REPORT OF
GEOTECHNICAL EXPLORATION

PALMETTO BAY DRAINAGE
APPROX., SW 89TH AVE. AND SW 157TH ST.
PALMETTO BAY, FLORIDA

FOR

CALVIN GIORDANO AND ASSOCIATES, INC.
1800 ELLER DRIVE, SUITE 600
FT. LAUDERDALE, FLORIDA 33316

PREPARED BY

NUTTING ENGINEERS OF FLORIDA, INC.
2051 NW 112TH AVE, SUITE 126
MIAMI, FLORIDA 33172

ORDER NO. 101.181

NOVEMBER 2022

November 23, 2022

Mr. James Messick, P.E.
Calvin Giordano and Associates, Inc.
1800 Eller Drive, Suite 600
Ft. Lauderdale, Florida 33316
Phone: (954) 921-7781 Email: jmessick@cgasolutions.com

Re: Report of Geotechnical Exploration
Palmetto Bay Drainage
Approx. SW 89th Ave. and SW 157th St.
Palmetto Bay, Florida

Dear Mr. Messick:

Nutting Engineers of Florida, Inc. (NE), has performed a Geotechnical Exploration at the referenced site in Palmetto Bay, Florida. The purpose of this exploration was to obtain information concerning the site and subsurface conditions at specific locations in order to provide an understanding of the soil conditions in the area of the proposed work. The following presents our findings and recommendations.

PROJECT INFORMATION

Per your email dated December 23, 2021 and review of the aerial and Figure 15 provided, we understand that plans for this project include the installation of 5,800 lineal feet of exfiltration basins (15 feet deep) within the sub basins 57 and 96 at the referenced site. If any of the above information or assumptions are incorrect, we should be notified in writing in order to revisit our recommendations.

GENERAL SUBSURFACE CONDITIONS

Soil Survey Maps

As part of the geotechnical study, we reviewed the Department of Agriculture Soil Survey of Miami-Dade County. These SCS maps provide qualitative information about potential general shallow soil conditions in the project vicinity. This information was derived from approximately 6 ft. deep manual auger borings, aerial photo and surface feature interpretation at some point in the past (mid 1980's to early 1970's). The SCS data may or may not reflect actual current site conditions. A review of the Soil Survey for Dade County revealed that at the time the survey was conducted, the soils at the site were described as Udorthents, limestone substratum-Urban land complex. About 40 to 70 percent of this map unit consists of Udorthents in open areas, and 25 to 60 percent consists of Urban land, or areas covered by concrete and buildings. The Udorthents

consist of fill material that is light gray and white extremely stony loam about 55 inches thick. The fill material is underlain by hard, porous limestone bedrock. We note that the maximum depth of the survey is approximately 6 feet.

Subsurface Exploration

NUTTING ENGINEERS OF FLORIDA, INC. performed thirteen (13) Standard Penetration Test (SPT) borings (ASTM D-1586) to a depth of twenty feet below land surface. In addition, four (4) 'Usual Open-Hole' exfiltration tests were performed in accordance with South Florida Water Management District specifications to a depth of fifteen feet. The locations of the test are indicated on the attached Test Location Plan, presented in the Appendix. The test boring reports are also presented in the Appendix of this report. The test locations were established in the field using approximate methods; namely, a measuring wheel and available surface controls. Therefore, the locations should be considered approximate.

The appended boring logs present information and descriptions of the subsurface conditions at each specific test boring location. Representative samples collected from the SPT boring were visually reviewed in the laboratory by a geotechnical engineer in order to confirm the field classifications. The Standard Penetration Test N-values, the number of successive blows required to drive the sampler into the soil one foot, are presented on the individual boring logs. The SPT N value has been empirically correlated with various soil properties and is considered to be indicative of the relative density of cohesionless soils and the consistency of cohesive soils. The correlation of penetration resistance with relative density is presented in the Soil Classification Criteria attached in the Appendix.

Test Boring Results

In general, the test borings revealed a surficial layer of medium dense dark brown fine sand with trace of limestone fragments and roots, followed by loose to medium hard light brown to light gray limestone to twenty feet, the maximum depth explored. A detailed description of the soil/rock profile is presented on the test boring records provided in the Appendix.

Rock Formation Note:

Although not necessarily identified in the borings, it is possible that the weathered limestone may extend to greater depths and be present in areas other than recorded in the test boring. Generally, rock in the South Florida area may include limestone or sandstone which have irregularities and discontinuities including vertical and horizontal solution features, varying surface and bottom elevations, and varying degrees of hardness. The rock features may also contain intervening sand and other material filled lenses. The standard penetration test boring executed in this evaluation was performed in accordance with the normal standard of care in this area. Despite this, this process may sometimes fail to detect the presence of rock strata by passing through solution features. Solution features can be very common in rock strata in Southeast Florida. Also given the brittle nature of some rock strata, rocks may readily shatter when hit by the split spoon. These strata which may not be depicted in the soil boring logs may present significant resistance to

excavation. For these reasons, due care shall be exercised by contractors performing excavation and compaction operations in this area, utilizing local experience.

Exfiltration Test Results

Four 'Usual Open-Hole' exfiltration tests were performed in general accordance with South Florida Water Management District (SFWMD) specifications to a depth of fifteen feet below the existing ground surface. The tests were performed in order to determine the hydraulic conductivity of the in situ subsurface soils to evaluate drainage requirements for the project. The hydraulic conductivity value ranged from 1.29×10^{-4} to 3.11×10^{-3} cubic feet per second, per square foot, per foot of head. Detailed soil descriptions and flow rates are presented in the Appendix.

Groundwater Table Observation

The immediate groundwater level was measured at the boring locations at the time of drilling. The groundwater level was encountered at approximately from six and a half to eight feet below the existing ground surface at the time of drilling.

The immediate depth to groundwater measurements presented in this report may not provide a reliable indication of stabilized or longer-term depth to groundwater at this site. Water table elevations can vary dramatically with time through rainfall, droughts, storm events, flood control activities, nearby surface water bodies, tidal activity, pumping and many other factors. For these reasons, this immediate depth to water data **should not** be relied upon alone for project design considerations.

ENGINEERING EVALUATION AND RECOMMENDATIONS

Our soil exploration for this project encountered a soil profile consisting primarily of sand and limestone fragments. In our opinion, these soils should provide adequate support for the proposed piping.

Based upon the depth to ground water encountered in our exploration, if the excavation needs to remain dry, we anticipate that dewatering will be necessary for open-cut areas where the depth of the excavation is below about six feet. If dewatering is to be performed, it is recommended that such work be designed, permitted and executed by qualified knowledgeable parties thoroughly experienced with similar local dewatering operations. We note that some of the exfiltration tests resulted in very high exfiltration rates which could cause significant difficulty in dewatering operations.

Piping laid through areas of limestone should be bedded in a granular material, or as specified by the civil engineer, in order to account for the associated stress concentrations on the pipe. Piping laid through these areas should be over-excavated approximately six inches below the anticipated pipe bedding elevation and backfilled using a granular fill.

Although deleterious materials were not encountered within the study area, in the case peat, silt or other unsuitable materials are encountered within the pipe bedding area, the bedding should be over-excavated to at least 6 inches below the proposed pipe. Backfill should be performed in accordance with the recommendations presented herein or as specified by the civil engineer. Sand and/or limestone fragments encountered above the unsuitable material layer may be stockpiled for later use.

Fill needed to bring the site to back to grade may be placed in lifts not exceeding twelve inches in loose thickness. Each lift should be thoroughly compacted until densities equivalent to at least 98 percent of the modified Proctor maximum dry density (ASTM D-1557) are uniformly obtained. Fill should consist of granular soil, with less than ten percent passing the No. 200 sieve, free of rubble, organics (five percent or less) clay, debris and other unsuitable material.

The fill should have ASTM designation (D-2487) of GP, GW, SP, or SW, with a maximum particle size of no more than three inches or as otherwise approved by the geotechnical engineer.

As previously stated, limestone was encountered within the soil profile of the study area. The limestone surface undulates and the depth to the limestone may vary dramatically over small horizontal distances. Hard excavation conditions should be anticipated and planned for. We are available to discuss excavation issues and to provide input concerning implementation.

If conditions are encountered which are not consistent with the findings presented in this report, this office shall be notified immediately so that the condition or change can be evaluated and appropriate action taken.

The following table presents the soil parameters for the soils encountered for this study. We note that the values are based on visual classification of the soils and if more exact values are needed, specific laboratory testing should be performed.

TABLE OF GENERALIZED SOIL PROPERTIES
BORINGS

Stratum No.	Description	Unit Weight (lb./cu.ft)		Angle of Internal Friction (Degrees)	Earth Pressure Coefficient	
		Saturated	Submerged		Passive	Active
1	Fine SAND, Limestone Fragments	115	53	30	3.00	0.33

Appropriate factors of safety should be used depending on the application.

GENERAL INFORMATION

Our client for this geotechnical evaluation was:

Calvin Giordano and Associates, Inc.
1800 Eller Drive, Suite 600
Ft. Lauderdale, Florida 33316

The contents of this report are for the exclusive use of the client, the client's design & construction team and governmental authorities for this specific project exclusively. Information conveyed in this report shall not be used or relied upon by other parties or for other projects without the expressed written consent of NE. This report discusses geotechnical considerations for this site based upon observed conditions and our understanding of proposed construction for foundation support. Environmental issues including (but not limited to), soil and/or groundwater contamination are beyond our scope of service for this project. As such, this report shall not be used or relied upon for evaluation of environmental issues.

Excavations of five feet or more in depth should be sloped or shored in accordance with OSHA and State of Florida requirements.

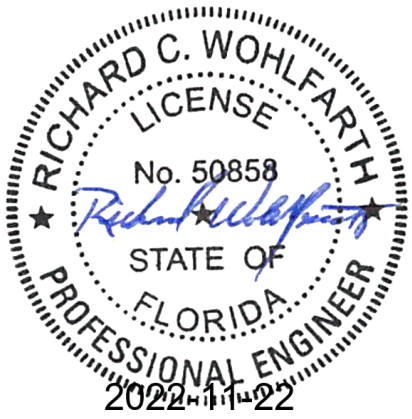
The Geotechnical Engineer warrants that the findings, recommendations, specifications, or professional advice contained herein, have been presented after being prepared in accordance with general accepted professional practice in the field of foundation engineering, soil mechanics and engineering geology. No other warranties are implied or expressed.

We appreciate the opportunity to provide these services for you. If we can be of any further assistance, or if you need additional information, please feel free to contact us at your convenience.

Sincerely,
NUTTING ENGINEERS OF FLORIDA, INC.

This item has been digitally signed and sealed by Richard C. Wohlfarth on the date adjacent to the seal.

Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.



Richard C. Wohlfarth, P.E. #50858
Director of Engineering

Attachments: Boring-Cores Location Plan
Test Boring Logs
Exfiltration Test Results
Soil Classification Criteria
Limitations of Liability

NUTTING ENGINEERS OF FLORIDA, INC. ESTABLISHED 1967

Calvin Giordano & Associates, Inc.
Palmetto Bay Drainage
Approx. SW 89th Ave. and SW 157th St.
Palmetto Bay, Florida
PROJECT NO. 101.181

APPROXIMATE TEST LOCATION PLAN

GEOTECHNICAL EXPLORATION

FIG. 1

Nutting Engineers of Florida

BORING NUMBER B-1

PROJECT NUMBER 101.181

CLIENT Calvin Giordano & Associates, Inc. **PROJECT NAME** Palmetto Bay Drainage

PROJECT LOCATION Approx. SW 89th Ave. and SW 157th St., Palmetto Bay, FL

DATE STARTED 11/3/22 COMPLETED 11/3/22 SURFACE ELEVATION REFERENCE Same as road crown

DRILLING METHOD Standard Penetration Boring GROUND WATER LEVELS:

LOGGED BY Dancor CHECKED BY C. Acevedo ▽ AT TIME OF DRILLING 7.7 ft

APPROXIMATE LOCATION OF BORING **As located on site plan**

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	Blows	N-Value
0		Dk. brown fine SAND, trace roots			
		Lt. brown LIMESTONE FRAGMENTS, trace fine sand	SS 1	12-16-18-17	34
		Lt. brown LIMESTONE	SS 2	9-6-8-8	14
5			SS 3	9-8-9-10	17
		Lt. brown to lt. gray LIMESTONE ▽	SS 4	6-6-7-10	13
			SS 5	11-9-13-7	22
10					
		Lt. gray LIMESTONE	SS 6	9-18-14-12	32
15					
		Lt. gray to tan LIMESTONE	SS 7	10-18-17-16	35
20		Bottom of hole at 20.0 feet.			

▲ SPT N VALUE ▲
10 20 30 40

PL MC LL
20 40 60 80

☐ FINES CONTENT (%) ☐
20 40 60 80

Nutting Engineers of Florida

BORING NUMBER B-2

PROJECT NUMBER 101.181

CLIENT Calvin Giordano & Associates, Inc. **PROJECT NAME** Palmetto Bay Drainage

PROJECT LOCATION Approx. SW 89th Ave. and SW 157th St., Palmetto Bay, FL

DATE STARTED 11/3/22 COMPLETED 11/3/22 SURFACE ELEVATION REFERENCE Same as road crown

DRILLING METHOD Standard Penetration Boring GROUND WATER LEVELS:

LOGGED BY Dancor CHECKED BY C. Acevedo ▽ AT TIME OF DRILLING 8.0 ft

APPROXIMATE LOCATION OF BORING **As located on site plan**

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	Blows	N-Value
0		Dk. brown to brown fine SAND, trace roots			
		Lt. brown to tan LIMESTONE FRAGMENTS	SS 1	7-9-11-14	20
		Lt. brown to tan LIMESTONE	SS 2	8-12-9-8	21
5		Lt. brown LIMESTONE	SS 3	8-6-7-11	13
			SS 4	10-9-10-10	19
	▽		SS 5	11-12-15-12	27
10					
			SS 6	10-9-10-13	19
15					
		Lt. brown to tan LIMESTONE	SS 7	6-3-5-5	8
20		Bottom of hole at 20.0 feet.			

▲ SPT N VALUE ▲
10 20 30 40
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

TEST NUTTING BOREHOLE 2-101.181 CALVIN GIORDANO & ASSOCIATES, INC. - PALMETTO BAY DRAINAGE.GPJ GINT US.GDT 11/17/22

Nutting Engineers of Florida

BORING NUMBER B-3

PROJECT NUMBER 101.181

CLIENT Calvin Giordano & Associates, Inc. **PROJECT NAME** Palmetto Bay Drainage

PROJECT LOCATION Approx. SW 89th Ave. and SW 157th St., Palmetto Bay, FL

DATE STARTED 11/3/22 COMPLETED 11/3/22 SURFACE ELEVATION REFERENCE Same as road crown

DRILLING METHOD Standard Penetration Boring GROUND WATER LEVELS:

LOGGED BY Dancor CHECKED BY C. Acevedo ▽ AT TIME OF DRILLING 7.5 ft

APPROXIMATE LOCATION OF BORING **As located on site plan**

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	Blows	N-Value
0		Dk. brown to brown fine SAND and ROOTS			
		Lt. brown LIMESTONE	SS 1	8-8-8-11	16
		Lt. brown LIMESTONE and fine SAND	SS 2	15-18-12-14	30
5		Lt. brown LIMESTONE	SS 3	27-31-28-23	59
		▽	SS 4	10-9-9-8	18
			SS 5	11-18-19-11	37
10					
		Lt. brown to tan LIMESTONE	SS 6	7-9-14-10	23
15					
		Tan LIMESTONE	SS 7	4-4-6-4	10
20		Bottom of hole at 20.0 feet.			

▲ SPT N VALUE ▲
10 20 30 40
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

Nutting Engineers of Florida

BORING NUMBER B-4

PROJECT NUMBER 101.181

CLIENT Calvin Giordano & Associates, Inc. **PROJECT NAME** Palmetto Bay Drainage

PROJECT LOCATION Approx. SW 89th Ave. and SW 157th St., Palmetto Bay, FL

DATE STARTED 11/4/22 COMPLETED 11/4/22 SURFACE ELEVATION REFERENCE Same as road crown

DRILLING METHOD Standard Penetration Boring GROUND WATER LEVELS:

LOGGED BY Dancor CHECKED BY C. Acevedo ▽ AT TIME OF DRILLING 7.1 ft

APPROXIMATE LOCATION OF BORING **As located on site plan**

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	Blows	N-Value	▲ SPT N VALUE ▲ 10 20 30 40 / PL MC LL 20 40 60 80 / ☐ FINES CONTENT (%) ☐ 20 40 60 80
0		Dk. brown fine SAND, trace limestone fragments and roots				
		Lt. brown LIMESTONE	SS 1	6-9-8-13	17	▲
		Lt. brown LIMESTONE, trace fine sand	SS 2	12-9-9-7	18	▲
5		Lt. brown LIMESTONE	SS 3	10-13-14-13	27	▲
	▽		SS 4	13-10-9-9	19	▲
			SS 5	8-6-6-6	12	▲
10						
		Lt. brown to brown LIMESTONE	SS 6	4-3-3-4	6	▲
15						
		Tan LIMESTONE	SS 7	3-5-5-9	10	▲
20		Bottom of hole at 20.0 feet.				

TEST NUTTING BOREHOLE 2-101.181 CALVIN GIORDANO & ASSOCIATES, INC. - PALMETTO BAY DRAINAGE.GPJ GINT US.GDT 11/17/22

Nutting Engineers of Florida

BORING NUMBER B-5

PROJECT NUMBER 101.181

CLIENT Calvin Giordano & Associates, Inc. **PROJECT NAME** Palmetto Bay Drainage

PROJECT LOCATION Approx. SW 89th Ave. and SW 157th St., Palmetto Bay, FL

DATE STARTED 11/3/22 COMPLETED 11/3/22 SURFACE ELEVATION REFERENCE Same as road crown

DRILLING METHOD Standard Penetration Boring GROUND WATER LEVELS:

LOGGED BY Dancor CHECKED BY C. Acevedo ▽ AT TIME OF DRILLING 6.4 ft

APPROXIMATE LOCATION OF BORING **As located on site plan**

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	Blows	N-Value
0		Dk. brown fine SAND, trace roots			
		Lt. brown fine SAND and LIMESTONE	SS 1	14-6-1-16	7
		Lt. brown LIMESTONE, trace fine sand	SS 2	19-10-12-11	22
5		Lt. brown fine SAND	SS 3	3-20-26-32	46
		▽	SS 4	10-12-14-21	26
			SS 5	12-15-18-31	33
10					
			SS 6	10-12-12-14	24
15					
			SS 7	11-21-18-14	39
20		Bottom of hole at 20.0 feet.			

▲ SPT N VALUE ▲
10 20 30 40
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

Nutting Engineers of Florida

BORING NUMBER B-6

PROJECT NUMBER 101.181

CLIENT Calvin Giordano & Associates, Inc. **PROJECT NAME** Palmetto Bay Drainage

PROJECT LOCATION Approx. SW 89th Ave. and SW 157th St., Palmetto Bay, FL

DATE STARTED 11/4/22 COMPLETED 11/4/22 SURFACE ELEVATION REFERENCE Same as road crown

DRILLING METHOD Standard Penetration Boring GROUND WATER LEVELS:

LOGGED BY Dancor CHECKED BY C. Acevedo ▽ AT TIME OF DRILLING 7.7 ft

APPROXIMATE LOCATION OF BORING **As located on site plan**

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	Blows	N-Value
0		Dk. brown fine SAND, trace roots			
		Lt. brown LIMESTONE FRAGMENTS, trace fine sand	SS 1	9-16-13-9	29
		Lt. brown LIMESTONE	SS 2	9-10-9-12	19
5			SS 3	18-22-15-10	37
		▽	SS 4	9-6-6-5	12
			SS 5	6-4-6-5	10
10					
			SS 6	4-3-3-3	6
15					
			SS 7	2-2-2-2	4
20		Bottom of hole at 20.0 feet.			

▲ SPT N VALUE ▲
10 20 30 40
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

Nutting Engineers of Florida

BORING NUMBER B-7

PROJECT NUMBER 101.181

CLIENT Calvin Giordano & Associates, Inc. **PROJECT NAME** Palmetto Bay Drainage

PROJECT LOCATION Approx. SW 89th Ave. and SW 157th St., Palmetto Bay, FL

DATE STARTED 11/3/22 COMPLETED 11/3/22 SURFACE ELEVATION REFERENCE Same as road crown

DRILLING METHOD Standard Penetration Boring GROUND WATER LEVELS:

LOGGED BY Dancor CHECKED BY C. Acevedo ▽ AT TIME OF DRILLING 7.3 ft

APPROXIMATE LOCATION OF BORING **As located on site plan**

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	Blows	N-Value
0		Dk. brown fine SAND and ROOTS			
		Lt. brown LIMESTONE, trace fine sand	SS 1	9-10-13-11	23
			SS 2	15-16-15-19	31
5		Lt. brown LIMESTONE	SS 3	17-14-7-10	21
		▽	SS 4	16-10-18-21	28
			SS 5	15-12-14-10	26
10					
			SS 6	8-3-5-3	8
15					
		Lt. brown to tan LIMESTONE	SS 7	4-2-1-2	3
20		Bottom of hole at 20.0 feet.			

▲ SPT N VALUE ▲
10 20 30 40
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

Nutting Engineers of Florida

BORING NUMBER B-8

PROJECT NUMBER 101.181

CLIENT Calvin Giordano & Associates, Inc. **PROJECT NAME** Palmetto Bay Drainage

PROJECT LOCATION Approx. SW 89th Ave. and SW 157th St., Palmetto Bay, FL

DATE STARTED 11/4/22 COMPLETED 11/4/22 SURFACE ELEVATION REFERENCE Same as road crown

DRILLING METHOD Standard Penetration Boring GROUND WATER LEVELS:

LOGGED BY Dancor CHECKED BY C. Acevedo ▽ AT TIME OF DRILLING 7.3 ft

APPROXIMATE LOCATION OF BORING **As located on site plan**

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	Blows	N-Value
0		Dk. brown fine SAND, trace roots			
		Lt. brown LIMESTONE FRAGMENTS	SS 1	9-10-9-9	19
		Lt. brown LIMESTONE, trace fine sand	SS 2	10-10-10-14	20
5		Lt. brown LIMESTONE	SS 3	15-19-19-22	38
	▽		SS 4	11-11-11-14	22
			SS 5	11-11-10-9	21
10					
			SS 6	3-4-5-4	9
15					
		Tan LIMESTONE	SS 7	4-5-5-6	10
20		Bottom of hole at 20.0 feet.			

▲ SPT N VALUE ▲

10 20 30 40

PL MC LL

20 40 60 80

☐ FINES CONTENT (%) ☐

20 40 60 80

Nutting Engineers of Florida

BORING NUMBER B-9

PROJECT NUMBER 101.181

CLIENT Calvin Giordano & Associates, Inc. **PROJECT NAME** Palmetto Bay Drainage

PROJECT LOCATION Approx. SW 89th Ave. and SW 157th St., Palmetto Bay, FL

DATE STARTED 11/3/22 COMPLETED 11/3/22 SURFACE ELEVATION REFERENCE Same as road crown

DRILLING METHOD Standard Penetration Boring GROUND WATER LEVELS:

LOGGED BY Dancor CHECKED BY C. Acevedo ▽ AT TIME OF DRILLING 7.9 ft

APPROXIMATE LOCATION OF BORING **As located on site plan**

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	Blows	N-Value
0		Dk. brown fine SAND, trace roots and limestone fragments			
		Lt. brown LIMESTONE FRAGMENTS	SS 1	13-20-21-21	41
		Lt. brown LIMESTONE	SS 2	9-10-10-9	20
5			SS 3	25-23-31-31	54
		Lt. brown LIMESTONE and fine SAND	SS 4	13-14-17-15	31
		▽ Lt. brown LIMESTONE	SS 5	19-17-14-19	31
10					
			SS 6	9-7-5-4	12
15					
		Lt. brown to brown LIMESTONE	SS 7	4-4-4-2	8
20		Bottom of hole at 20.0 feet.			

▲ SPT N VALUE ▲
10 20 30 40
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

Nutting Engineers of Florida

BORING NUMBER B-10

PROJECT NUMBER 101.181

CLIENT Calvin Giordano & Associates, Inc. **PROJECT NAME** Palmetto Bay Drainage

PROJECT LOCATION Approx. SW 89th Ave. and SW 157th St., Palmetto Bay, FL

DATE STARTED 11/4/22 COMPLETED 11/4/22 SURFACE ELEVATION REFERENCE Same as road crown

DRILLING METHOD Standard Penetration Boring GROUND WATER LEVELS:

LOGGED BY Dancor CHECKED BY C. Acevedo ▽ AT TIME OF DRILLING 7.4 ft

APPROXIMATE LOCATION OF BORING **As located on site plan**

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	Blows	N-Value
0		Dk. brown fine SAND, trace roots			
		Lt. brown LIMESTONE	SS 1	7-18-24-14	**42**
			SS 2	9-11-11-12	**22**
5			SS 3	13-13-11-13	**24**
		▽	SS 4	15-10-12-8	**22**
			SS 5	12-12-17-17	**29**
10					
			SS 6	5-6-10-6	**16**
15					
		Lt. brown to brown LIMESTONE	SS 7	6-5-5-5	**10**
20		Bottom of hole at 20.0 feet.			

▲ SPT N VALUE ▲
10 20 30 40
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

Nutting Engineers of Florida

BORING NUMBER B-11

PROJECT NUMBER 101.181

CLIENT Calvin Giordano & Associates, Inc. **PROJECT NAME** Palmetto Bay Drainage

PROJECT LOCATION Approx. SW 89th Ave. and SW 157th St., Palmetto Bay, FL

DATE STARTED 11/4/22 COMPLETED 11/4/22 SURFACE ELEVATION REFERENCE Same as road crown

DRILLING METHOD Standard Penetration Boring GROUND WATER LEVELS:

LOGGED BY Dancor CHECKED BY C. Acevedo ▽ AT TIME OF DRILLING 7.2 ft

APPROXIMATE LOCATION OF BORING **As located on site plan**

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	Blows	N-Value
0		Dk. brown fine SAND, trace limestone fragments and roots			
		Lt. brown LIMESTONE FRAGMENTS, trace fine sand	SS 1	10-14-7-10	21
		Lt. brown LIMESTONE	SS 2	14-14-16-18	30
5			SS 3	15-10-10-13	20
		▽	SS 4	10-6-4-8	10
			SS 5	10-11-11-9	22
10					
			SS 6	7-5-4-4	9
15					
			SS 7	4-3-2-2	5
20		Bottom of hole at 20.0 feet.			

▲ SPT N VALUE ▲
10 20 30 40
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

Nutting Engineers of Florida

BORING NUMBER B-12

PROJECT NUMBER 101.181

CLIENT Calvin Giordano & Associates, Inc. **PROJECT NAME** Palmetto Bay Drainage

PROJECT LOCATION Approx. SW 89th Ave. and SW 157th St., Palmetto Bay, FL

DATE STARTED 11/4/22 COMPLETED 11/4/22 SURFACE ELEVATION REFERENCE Same as road crown

DRILLING METHOD Standard Penetration Boring GROUND WATER LEVELS:

LOGGED BY Dancor CHECKED BY C. Acevedo ▽ AT TIME OF DRILLING 6.5 ft

APPROXIMATE LOCATION OF BORING **As located on site plan**

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	Blows	N-Value
0		Brown fine SAND			
		Lt. brown LIMESTONE	SS 1	9-20-15-13	35
			SS 2	9-15-15-17	30
5			SS 3	16-16-18-15	34
		▽	SS 4	13-11-9-6	20
			SS 5	9-7-4-7	11
10					
		Lt. brown to brown LIMESTONE	SS 6	4-3-4-3	7
15					
		Lt. brown to tan LIMESTONE	SS 7	2-3-2-2	5
20		Bottom of hole at 20.0 feet.			

▲ SPT N VALUE ▲
10 20 30 40
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

Nutting Engineers of Florida

BORING NUMBER B-13

PROJECT NUMBER 101.181

CLIENT Calvin Giordano & Associates, Inc. **PROJECT NAME** Palmetto Bay Drainage

PROJECT LOCATION Approx. SW 89th Ave. and SW 157th St., Palmetto Bay, FL

DATE STARTED 11/4/22 COMPLETED 11/4/22 SURFACE ELEVATION REFERENCE Same as road crown

DRILLING METHOD Standard Penetration Boring GROUND WATER LEVELS:

LOGGED BY Dancor CHECKED BY C. Acevedo ▽ AT TIME OF DRILLING 7.1 ft

APPROXIMATE LOCATION OF BORING **As located on site plan**

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	Blows	N-Value
0		Dk. brown fine SAND, trace roots			
		Lt. brown LIMESTONE	SS 1	20-17-11-13	28
			SS 2	10-10-10-10	20
5			SS 3	9-18-16-22	34
		▽	SS 4	10-9-9-9	18
			SS 5	10-17-12-14	29
10					
			SS 6	7-3-3-3	6
15					
		Lt. brown to tan LIMESTONE	SS 7	3-3-3-3	6
20		Bottom of hole at 20.0 feet.			

▲ SPT N VALUE ▲
10 20 30 40
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

TEST NUTTING BOREHOLE 2-101.181 CALVIN GIORDANO & ASSOCIATES, INC. - PALMETTO BAY DRAINAGE.GPJ GINT US.GDT 11/17/22

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www.nuttingengineers.com info@nuttingengineers.com

Report of Exfiltration Test

Client:	Calvin Giordano & Associates, Inc.	Order No	101.181
Project:	Palmetto Bay Drainage	Report No	1
Location:	Approx. SW 89th Ave. and SW 157th St.	Date:	11/3/22
	Palmetto Bay, Florida		
Test:	Usual Open Hole Exfiltration Test		
Surface Elevation:	Approx. at Road Crown	Water table from ground surface:	7.6'
Casing Diameter:	6"		
Tube Depth:	15'		

Hydraulic Conductivity (K) = 2.1×10^{-4} cfs/ft^{2}ft.head

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EXFIL NO. 1

Sample Location: Approx. as located on site plan.

Material:		
	0'- 0.5'	Dk. brown fine SAND and ROOTS
	0.5'- 8'	Lt. brown LIMESTONE, trace fine sand
	8'- 15'	Lt. brown LIMESTONE

One Minute Increme	Pump Rate in Gal/Min
1	13
2	14
3	14
4	13
5	13
6	12
7	13
8	13
9	14
10	13

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Report of Exfiltration Test

Client:	Calvin Giordano & Associates, Inc.	Order No	101.181
Project:	Palmetto Bay Drainage	Report No	2
Location:	Approx. SW 89th Ave. and SW 157th St.	Date:	11/4/22
	Palmetto Bay, Florida		
Test:	Usual Open Hole Exfiltration Test		
Surface Elevation:	Approx. at Road Crown	Water table from ground surface:	7.5'
Casing Diameter:	6"		
Tube Depth:	15'		

Hydraulic Conductivity (K) = 1.46×10^{-3} cfs/ft^{2}ft.head

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EXFIL NO. 2	One Minute Increme	Pump Rate in Gal/Min
	1	50
	2	50
Sample Location: Approx. as located on site plan.	3	50
	4	50
	5	50
Material: 0'- 0.5' Dk. brown fine SAND, trace limestone fragments and roots	6	50
	7	50
0.5'- 15' Lt. brown LIMESTONE		

Note: Water table only raised 4.84 feet during testing

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Report of Exfiltration Test

Client:	Calvin Giordano & Associates, Inc.	Order No	101.181
Project:	Palmetto Bay Drainage	Report No	3
Location:	Approx. SW 89th Ave. and SW 157th St.	Date:	11/3/22
	Palmetto Bay, Florida		
Test:	Usual Open Hole Exfiltration Test		
Surface Elevation:	Approx. at Road Crown	Water table from ground surface:	7.08'
Casing Diameter:	6"		
Tube Depth:	15'		

Hydraulic Conductivity (K) = 1.29×10^{-4} cfs/ft^{2}ft.head

.

EXFIL NO. 3	One Minute Increme	Pump Rate in Gal/Min
	1	8.0
	2	8.0
Sample Location: Approx. as located on site plan.	3	7.0
	4	7.5
	5	7.0
Material: 0'- 0.5' Dk. brown fine SAND, trace roots	6	7.5
0.5'- 15' Lt. brown LIMESTONE	7	8.0
	8	7.5
	9	7.0
	10	7.0

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Report of Exfiltration Test

Client:	Calvin Giordano & Associates, Inc.	Order No	101.181
Project:	Palmetto Bay Drainage	Report No	4
Location:	Approx. SW 89th Ave. and SW 157th St.	Date:	11/4/22
	Palmetto Bay, Florida		
Test:	Usual Open Hole Exfiltration Test		
Surface Elevation:	Approx. at Road Crown	Water table from ground surface:	7.9'
Casing Diameter:	6"		
Tube Depth:	15'		

Hydraulic Conductivity (K) = 3.11×10^{-3} cfs/ft^{2}ft.head

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EXFIL NO. 4	One Minute Increme	Pump Rate in Gal/Min
	1	50
	2	50
Sample Location: Approx. as located on site plan.	3	50
	4	50
	5	50
Material: 0'- 0.5' Dk. brown fine SAND, trace limestone fragments and roots	6	50
	7	50
0.5'- 15' Lt. brown LIMESTONE and fine SAND	8	50

Note: Water table only raised 2.67 feet during testing

LIMITATIONS OF LIABLILITY

WARRANTY

We warranty that the services performed by Nutting Engineers of Florida, Inc. are conducted in a manner consistent with that level of care and skill ordinarily exercised by members of the profession in our area currently practicing under similar conditions at the time our services were performed. ***No other warranties, expressed or implied, are made***. While the services of Nutting Engineers of Florida, Inc. are a valuable and integral part of the design and construction teams, we do not warrant, guarantee or insure the quality, completeness, or satisfactory performance of designs, construction plans, specifications we have not prepared, nor the ultimate performance of building site materials or assembly/construction.

SUBSURFACE EXPLORATION

Subsurface exploration is normally accomplished by test borings; test pits are sometimes employed. The method of determining the boring location and the surface elevation at the boring is noted in the report. This information is represented in the soil boring logs and/or a drawing. The location and elevation of the borings should be considered accurate only to the degree inherent with the method used and may be approximate.

The soil boring log includes sampling information, description of the materials recovered, approximate depths of boundaries between soil and rock strata as encountered and immediate depth to water data. The log represents conditions recorded specifically at the location where and when the boring was made. Site conditions may vary through time as will subsurface conditions. The boundaries between different soil strata as encountered are indicated at specific depths; however, these depths are in fact approximate and dependent upon the frequency of sampling, nature and consistency of the respective strata. Substantial variation between soil borings may commonly exist in subsurface conditions. Water level readings are made at the time and under conditions stated on the boring logs. Water levels change with time, precipitation, canal level, local well drawdown and other factors. Water level data provided on soil boring logs shall not be relied upon for groundwater based design or construction considerations.

LABORATORY AND FIELD TESTS

Tests are performed in *general* accordance with specific ASTM Standards unless otherwise indicated. All criteria included in a given ASTM Standard are not always required and performed. Each test boring report indicates the measurements and data developed at each specific test location.

ANALYSIS AND RECOMMENDATIONS

The geotechnical report is prepared primarily to aid in the design of site work and structural foundations. Although the information in the report is expected to be sufficient for these purposes, it shall not be utilized to determine the cost of construction nor to stand alone as a construction specification. Contractors shall verify subsurface conditions as may be appropriate prior to undertaking subsurface work.

Report recommendations are based primarily on data from test borings made at the locations shown on the test boring reports. Soil variations commonly exist between boring locations. Such variations may not become evident until construction. Test pits sometimes provide valuable supplemental information that derived from soil borings. If variations are then noted, the geotechnical engineer shall be contacted in writing immediately so that field conditions can be examined and recommendations revised if necessary.

The geotechnical report states our understanding as to the location, dimensions and structural features proposed for the site. ***Any significant changes of the site improvements or site conditions must be communicated in writing to the geotechnical engineer immediately*** so that the geotechnical analysis, conclusions, and recommendations can be reviewed and appropriately adjusted as necessary.

CONSTRUCTION OBSERVATION

Construction observation and testing is an important element of geotechnical services. The geotechnical engineer's field representative (G.E.F.R.) is the "owner's representative" observing the work of the contractor, performing tests and reporting data from such tests and observations. ***The geotechnical engineer's field representative does not direct the contractor's construction means, methods, operations or personnel.*** The G.E.F.R. does not interfere with the relationship between the owner and the contractor and, except as an observer, does not become a substitute owner on site. The G.E.F.R. is responsible for his/her safety, but has no responsibility for the safety of other personnel at the site. The G.E.F.R. is an important member of a team whose responsibility is to observe and test the work being done and report to the owner whether that work is being carried out in general conformance with the plans and specifications. The enclosed report may be relied upon solely by the named client.

SOIL AND ROCK CLASSIFICATION CRITERIA

SAND/SILT

N-VALUE (bpf)	RELATIVE DENSITY
0 – 4	Very Loose
5 – 10	Loose
11 – 29	Medium
30 – 49	Dense
>50	Very dense
100	Refusal

CLAY/SILTY CLAY

N-VALUE (bpf)	UNCONFINED COMP. STRENGTH (tsf)	CONSISTENCY
<2	<0.25	v. Soft
2 – 4	0.25 – 0.50	Soft
5 – 8	0.50 – 1.00	Medium
9 – 15	1.00 – 2.00	Stiff
16 – 30	2.00 – 4.00	v. Stiff
>30	>4.00	Hard

ROCK

N-VALUE (bpf)	RELATIVE HARDNESS	ROCK CHARACTERISTICS
N≥ 100	Hard to v. hard	Local rock formations vary in hardness from soft to very hard within short vertical and horizontal distances and often contain vertical solution holes of 3 to 36 inch diameter to varying depths and horizontal solution features. Rock may be brittle to split spoon impact, but more resistant to excavation.
25≤ N ≤ 100	Medium hard to hard	
5≤ N ≤ 25	Soft to medium hard	

PARTICLE SIZE

Boulder	>12 in.
Cobble	3 to 12 in.
Gravel	4.76 mm to 3 in.
Sand	0.074 mm to 4.76 mm
Silt	0.005 mm to 0.074 mm
Clay	<0.005 mm

DESCRIPTION MODIFIERS

0 – 5%	Slight trace
6 – 10%	Trace
11 – 20%	Little
21 – 35%	Some
>35%	And

Major Divisions			Group Symbols	Typical names	Laboratory classification criteria
Coarse-grained soils (More than half of material is *larger* than No. 200 sieve size)	Gravels (More than half of coarse fraction is larger than No. 4 sieve size)	Clean gravels (Little or no fines)	GW	Well-graded gavels, gravel-sand mixtures, little or no fines	Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows: Less than five percent……GW, GP, SW, SP More than 12 percent……GM, GC, SM, SC 5 to 12 percent……*Borderline* cases requiring dual systems**
			GP	Poorly graded gravels, gravel-sand mixtures, little or no fines	
		Gravels with fines (Appreciable amount of fines)	GW* d	Silty gravels, gravel-sand-silt mixtures	
			u		
			GC	Clayey gravels, gravel-sand-clay mixtures	
	Sands (More than half of coarse fraction is smaller than No. 4 sieve size)	Clean sands (Little or no fines)	SW	Well-graded sands, gravelly sands, little or no fines	
			SP	Poorly graded sands, gravelly sands, little or no fines	
		Sands with fines (Appreciable amount of fines)	SM* d	Silty sands, sand-silt mixtures	
			u		
			SC	Clayey sands, sand-clay mixtures	
Fine-grained soils (More than half 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 sandy or silty soils, elastic silts	
			CH	Inorganic clays or high plasticity, fat clays	
			OH	Organic clays of medium to high plasticity, organic silts	
	Highly organic soils		PT	Peat and other highly organic soils	

$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_z = \frac{(D_{30})^2}{D_{10} x D_{60}}$ *between* 1 and 3

Not meeting all gradation requirements for GW

Atterberg limits below "A" line or P.I. less than 4

Atterberg limits above "A" line with P.I. greater than 7

Above "A" line with P.I. between 4 and 7 are *borderline* cases requiring use of dual symbols.

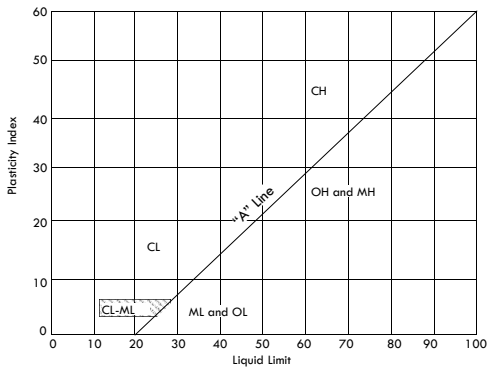
$C_u = \frac{D_{60}}{D_{10}}$ greater than 6; $C_z = \frac{(D_{30})^2}{D_{10} x D_{60}}$ *between* 1 and 3

Not meeting all gradation requirements for SW

Atterberg limits below "A" line or P.I. less than 4

Atterberg limits above "A" line with P.I. more than 7

Limits plotting in hatched zone with P.I. between 4 and 7 are *borderline* cases requiring use of dual system.



Plasticity Chart

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