



**B3 MATERIAL TESTING ENGINEERING**  
E s s e n c e o f P e r f e c t i o n

1676 West 31 PL., Hialeah FL, 33012 - Off. 786.773-5871/5889 - Fax. 786.615-5801

June 7, 2021

Project No. 21-0277

Ross Engineering  
3325 S. University Drive, Suite 111  
Davie, Florida 33328

Attn. Mr. Daniel Sanders

RE: Report of Geotechnical exploration for existing property  
**Located: 5226 North Bay Road, Miami Beach, Florida**

Dear Mr. Sanders:

In accordance with your request, we have completed the subsurface exploration and geotechnical evaluation for the proposed existing property in Miami Beach, Florida. Enclosed are two (2) copies of the report that includes our findings and construction considerations.

B3 Material Testing Engineering, LLC (B3 MTE) appreciates the opportunity to be of service during this phase of the project. If there are any questions or comments you may have regarding the content of this report, or if you may need of any further service, please contact us at your convenience.

If there are any questions regarding the information submitted herein, please do not hesitate to contact us.

Sincerely yours,

**B3 Material Testing Engineering, LLC.**

Dario Herrera, P.E.  
Florida Reg. 67796

CC/AD/bm-RossEngineering





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### **INTRODUCTION**

**B3 Material Testing Engineering LLC.** (B3 MTE) conducted a subsurface investigation at the above referenced project. The investigation was performed on **June 1, 2021**, authorized by Mr. Daniel Sanders from Ross Engineering.

The purpose of the investigation was to obtain information concerning the sub-surface condition to provide site preparation and foundation design alternatives for support of the proposed construction. To achieve the desired objective three (3) standard penetration test borings were performed. The approximate boring locations are indicated on the attached Boring Location Plan. We have also attached the Boring Logs, which include the types of materials encountered, results of the field tests and measured groundwater depths.

### **SCOPE**

The scope of services included a reconnaissance of the site, geotechnical investigation, field and engineering analysis and evaluation of the data.

### **PROJECT AND SITE DESCRIPTION**

The proposed project consists of an existing property in Miami Beach, Florida.

### **SUBSURFACE INVESTIGATION PROCEDURES**

The soil borings were performed on **June 1, 2021**, with a truck mounted drilling rig and it was advanced using hollow stem auger drilling methods. A total of three (3) soil borings to a depth of 30 feet and one (1) percolation test were performed. Representative soil samples were obtained employing split spoon sampling procedures in accordance with ASTM Specification D-1586.

A two (2) foot long two (2) inches O.D. Split Spoon Sampler was driven into the ground by successive blows with 140 lb. Hammer dropping thirty (30) inches. The soil sampler was driven two (2) feet at a time or at every change in soil characteristics, then extracted for visual examination and classification of the retained soil samples.

The number of blows required for a one (1) foot penetration of the sampler is designated as "N" (known as the standard penetration resistance value). The "N" value provides an indication of the relative density of non-cohesive soils and the consistency of cohesive soils.



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Suitable corrections are applied to this number to include the effects of soil overburden pressure and other factors. A general evaluation of soils is made from the established correlation between "N" and the relative density or consistency of soils.

This dynamic method of soil testing has been widely accepted by foundation engineers and architects to conservatively evaluate the bearing capacity of soils. A continuous drilling and sampling procedure was used therefore, the samples were taken at intervals of two (2) feet.

### SOIL, PAVEMENT AND GROUND WATER CONDITIONS

Specific soil conditions encountered in the borings are indicated on the soil boring logs included with this report. The stratification of the profile components as shown on the boring logs represents the subsurface conditions at the actual boring locations. Variations may occur within a short distance from the borings. Lines of demarcation represent the approximate boundary between the type of material encountered, but the transition may be gradual, or not clearly define.

The existing surface consists of 6" topsoil and bricks over 6" to 2' shell fragment with light brown fine to medium sand, 2' to 4' shell fragment and brown fine to medium sand, 4' to 8' dark gray silty muck with organics, 8' to 12' peat, 12' to 19' gray fine to medium sand with shell fragment, between 19' to 26' lime rock with gray fine to medium sand, and between 26' to 30' lime rock with light gray fine to medium sand.

Fluctuations in the amount of water accumulated and in the hydrostatic water table can be anticipated depending upon variations in precipitation and surface runoff.

The types of foundation material encountered have been visually classified and are described in detail in the boring logs. The results of the field penetration tests are presented in the boring logs in numerical and graphic forms.

Groundwater was measure immediately at the completion of each soil boring and was found at an average of approximately **four (4) feet four (4) inches**, below the existing surface (see logs). Design engineers must verify existing ground elevations as well as FEMA Flood and County highest and lowest groundwater elevation for their design. Surface flooding may result under hurricane conditions and should be taken into consideration in the design of the project. Specialty groundwater and water proofing contractors shall be consulted for all work below the groundwater level. Fluctuation in the observed ground water level should be expected due to seasonal climatic changes rainfall variation, surface water run-off and other, specific factors related to the site in question. Dewatering for pile caps shall be considered.



