

O'BERRY ENGINEERING, INC.

GEOTECHNICAL ENGINEERING • CONSTRUCTION INSPECTION

3161 Solomons Island Road, Suite 2 • Edgewater, MD 21037

(410) 956-7820 • FAX (410) 956-1537

obei@oberryengineering.com

Robert A. O'Berry, P.E.
President

Lisa P. Carroll
Project Manager

April 12, 2024

RRMM Architects
3700 Koppers Street – Suite 300
Baltimore, Maryland 21227
Attention: Joe Graves

Re: Geotechnical Investigation
Proposed Amphitheater Canopy and Stage
Allen Pond Amphitheater
3330 Northview Drive
Prince George's County (Bowie), Maryland
OBEI Job No. 24018

Mr. Graves:

Submitted here is the report for our geotechnical investigation performed at the referenced site. The purpose of this study was to determine the subsurface conditions at the site and, based on an engineering analysis of those conditions, to develop recommendations to guide design and construction of foundations to support the proposed amphitheater canopy and stage.

SITE AND PROJECT DESCRIPTION

Allen Pond Park is located on the south side of Northview Drive between its intersections with Mitchellville Road and Nottingham Drive in Bowie, Maryland. The existing amphitheater is located on the north side of Allen Pond which is generally located in the west central portion of the park. Ground surface elevations at the boring locations were not provided to our office. It is assumed that existing and proposed ground surface elevations around the perimeter of the new stage will be similar.

It is proposed to remove the existing wood canopy and stage. It is our understanding that a new concrete stage will be placed on top of an old concrete stage that was covered in the past by the currently existing wood stage. The new concrete stage will also be extended somewhat to the north, east and west. The four pier footings for the new pre-manufactured canopy will be located within the footprint of the existing old concrete stage requiring removal of the concrete at these locations. New masonry screen walls (maximum height of 5 feet) are proposed on the south (back) side of the proposed amphitheater as well as adjacent to new access ramps on the east and west sides. Portions of the new screen walls are proposed to bear on the existing old concrete stage. It is our understanding that the condition of the existing concrete stage is unknown.

The canopy and screen wall loads were not provided to our office. Our geotechnical recommendations are based on the information as described above. If any of that information is incorrect or should change, our office should be contacted so we can review and modify our recommendations, if necessary.

FIELD INVESTIGATION

To determine the subsurface conditions, three borings (labeled B-1 through B-3) were made to depths of between 15 and 30 feet below the existing ground surface around the perimeter of the existing amphitheater as shown on the boring plan in Appendix A. The boring locations were estimated based on measurements from existing site features. The borings were performed with a truck-mounted drill rig using hollow stem augers. Split spoon samples were obtained at 2.5 to 5-foot intervals of depth by the Standard Penetration Test (SPT) Procedure. A representative portion of each sample was sealed in a glass jar and was subsequently inspected and visually classified by our geotechnical staff.

Boring logs giving descriptions of the various soils encountered and other boring and sampling information are included in Appendix B. On the logs, the soils have been classified using the Unified Soil Classification System (USCS). The depths given on each log were referenced from the existing ground surface at the time of our investigation. The ground surface elevations at the boring locations were not provided to our office.

GENERAL SUBSURFACE CONDITIONS

The reader is referred to the Boring Logs in Appendix B for details pertaining to the specific subsurface conditions encountered at each boring location. Based on the Geologic Map of Maryland prepared by the Maryland Geological Survey, the site is underlain by the Aquia Formation. Given below is a summary of the subsurface conditions at the boring locations. It is noted that about 2 to 4 inches of topsoil and rootmat covered the ground surface at the boring locations.

Fill and/or Possible Fill soils were encountered at each of the boring locations that extend to depths of about 4 to 4.5 feet below the existing ground surface. Possible Fill is defined herein as material that had visual evidence it might be Fill but no positive indicators. The Fill/Possible Fill generally consists of Silty to Clayey Sands (SM, SC-SM and/or SC) with trace gravel at various depths. Decayed organics were also encountered at the location of Boring B-1 between depths of 2 and 4 feet. The N-values (blows per foot from the SPT) in the Fill/Possible Fill vary between 4 and 20 indicating the low end of loose to medium dense soil conditions. It is noted that half of the N-values are between 4 and 5.

