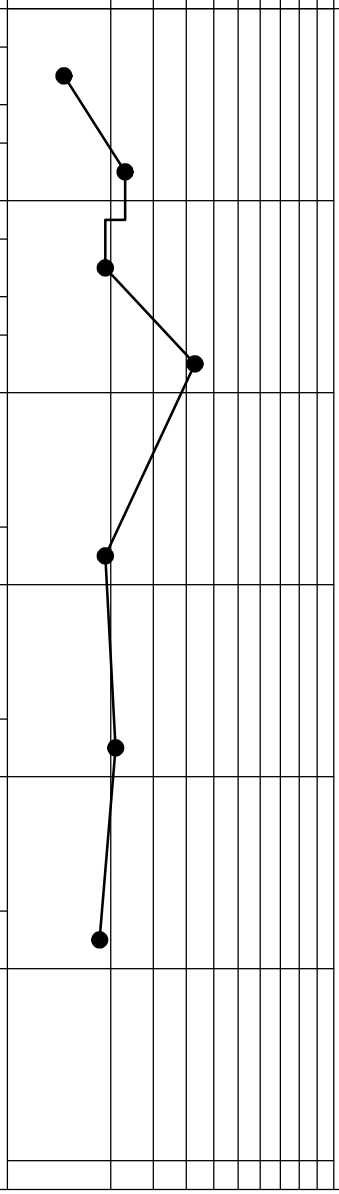
SOIL BORING RECORD

Project: **Freedom park Renovations**	Boring No: **B-12**
	Project No: 160471.210
Location: **See Figure 2**	GS Elevation:
Driller/Equipment: JD/ GEC: CME 45; 2.25" HSA; AUTO HAMMER	Drilling Date:
Water Level: 12.0 ft at time of boring	Engineer/Geologist:

Water Level (ft)	Depth (ft)	Soil Symbol	Soil Description	Sample Type	Standard Penetration Test Data (blows/ft)	N-Value
			TOPSOIL			
			topsoil (5 inches)			
			COASTAL PLAIN SEDIMENTS	SS-1		3
			soft to stiff, tan orange, fine to coarse sandy **SILT (ML)**; trace gravel	SS-2		13
	5		loose, white, silty, fine to medium **SAND (SM)**	SS-3		9
			loose to dense, white, silty, fine to coarse **SAND (SM)**; with gravel	SS-4		33
▽	10					
				SS-5		9
	15					
				SS-6		11
	20					
				SS-7		8
	25		**BORING TERMINATED AT 25.0ft**			
	30					



- Boring and sampling performed in accordance with ASTM D 1586.
- Depths are measured from existing ground surface at time of drilling.
- Depths are shown to illustrate general arrangements of the strata encountered at the boring location.
- Do not use depths for determinations of quantities or distances.

NOTES:

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SOIL BORING RECORD

Project: **Freedom park Renovations**	Boring No: **B-13**
	Project No: 160471.210
Location: **See Figure 2**	GS Elevation:
Driller/Equipment: JD/ GEC: CME 45; 2.25" HSA; AUTO HAMMER	Drilling Date:
Water Level: 14.0 ft at time of boring	Engineer/Geologist:

Water Level (ft)	Depth (ft)	Soil Symbol	Soil Description	Sample Type	Standard Penetration Test Data (blows/ft)	N-Value
			TOPSOIL			
			topsoil (4 inches)			
			COASTAL PLAIN SEDIMENTS			
			loose to medium dense, tan, silty, fine to coarse **SAND (SM)**; with gravel	SS-1		10
				SS-2		13
	5		very stiff, reddish orange, fine to medium sandy **SILT (ML)**	SS-3		20
			medium dense, yellowish orange, silty, fine to medium **SAND (SM)**	SS-4		24
	10					
▽			loose to medium dense, white, silty, fine to coarse **SAND (SM)**; trace gravel	SS-5		8
	15					
				SS-6		9
	20					
				SS-7		14
	25		**BORING TERMINATED AT 25.0ft**			
	30					

Standard Penetration Test Data (blows/ft): 0, 10, 20, 30, 60, 80

- Boring and sampling performed in accordance with ASTM D 1586.
- Depths are measured from existing ground surface at time of drilling.
- Depths are shown to illustrate general arrangements of the strata encountered at the boring location.
- Do not use depths for determinations of quantities or distances.