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**FOUNDATION RECOMMENDATIONS:**

Based on the sub-surface conditions encountered **B3 Material Testing Engineering LLC.**, has evaluated a few foundation systems for providing additional support to the existing structure. Based on our understanding of the proposed structure and our field boring logs; it is evident that deep foundation systems are needed to support the proposed structure and slabs without detrimental settlement.

Existing land elevation was not provided to B3 MTE; therefore, the proposed pile length is based on the existing ground elevation at the time of drilling. Pile length will need to be adjusted accordingly based on proposed final designs.

Pile special consideration in the analysis was given to the following:

1. The presence of a layer organic material of varied thickness, which makes the site less appropriate for construction using regular spread footings and single column pads at the existing grade.
2. Length to width ratio of the proposed structure with special emphasis on differential settlement.

Given the above, the following foundation systems were selected.

**ALTERNATIVE I: AUGERCAST PILES (Pressure grouted):**

Auger cast (pressure grouted) piles are a feasible foundation alternative. The capacity of these piles is essentially developed in tip bearing and side friction. When these piles are installed or socketed into place, they will "lock into" the rock and sand strata thereby providing adequate bearing capacity.

The relationship obtained is as follows in Table I:

**TABLE I**

SIZE (Dia.)	Allowable Proposed Length	Allowable Lateral Load	Allowable Tensile Capacity	Compressive Bearing Capacity
14" Ø	26 Feet	2 Tons	15 Tons	35 Tons

Large volumes, possibly up to twice (or more) of the theoretical pile volume, may be required for proper auger cast pile installation.

A minimum of three (3) piles should initially be driven (installed) at strategic locations to verify the suggested pile length. The entire pile driving (installation) operation should be monitored and performed in accordance with the relevant local and state requirements.



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The installation of adjacent auger cast piles (located within 6' o.c. of each other) on the same working day is not recommended. We recommend that the adjacent piles not be installed until the initial grouted pile has set overnight.

The grout used in the pile installation shall develop a minimum compressive strength of 4,000 psi at 28 days. Large grout volume, possible twice of the theoretical pile volume, are expected for proper auger cast pile installation due to subsoil conditions. Furthermore, where former structures have been demolished and former piles removed causing additional underground cavities.

All piles shall be designed by a professional engineer and shall be placed under supervision of B3 MTE geotechnical engineer to verify compliance with our recommendation. If the pile is not reinforcing over the entire length, we recommend a single #7 bar be placed the full length of the pile to verify pile continuity.

Detailed settlement analysis was beyond the scope of this report. However, we have compared the field test data obtained in this exploration with our experience with structures similar to those proposed for this report. The estimated magnitude of these settlements is 1/2 to 1 inch. Due to the granular nature of the subsurface materials, the foundation settlements should occur as the loads are applied and should be virtually negligible by the end of the building shell completion.

**ALTERNATIVE II: TYPE B HELIX PIER; HELICAL PILES:**

Helical piles are another feasible alternative. The capacity of these piles is essentially developed in tip bearing and side friction. When these piles are installed or socketed into place, they will "lock into" the rock and sand strata thereby providing adequate bearing capacity.

Helical piles bearing capacity is a proprietary product dependent on a shaft type, size, and steel strength as well as helix size, numbers and spacing as well as depth. Therefore, the helical pile specialty foundation contractors and its engineer shall submit a signed and sealed shop drawings of the proposed helical piles to the building department. Below are the minimum depth and capacities unless authorized by the geotechnical engineer. Predrilling may be required to achieve design depths.

The analysis for this foundation alternative consisted of determining a pile capacity for specific size and depth of installation. See Table II below:

TABLE II

Size (Dia.)	Allowable Proposed Length	Allowable Tension Capacity	Allowable Compressive Bearing Capacity
Type B. Pier 3.5"	26 Feet or refusal	5 Tons	15 Tons



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### **LIMITATIONS OF STUDY**

The exploration and evaluation of the foundation conditions reported herein are considered sufficient in detail and scope to form a reasonable basis for the foundation design. The recommendations submitted for the proposed construction are based on the available subsurface information and the preliminary design details furnished by the client.

Any revisions to the plans for the proposed structure from those enumerated in this report should be brought to the attention of the soil engineer, so that he might determine if changes in the foundation recommendations are required. If deviations from the noted subsurface conditions are encountered during construction, they should also be brought to the attention of the soil engineer, so that he can review the changed conditions and revise these recommendations, if warranted.