The natural soils encountered below the Fill/Possible Fill consist of layered Silty to Clayey Sands (SM, SC-SM and/or SC) to depths of between 6 and 7.5 feet underlain by Silty Sands (SM). The N-values in the natural soils generally indicate very loose to the low end of loose soil conditions just below the Fill/Possible Fill and the low end of medium dense conditions below depths of about 7 to 7.5 feet.

Groundwater

Groundwater observations were made while augering the borings, at completion of the borings and 24 hours after completion of the borings. Groundwater was measured at the locations of Borings B-1 through B-3 at depths of 1.5, 1.7 and 1.9 feet, respectively, below the existing ground surface after 24 hours. At the location of Boring B-2, water may have been encountered somewhat deeper while drilling than indicated by the 24-hour water measurement which may be the result of hydrostatic pressure forcing water up into the

borehole. It is noted that water levels will vary at different times due to seasonal changes, precipitation and local runoff.

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of this investigation, it is concluded that the low end of loose to very loose soil conditions expected to be present at and below the footing subgrade level will not properly support the proposed canopy using conventional spread footings without excessive total and differential settlement occurring. Therefore, it is our opinion that a deep foundation system, such as helical piers, will be necessary to support the proposed canopy.

The lighter loads expected for the proposed screen walls and concrete stage extensions can likely be supported in these soils using spread footings. However, a relatively low soil bearing capacity is recommended for design and settlement of these structures should be expected. Due to the shallow water table, construction of stone mats should be expected under portions, if not all, of the screen wall and stage extension footings. If settlement of these lightly loaded structures is a concern and/or to minimize undercutting and stone mat construction, consideration should be given to supporting the new screen walls and stage extensions on helical piers.

After removal of the wood stage, it is recommended that any portion of the of the old concrete stage that will be used to support the new screen walls be evaluated to determine if it can support the walls. Test pits should also be performed to determine the depth, outer projection and thickness of the existing footings. Differential settlement between portions of the wall resting on new footings and the existing concrete stage may occur.

Helical Pier Design

We recommend that helical piers be installed to support the proposed canopy. We consulted with Ram Jack Chesapeake who installs helical piers and reviewed the boring logs. Based on their input, for preliminary design and estimating purposes, we recommend an allowable pile capacity of 20 kips for a 10"/12"/14" helix configuration and

an embedment depth of 24 feet. A higher capacity for helical piers located at a deeper embedment depth may be acceptable at the discretion of the deep foundation contractor that installs/designs the piers; however, it is noted that the deepest boring only extended to a depth of 30 feet.

The design of the deep foundation system will be the responsibility of the deep foundation contractor that installs the piers. The pier shaft should be sufficient enough to prevent buckling in the very loose to low end of loose soil deposits in the upper portion of the profile. The design must be submitted to the project structural engineer and our office for review and comments. Other deep foundation systems can also be considered provided they meet the design uplift, lateral and vertical allowable capacities for the project.

A factor of safety of at least 2 is recommended for pier design provided load testing is performed and careful logging of the installation torque is recorded. Load testing may be omitted at the discretion of the pier designer if a larger factor of safety is used for design. The efficiency of group piers must be considered in the design. Minimum spacing between individual piers should be at least 5 times the diameter of the largest helix. The piers can be slightly battered to lessen the pile cap size. A geotechnical engineer or his/her representative should inspect the installation of the piers or at least review the logs of the installation torque for helical piers.

Pier Load Testing

Pier load testing to verify the vertical (downward) capacity is recommended. We recommend at least one load test be performed to at least 2 times the allowable vertical capacity prior to installation of the production piers. If the load test fails to meet the acceptance criteria, the contractor will need to modify the design. Proof testing in excess of the allowable vertical capacity will be required at additional locations if concerns arise during pier installation based on observations made during construction inspection. A geotechnical engineer or his/her representative should inspect the load testing procedures or at least review the load testing data prior to installation of the production piers. It is again noted that

load testing may be omitted at the discretion of the pier designer provided a factor of safety greater than 2 is used for design.

Seismic Site Class

Concerning Seismic Site Classification, reference is made to the *International Building Code (IBC) 2018 Section 1613 Earthquake Loads*. Based on the boring results and our knowledge of the condition of the deeper subsurface soil conditions in the site area, it is our opinion that the Seismic Site Classification is "E".

Structural Fill Placement (if required)

Any Structural Fill should be placed in loose lifts not to exceed 8 inches and each lift should be compacted to at least 95 percent maximum dry density as determined by the Modified Proctor Test (ASTM D1557). All subgrade preparation, fill placement, and compaction should be monitored by a qualified soils inspector under the supervision of a geotechnical engineer on a full-time basis to ensure that the fill materials are being properly placed and compacted.

Shallow Lightly-Loaded Foundations

It is again noted that if settlement of the screen walls and stage extensions is a concern and/or to minimize undercutting and stone mat construction, consideration should be given to supporting the new screen walls on helical piers.

Site Preparation

After stripping topsoil, vegetation, concrete and any other unsuitable condition that may be found to exist over the surface, test pits and/or hand auger borings with Dynamic Cone Penetrometer (DCP) testing should be performed to determine the condition of the shallow subsurface profile and the need for undercutting and stone mat construction.

Foundation Design

The proposed new screen walls and any other shallow lightly-loaded structures can be supported on conventional spread footings located at frost depth using an allowable soil bearing capacity not to exceed 1,000 psf. Settlement of these structures should be expected

and considered in the structural design of the structures which may include designing the footings as grade beams to minimize differential settlement over short distances. All foundations exposed to outside temperatures must be located at least 2.5 feet below final exterior grade for frost protection. Foundations not exposed to outside temperatures can be located as shallow as 1 foot below final grade.

Inspection

Any shallow footing excavations must be inspected by a geotechnical engineer or his/her representative prior to the placement of concrete. This inspection should include hand auger borings and DCP testing to determine conditions within the depth influence of the foundations. Undercutting of loose shallow subgrade soils and replacement with a stone mat should be expected based on the boring results.

Stone Mat Construction (where necessary)

The stone mat should be a minimum of 18 inches thick with overcuts of 12 inches for every 12 inches of stone mat depth with a minimum overcut of 18 inches. The actual stone mat thickness will need to be determined at the time of construction. Construction of the stone mat must be inspected by a geotechnical engineer or his/her representative and the footings must be formed on top of the stone. After performing any required undercutting, a woven geotextile should be placed on the subgrade surface and sides of the excavation prior to placing any stone. We recommend #2 stone (or clean #2 recycled concrete) be used to construct the stone mat. The surface of the stone mat must be tamped with the excavator bucket after all of the stone is placed. The upper 2 inches of the stone mat can be #57 stone to allow for easier grading.

It is likely that the excavation for the stone mat will need to be performed in sections due to groundwater and possible loosening of the subgrade surface. A method to control groundwater (pumps, etc.) will also be necessary during construction of the stone mat. All exposed stone areas should be covered with filter cloth after pouring the footings and prior to backfilling to prevent soil loss into the void space in the stone.

GEOTECHNICAL INSPECTION

The conclusions and recommendations in this report are valid only if a geotechnical engineer inspects all phases of site grading and foundation construction. This inspection will include, but not necessarily be limited to the items listed on the following page.

- a) Inspection of the subgrade during site preparation to determine the need for undercutting and stone mat construction.
- b) Inspection of any required undercutting and stone mat construction.
- c) Inspection of any Structural Fill placement and compaction to include performing field density tests.
- d) Inspection of the footing excavations prior to placement of concrete to include performing portable penetration tests.
- e) Review of the helical pier design to verify that the design is in accordance with the recommendations contained within this report.
- f) Inspection of helical pier installation and any required load testing.

REMARKS

This report was compiled based solely on the results of the soil test borings performed at the project site. The recommendations were developed from the information obtained in the test borings which depict subsurface conditions only at these specific locations and at the particular time designated on the logs. Soil conditions at other locations may differ from conditions occurring at these boring locations. Also, the passage of time may result in a change in the soil conditions at the boring locations.

The nature and extent of variations between the borings may not become evident until the time of construction. If variations then appear evident, it will be necessary to re-evaluate the recommendations in this report after performing on-site observations during the excavation period and noting the characteristics of any variation. However, only minor variations that can be readily evaluated and adjusted during construction are expected.

Our professional services have been performed, our findings obtained and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. This warranty is in lieu of all other warranties either expressed or implied. This company is not responsible for the conclusions, opinions or recommendations made by others based on this data. If during construction, any problems or deviations are encountered contrary to our findings, O'Berry Engineering, Inc. should be notified immediately.

We have appreciated this opportunity to provide our services to you on this project. If you have any questions concerning this report, please do not hesitate to contact our office.

Respectfully,
O'BERRY ENGINEERING, INC.



Robert A. O'Berry, P.E.
President

RAO

Copies: Client – email jgraves@rrmm.com



APPENDIX A

APPENDIX B

DRILL HOLE LOG

BORING NO.: B-1

PROJECT: Allen Pond Amphitheater

CLIENT: RRMM Architects

LOCATION: See Boring Plan

DRILLER: DGMTS, Inc.

DRILL RIG: Truck Rig

DEPTH TO WATER > AT COMPLETION: 1.7'

DEPTH TO CAVING > AT COMPLETION: 7.9'

PROJECT NO.: 24018

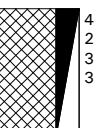
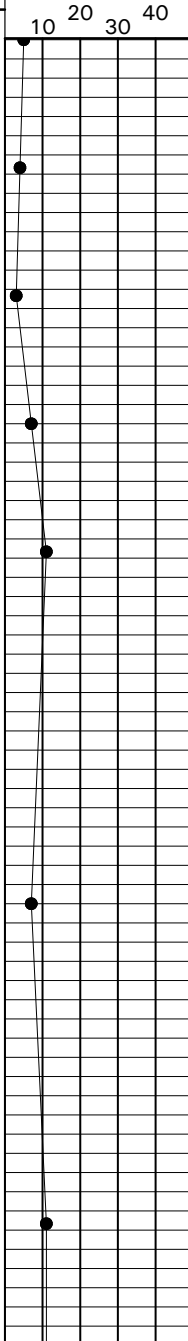
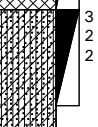
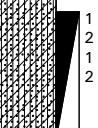
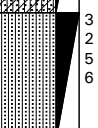
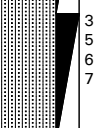
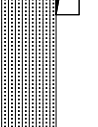
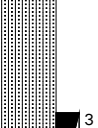
DATE: 3/13/2024

ELEVATION: 111.5'±

LOGGED BY: RAO

AFTER 24 HOURS: 1.5'

AFTER 24 HOURS: 5.7'

ELEVATION/ DEPTH	SOIL SYMBOLS, SAMPLERS AND TEST DATA	USCS	Description	NM%	STANDARD PENETRATION TEST		
					DEPTH	N	CURVE
111		FILL	Intermixed Moist Brown loose f-m Clayey Sand (SC) and Silty Clayey Sand (SC-SM) w/trace gravel [Fill]	16	0'-2'	5	
		2.0		29	2'-3'6"	4	
108		SC-SM	Layered Very Moist to Wet Gray, Olive and Brown loose f-m Clayey Sand (SC) and Silty Clayey Sand (SC-SM)	35	4'-6'	3	
		6.0	- [Fill?] w/decayed wood from 2' to 4'		6'-8'	7	
105		SM	- ironstone layers at 5.7'		8'-10'	11	
			Wet Black loose f-m Silty Sand (SM)		13'6"-15'	7	
102			- medium dense w/Silty Clayey Sand (SC-SM) layers from 8' to 12' and below 17'		18'6"-20'	11	
99							
96							
93							

This information pertains only to this boring and should not be interpreted as being indicative of the site.

O'Berry Engineering, Inc.

DRILL HOLE LOG

BORING NO.: B-1

PROJECT: Allen Pond Amphitheater

PROJECT NO.: 24018

ELEVATION/ DEPTH	SOIL SYMBOLS, SAMPLERS AND TEST DATA	USCS	Description	NM%	STANDARD PENETRATION TEST		
					DEPTH	N	CURVE
21 90 24 87 27 84 30 81 33 78 36 75 39 72 42 69 45			(See Previous Description)		23'6"-25'	11	10 20 30 40
		30.0	Bottom of Boring 30'				

DRILL HOLE LOG

BORING NO.: B-2

PROJECT: Allen Pond Amphitheater

CLIENT: RRMM Architects

LOCATION: See Boring Plan

DRILLER: DGMTS, Inc.

DRILL RIG: Truck Rig

DEPTH TO WATER > AT COMPLETION: 1.9'

DEPTH TO CAVING > AT COMPLETION: 5.9'

PROJECT NO.: 24018

DATE: 3/13/2024

ELEVATION: 111.5'±

LOGGED BY: RAO

AFTER 24 HOURS: 1.7'

AFTER 24 HOURS: 5.9'

ELEVATION/ DEPTH	SOIL SYMBOLS, SAMPLERS AND TEST DATA	USCS	Description	NM%	STANDARD PENETRATION TEST		
					DEPTH	N	CURVE
111		FILL	Intermixed Moist Brown and Grayish Brown medium dense f-m Clayey Sand (SC) and Silty Clayey Sand (SC-SM) w/trace gravel [Fill]	14	0'-1'6"	11	
108		SC	Moist to Very Moist Brown, Olive and Gray f-m Clayey Sand (SC) w/Silty Clayey Sand (SC-SM) layers and trace gravel [Fill?]	18	2'6"-4'	20	
105		SC-SM	Very Moist to Wet Brown and Black loose f-m Silty Clayey Sand (SC-SM) w/ironstone layers or fragments	29	5'-6'6"	5	
102		SM	Wet Black medium dense f-m Silty Sand (SM)		8'6"-10'	11	
99					13'6"-15'	10	
96			Bottom of Boring 15'				
93							

This information pertains only to this boring and should not be interpreted as being indicative of the site.

O'Berry Engineering, Inc.

DRILL HOLE LOG

BORING NO.: B-3

PROJECT: Allen Pond Amphitheater

CLIENT: RRMM Architects

LOCATION: See Boring Plan

DRILLER: DGMTS, Inc.

DRILL RIG: Truck Rig

DEPTH TO WATER > AT COMPLETION: 3.6'

DEPTH TO CAVING > AT COMPLETION: 7.9'

PROJECT NO.: 24018

DATE: 3/13/2024

ELEVATION: 112.5'±

LOGGED BY: RAO

AFTER 24 HOURS: 1.9'

AFTER 24 HOURS: 4.9'

ELEVATION/ DEPTH	SOIL SYMBOLS, SAMPLERS AND TEST DATA	USCS	Description	NM%	STANDARD PENETRATION TEST		
					DEPTH	N	CURVE
0							10 20 30 40
111		FILL	Moist Brown and Gray medium dense f-m Clayey Sand (SC) w/trace gravel [Fill]	19	0'-1'6"	9	
3		2.0					
108		SC-SM	Layered Very Moist Gray and Light Gray loose f-m Silty Sand (SM) and Silty Clayey Sand (SC-SM) [Fill?]	23	2'6"-4'	4	
6		4.5					
105		SC-SM	Layered Very Moist to Wet Bluish Gray and Gray very loose fine Silty Sand (SM) and Silty Clayey Sand (SC-SM) w/Sandy Clay (CL) layers	31	5'-6'6"	0	
9		7.5					
102		SM	Wet Black medium dense f-m Silty Sand (SM)		8'6"-10'	9	
12							
99					13'6"-15'	10	
15		15.0					
96			Bottom of Boring 15'				
18							
93							

This information pertains only to this boring and should not be interpreted as being indicative of the site.

O'Berry Engineering, Inc.