NOTES:

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SOIL BORING RECORD

Project: **Freedom park Renovations**	Boring No: **B-14**
	Project No: 160471.210
Location: **See Figure 2**	GS Elevation:
Driller/Equipment: JD/ GEC: CME 45; 2.25" HSA; AUTO HAMMER	Drilling Date:
Water Level: 14.0 ft at time of boring	Engineer/Geologist:

Depth (ft)	Soil Description	Sample Type	N-Value
	TOPSOIL		
	topsoil (4 inches)		
	COASTAL PLAIN SEDIMENTS		
	firm, reddish tan, fine to coarse sandy **SILT (ML)**; trace gravel	SS-1	6
	stiff, orange-grey, slightly clayey, fine sandy **SILT (ML)**	SS-2	15
5	medium dense, tan orange, silty, fine to coarse **SAND (SM)**; and gravel	SS-3	12
		SS-4	12
10	stiff, reddish orange, fine to medium sandy **SILT (ML)**		
15		SS-5	9
	loose, white, silty, fine to coarse **SAND (SM)**		
20		SS-6	9
		SS-7	9
25	**BORING TERMINATED AT 25.0ft**		
30			

Water Level (ft) ▽

Soil Symbol

Standard Penetration Test Data (blows/ft): 0 10 20 30 60 80

- Boring and sampling performed in accordance with ASTM D 1586.
- Depths are measured from existing ground surface at time of drilling.
- Depths are shown to illustrate general arrangements of the strata encountered at the boring location.
- Do not use depths for determinations of quantities or distances.

NOTES:

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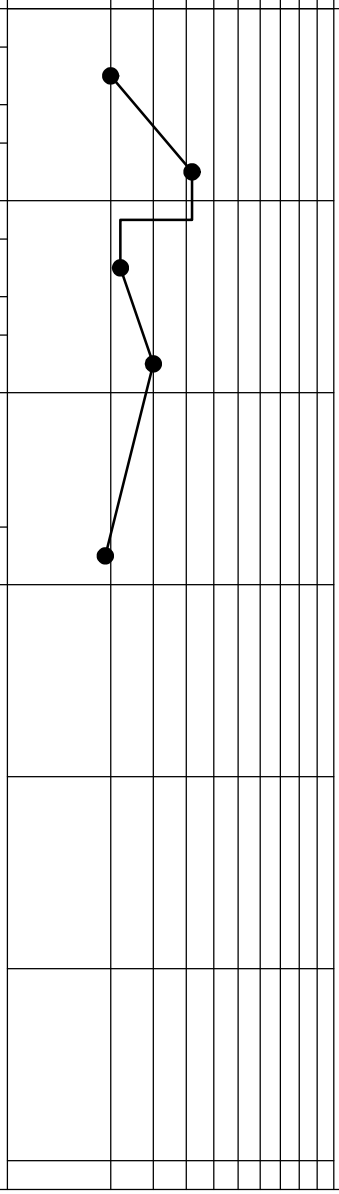
SOIL BORING RECORD

Project: **Freedom park Renovations**	Boring No: **B-15**
	Project No: 160471.210
Location: **See Figure 2**	GS Elevation:
Driller/Equipment: JD/ GEC: CME 45; 2.25" HSA; AUTO HAMMER	Drilling Date:
Water Level: 15.0 ft at time of boring	Engineer/Geologist:

Water Level (ft)	Depth (ft)	Soil Symbol	Soil Description	Sample Type	Standard Penetration Test Data (blows/ft)	N-Value
			TOPSOIL			
			topsoil (3 inches)			
			COASTAL PLAIN SEDIMENTS	SS-1		10
			stiff to hard, tan, clayey, fine sandy **SILT (ML)**			
				SS-2		32
	5					
			loose to medium dense, white, silty, fine to coarse **SAND (SM)**; with gravel	SS-3		12
				SS-4		20
	10					
				SS-5		9
▽	15		**BORING TERMINATED AT 15.0ft**			
	20					
	25					
	30					



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- Depths are measured from existing ground surface at time of drilling.
- Depths are shown to illustrate general arrangements of the strata encountered at the boring location.
- Do not use depths for determinations of quantities or distances.