### **GENERAL QUALIFICATIONS**

The analysis and recommendations presented in this report are based upon the data obtained from the soil borings performed at the indicated locations and from any other information discussed in this report. This report does not reflect any variations that may occur between borings or across the site. Any statements which appear in this report or on the boring logs regarding odors, color, unusual or suspicious items or conditions are strictly for the information of the client. In addition, the soils samples cannot be relied on to accurately reflect the strata variations that usually exist between sampling locations. The nature and extent of such variations may not become evident until construction. If variations appear evident, it will be necessary to reevaluate the recommendations of the report. In addition, it is recommended that B3 Material Testing Engineering, LLC. be retained to perform construction observation and thereby provide a complete professional geotechnical engineering service through the observational method. For environmental due to diligence, a phase I and/or phase II Environmental Site Assessments is recommended.

This report has been prepared for the exclusive use of **Ross Engineering** for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. In the event that any changes in the nature, design or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed, and the conclusions of this report modified or verified in writing by the geotechnical engineer. Also, note that B3 Material Testing Engineering, LLC. is not responsible for any claims, damages, or liability associated with any other party's interpretation of this report's subsurface data or reuse of the report's' subsurface data or engineering analyses without the express written authorization of B3 Material Testing Engineering, LLC.

**B3 Material Testing Engineering, LLC.** appreciates the opportunity to be of service to you at this phase of your project. Please feel free to contact us if there are any questions or comments pertaining to this report.



## SOIL BORING LOGS



**SOIL BORING LOG**

PROJECT NO.	21-0277	Date	Tuesday, June 1, 2021
PROJECT	Existing property 5226 N. Bay Road, Miami Beach, Florida		
	Location: 10' East of SFH at Center of Driveway		
CLIENT	Ross Engineering 3325 S. University Drive, Suite 111, Davie, Florida		<b>B-1</b>
	Contact: Daniel Sanders		

LATITUDE	LONGITUDE	Driller	AL	Helper	FM
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Depth (feet)	MATERIAL DESCRIPTION	SAMPLE RUN NO.	RECOVERY (%)	BLOW COUNTS	N VALUE	MOISTURE CONTENT (%)	"N" Curve
Soil Boring from 0' to 30'							
0' - 6"	Brick.						
6" - 2'	Shell fragment with light brown fine to medium sand.	1	23	14 14 16 18	30		
2' - 4'	Shell fragment and brown fine to medium sand.	2	22	18 19 7 6	26		
4' - 8'	Dark gray silty muck with organics.	3	20	6 4 1 2	5		
		4	21	0 1 1 2	2		
8' - 12'	Peat	5	18	0 0 1 0	1		
		6	19	0 0 1 1	1		
12' - 19'	Gray fine to medium sand with shell fragment.	7	19	14 16 19 21	35		
		8	22	28 20 29 24	49		
		9	21	27 26 25 26	51		
		10	22	24 20 29 20	49		
		11	20	29 30 30 30	60		
19' - 26'	Lime rock with gray fine to medium sand.	12	18	33 31 28 20	59		
		13	20	28 29 29 28	58		
26' - 30'	Lime rock with light gray fine to medium sand.	14	22	29 20 30 38	50		
		15	24	31 31 34 38	65		
30'	End of boring @ 30'						

Water Level (▼): 4'-4"  
 Sample Type: Split Spoon (SS)  
 Boring performed on: 06/01/21

Respectfully submitted by

**Dario A. Herrero, P.E.**  
 Florida Reg. #67196  
 6/1/2021

As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publications of statements, conclusions, or extract from or regarding our reports is reserved pending our written approval.





**B3 MATERIAL TESTING ENGINEERING**

Essence of Perfection

1676 WEST 31st Place, Hialeah, Florida 33012/Off: 786-773-5871/ Fax: 786-773-5889

**SOIL BORING LOG**

PROJECT NO.	21-0277	Date	Tuesday, June 1, 2021
PROJECT	Existing property 5226 N. Bay Road, Miami Beach, Florida Location: 10' West of Court Yard opening at center of pond.		
CLIENT	Ross Engineering 3325 S. University Drive, Suite 111, Davie, Florida Contact: Daniel Sanders		<b>B-2</b>

LATITUDE	LONGITUDE	Driller	AL	Helper	FM
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Depth (feet)	MATERIAL DESCRIPTION	SAMPLE RUN No.	RECOVERY (%)	BLOW COUNTS	N VALUE	MOISTURE CONTENT (%)	"N" Curve
Soil boring from 0' to 30'							
0' - 6"	Topsoil with vegetation.	1	23	15 15 16 19	31		
6" - 4'	Light brown fine to medium sand with shell fragment.	2	22	19 17 18 16	35		
4' - 8'	Dark gray silty muck with organics,	3	20	5 1 1 1	2		
		4	21	1 1 1 0	2		
8' - 12'	Peat	5	18	0 0 0 1	0		
		6	19	1 3 4 14	7		
		7	19	19 17 16 5	33		
12' - 20'	Gray fine to medium sand with shell fragment.	8	22	16 18 17 18	35		
		9	21	19 21 28 28	49		
		10	22	29 31 38 38	60		
		11	20	30 31 38 34	69		
20' - 26'	Lime rock with gray fine to medium sand.	12	18	33 31 31 30	62		
		13	20	30 34 33 58	67		
26' - 30'	Lime rock with light gray fine to medium sand.	14	22	30 30 31 38	61		
End of boring @ 30'		15	24	39 30 30 23	60		

Water Level (▼): 4'-4"  
 Sample Type: Split Spoon (SS)  
 Boring performed on: 06/01/21

Respectfully submitted by

**Dario A. Herrero, P.E.**  
 Florida Reg. #67796

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**B3 MATERIAL TESTING ENGINEERING**

*E s s e n c e o f P e r f e c t i o n*

1676 WEST 31st Place, Hialeah, Florida 33012/Off: 786-773-5871/ Fax: 786-773-5889

**SOIL BORING LOG**

PROJECT NO.	21-0277	Date	Tuesday, June 1, 2021
PROJECT	Existing property 5226 N. Bay Road, Miami Beach, Florida		
	Location: 10' West of SFH at rear of Center SFH		
CLIENT	Ross Engineering 3325 S. University Drive, Suite 111, Davie, Florida		<b>B-3</b>
	Contact: Daniel Sanders		

LATITUDE	LONGITUDE	Driller	AL	Helper	FM
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Depth (feet)	MATERIAL DESCRIPTION	SAMPLE RUN No.	RECOVERY (%)	BLOW COUNTS	N VALUE	MOISTURE CONTENT (%)	"N" Curve
Soil Boring from 0' to 30'							
0' - 6"	Topsail with vegetation.	1	23	11 14 19 21	33		
6" - 4'	Brown fine to medium sand with shell fragment	2	22	21 21 20 21	41		
4' - 10'	Dark gray very silty muck with organics.	3	20	11 4 2 1	6		
		4	21	0 1 0 1	1		
		5	18	1 0 1 0	1		
		6	19	1 0 0 0	0		
10' - 16'	Dark gray heavy shell fragment with gray fine to medium sand.	7	19	4 9 14 19	23		
		8	22	21 28 29 30	57		
		9	21	29 31 30 31	61		
16' - 22'	Lime rock with gray fine to medium sand.	10	22	30 27 27 30	54		
		11	20	30 38 38 30	76		
		12	18	38 30 33 30	63		
22' - 26'	Lime rock with gray fine to medium sand.	13	20	31 30 38 30	68		
26' - 30'	Lime rock.	14	22	50+1' Refusal			
End of boring @ 30'		15	21	50+1' Refusal			

Water Level (▼): 4'-4"  
 Sample Type: Split Spoon (SS)  
 Boring performed on: 06/01/21

Respectfully submitted by

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**PERCOLATION TEST  
 USUAL OPEN HOLE TEST (CONSTANT HEAD)**

PROJECT NO.	21-0277	DATE:	Tuesday, June 1, 2021
PROJECT	Existing Property 5226 North Bay Road Miami Beach, Florida		
CLIENT	Ross Engineering Inc 3325 S. University Drive, Suite 111 Davie, Florida 33328		

TEST LOCATION	10' East of SFH at Center of Driveway		
HOLE DIAMETER (FT)	0.5	LATITUD:	25.830532°
		LONGITUD:	-80.130365°
HOLE DEPTH (FT)	15	DATE TEST PERFORMED:	6/1/2021
WATER TABLE BELOW GROUND SURFACE (FT.)	4.4	TEST #:	P-1

No.	ELAPSE TIME (min)	GPM
1	1	9.9
2	1	9.8
3	1	9.6
4	1	9.6
5	1	9.4
6	1	9.2
7	1	9.1
8	1	8.9
9	1	8.9
10	1	8.9

DEPTH (FT)	SOIL DESCRIPTION
0' - 6"	Brick.
6" - 2'	Shell fragment with light brown fine to medium sand.
2' - 4'	Heavy shell fragment with gray fine to medium sand.
4' - 8'	Dark gray very silty muck.
8' - 12'	Peat.
12' - 15'	Dark gray fine to medium sand with heavy shell fragment.

PERCOLATION RATE :	<b>9.3</b>
K-VALUE:	<b>2.328E-04</b>

Respectfully submitted,

FIELD TECH.:	AL/FM
TYPE BY:	CM

Report Distribution:      1    Client  
                                      1    BIII Office

  
**Dario A. Herrero, P.E.**  
 Fla. Reg. #67796