NOTES:

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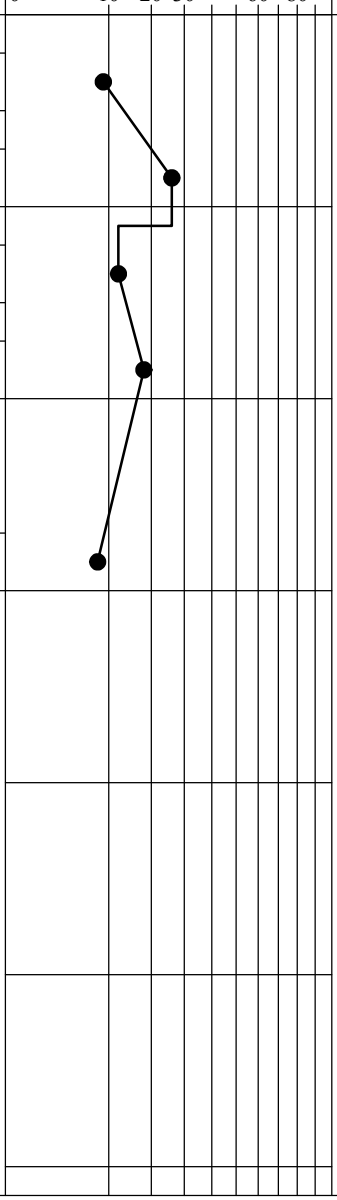
Project: **Freedom park Renovations**	Boring No: **B-16**
	Project No: 160471.210
Location: **See Figure 2**	GS Elevation:
Driller/Equipment: JD/ GEC: CME 45; 2.25" HSA; AUTO HAMMER	Drilling Date:
Water Level: 9.0 ft at time of boring	Engineer/Geologist:

Depth (ft)	Soil Description	Sample Type	N-Value
	ASPHALT PAVEMENT		
	asphalt pavement (2 inches)	SS-1	9
	GAB		
	graded aggregate base (3 inches)		
	COASTAL PLAIN SEDIMENTS	SS-2	26
5	stiff, reddish orange, fine to medium sandy **SILT (ML)**		
	very stiff, reddish orange-grey, slightly clayey, fine sandy **SILT (ML)**	SS-3	12
	loose to medium dense, pinkish-tan, silty, fine to coarse **SAND (SM)**	SS-4	18
10			
		SS-5	8
15	**BORING TERMINATED AT 15.0ft**		
20			
25			
30			

Standard Penetration Test Data (blows/ft)



- Boring and sampling performed in accordance with ASTM D 1586.
- Depths are measured from existing ground surface at time of drilling.
- Depths are shown to illustrate general arrangements of the strata encountered at the boring location.
- Do not use depths for determinations of quantities or distances.

NOTES:

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514 Hillcrest Industrial Blvd., Macon, GA 31204
5031 Milgen Court, Columbus, GA 31907

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SOIL BORING RECORD

Project: **Freedom park Renovations**	Boring No: **B-17**
	Project No: 160471.210
Location: **See Figure 2**	GS Elevation:
Driller/Equipment: JD/ GEC: CME 45; 2.25" HSA; AUTO HAMMER	Drilling Date:
Water Level: 6.0 ft at time of boring	Engineer/Geologist:

Water Level (ft)	Depth (ft)	Soil Symbol	Soil Description	Sample Type	Standard Penetration Test Data (blows/ft) 0 10 20 30 60 80	N-Value
			TOPSOIL			
			topsoil (4 inches)	SS-1		5
			COASTAL PLAIN SEDIMENTS			
			loose, black grey, fine to coarse **SAND (SM)**			
			Wood Fragments	SS-2		10
	5					
▽			soft to firm, black grey, fine sandy **SILT (ML)**	SS-3		4
				SS-4		8
	10					
				SS-5		5
	15		**BORING TERMINATED AT 15.0ft**			
	20					
	25					
	30					

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SOIL CLASSIFICATION CHART

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

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS