REPORT OF SUBSURFACE SOIL EXPLORATION
GEOTECHNICAL EVALUATION AND RECOMMENDATIONS

FERN-ISLE REDEVELOPMENT PROJECT
2300 NW 14th STREET
MIAMI, FLORIDA

MARCH 2017

Prepared for:

KIMLEY-HORN
2151 LE JEUNE ROAD, SUITE 202
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NELCO TESTING AND ENGINEERING SERVICES, INC.
13370 SW 131st Street, Suite 105
Miami, Florida 33186

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March 13th, 2017

Kimley-Horn
2151 Le Jeune Road, Suite 202
Coral Gables, Florida 33134

Reference: Report of Subsurface Soil Exploration and Recommendations
Evaluation of Subsurface Conditions
For the Proposed Construction:

Fern-Isle Redevelopment Project
2300 NW 14th Street
Miami, Florida

NTES Project Number: B-170367

Dear Sirs,

Following please find the report of subsurface soil explorations and geotechnical evaluation for the above referenced property. Test Borings and soil sampling took place on February 27th, 2017 using procedures in general accordance with ASTM D-1586, the Standard Penetration Test. This report presents our findings, data, and recommendations.

We appreciate this opportunity to assist you in this project. If you have any questions or comments, please call us at (305) 259-9779.

Respectfully Submitted,
NELCO Testing and Engineering Services, Inc.

V.M.B Venkatesan 3/14/17
V.M.B Venkatesan
Professional Engineer No. 63107
State of Florida

NELCO
TESTING AND ENGINEERING SERVICES

TABLE OF CONTENTS

APPENDICES

Subsurface Soil Exploration and Recommendations
For
Fern-Isle Redevelopment Project
2300 NW 14th Street
Miami, Florida

INTRODUCTION

The purpose of this sub-surface exploration was to obtain data in order to provide an evaluation of the sub-surface conditions and recommendations for foundation design for support of the proposed construction.

PROJECT INFORMATION

Site plans and construction information was provided by Mr. George Puig, PLA of Kimley-Horn.

At the time of testing, the subject property was observed to be vacant. Proposed construction consists of a park redevelopment project consisting of a future bathroom facility and new shade/shelter structures.

TESTING PROGRAM / SUB-SURFACE CONDITIONS

Sub-surface exploration consisted of three (3) Standard Penetration Test Borings conducted conforming to the guidelines as set forth in ASTM D-1586.

Testing was performed on February 27th, 2017. A review of the Test Boring No. 1 generally indicates that the Future Bathroom site consists of various layers of sand and sand with gravel throughout the maximum explored depth of fifteen (15) feet below existing grade.

Test Boring Nos. 2 and 3, performed in the proposed shelter areas encountered various layers of sand, silty sand, sand with gravel, muck and sandy limestone throughout the maximum explored depth of fifteen (15) feet below existing grade. Significant soil improvements or alternative foundation methods will need to be imposed for the construction design of the proposed shelter areas, included in the recommendations section to follow herein.

Groundwater at the time of testing was encountered between approximate depths of 4.5 and 6.0 feet below existing grade.

Please refer to the enclosed appendices for location, classification, and stratification information.

FOUNDATION / SOIL IMPROVEMENT RECOMMENDATIONS

Proposed Future Bathroom Building

1. Remove any surface vegetation, topsoil, and organic material within the building areas plus five (5) feet outside the building footprint. The area under footings, foundations, and concrete slabs on grade shall have all vegetation, stumps, roots, and foreign materials removed prior to placement of fill.

2. Compact the cleared area to a minimum compaction of 95 percent of the dry soil density as determined by the Modified Proctor Test – ASTM D-1557.

3. If any fill material is required, fill and compact the cleared areas in lifts not greater than 12 inches of compacted thickness to elevate to the required grade. Fill material for areas in support of footings is to be a mixture of limerock and sand, free of vegetation, organic material, construction debris, and large rocks. Fill material for slab on grade areas may be clean sand, filled and compacted in lifts not greater than 12 inches of loose material. The maximum size of fill material (rocks) within 12 inches below the floor slab shall be no more than 3 inches in diameter.

4. All fill material shall be inorganic containing no more than 5% by weight organic material. Silt-size fine particulates (material passing the No. 200 Sieve) in fill material shall be limited to less than 10% by weight.

5. Compact each lift of fill material and excavated footings to a minimum compaction of 95 percent of the dry soil density as determined by the Modified Proctor Test – ASTM D-1557 prior to placement of any additional fill required.
   Prior to compaction, the moisture content of each lift of fill material shall be adjusted to within plus/minus 2 percent of the optimum moisture as determined by the Modified Proctor Test – ASTM D-1557.

6. Compaction of building site shall be verified by means of one Field Density Test for each 2500 square feet or fraction thereof for each lift of compacted soil for building pad or slab area. One Field Density Test will also be required for every 50 linear feet of excavated spread footings, and every isolated footing excavation. Field density tests shall be performed as per ASTM D-2922.

7. All Geotechnical work must be performed under the supervision of our geotechnical engineer or one of his representatives, in order to verify compliance with our specifications.

SOIL BEARING CAPACITY FOR SHALLOW FOUNDATIONS
(Future Bathroom Building)

Our observations, exploration, and evaluation, supplemented by a review of sub-soil profile developed from the soil engineering Standard Penetration Test, indicate that the soils found, after improvements as specified, will be suitable for supporting shallow foundations proportioned for a maximum allowable bearing stress of 3000 pounds per square foot, based on total load.

Proposed Shade/Shelter Structures

Our observations, exploration, and evaluation, supplemented by a review of sub-surface profile developed from the soil engineering Standard Penetration Test, indicate that the sub-surface conditions at the site are not capable of providing support with shallow spread footings without significant improvements. We hereby recommend one of the following soil improvement/ foundation system options for support of the proposed structures.

Option A: Clear and Fill

1. Remove all vegetation, soil, muck and all organic material within building areas plus five (5) feet outside the building footprint down to clean granular material. The area under footings, foundations, and concrete slabs on grade shall have all vegetation, stumps, roots, and foreign materials removed prior to placement of fill.

2. As fill material is expected to be placed below the water level, bulk place fill carefully to avoid material segregation, to approximately one foot above the ground water level. Compact to a minimum of 95 percent of the dry soil density as determined by the Modified Proctor Test – ASTM D-1557.

3. Continue to fill and compact the cleared areas in lifts not greater than 12 inches of compacted thickness to elevate to the required grade. Fill material for areas in support of footings is to be a mixture of limerock and sand (minimum LBR 100), free of vegetation, organic material, construction debris, and large rocks. Fill material for slab on grade areas may be clean sand, filled and compacted in lifts not greater than 12 inches of loose material. The maximum size of fill material (rocks) within 12 inches below the floor slab shall be no more than 3 inches in diameter.

4. All fill material shall be inorganic containing no more than 5% by weight organic material. Silt-size fine particulates (material passing the No. 200 Sieve) in fill material shall be limited to less than 10% by weight.

5. Compact each lift of fill material and excavated footings to a minimum compaction of 95 percent of the dry soil density as determined by the Modified Proctor Test – ASTM D-1557 prior to placement of any additional fill required.
   Prior to compaction, the moisture content of each lift of fill material shall be adjusted to within plus/minus 2 percent of the optimum moisture as determined by the Modified Proctor Test – ASTM D-1557.

6. Compaction of building site shall be verified by means of one Field Density Test for each 2500 square feet or fraction thereof for each lift of compacted soil for building pad or slab area. One Field Density Test will also be required for every 50 linear feet of excavated spread footings, and every isolated footing excavation. Field density tests shall be performed as per ASTM D-2922.

7. All Geotechnical work must be performed under the supervision of our geotechnical engineer or one of his representatives, in order to verify compliance with our specifications.

SOIL BEARING CAPACITY FOR SHALLOW FOUNDATIONS
(Shelter/Shade Structures)

Our observations, exploration, and evaluation, supplemented by a review of sub-soil profile developed from the soil engineering Standard Penetration Test, indicate that the soils found, after improvements as specified, will be suitable for supporting shallow foundations proportioned for a maximum allowable bearing stress of 3000 pounds per square foot, based on total load.

Option B: Helical Pile System

The helical piles should be drilled to the depths and specifications as outlined in Table 1, below:

Pile Type	Helical
Pile Diameter	• 3-inches
Design Compressive Capacity	• 7-tons
Design Tensile Capacity	• 1-ton
Lateral Resistance	• N/A
Minimum Helix Diameter	• 12-inches
Minimum Helix Thickness	• 0.375-inches
Approximate Depth Below Grade	• 12-15 feet **or until required torque is achieved.**

Installation Guidelines:

1. Constant downward pressure shall be applied while screwing helical piles into the ground. Pressure applied shall be sufficient to ensure that the downward pile progression is equal to the blade pitch.
2. Rate of helical pile rotation shall not exceed 20 revolutions per minute.
3. Helical piles shall be advanced until the minimum required torque is achieved to accommodate the required ultimate bearing capacity.
4. Piles shall be installed as close to vertical as possible.
5. Required torque shall be maintained (or exceeded) while advancing the pile a minimum of three (3) times the diameter of the helix in order for the pile to be considered acceptable.
6. Helical piles shall be protected from corrosion by galvanizing or other suitable means.

Notes:

- Lateral load capacities are estimated for a top deflection of ¼ inch.
- In order to determine production pile length, it is recommended that test piles be driven. All work shall be performed in accordance with applicable building codes.
- Proposed pile lengths are based on existing ground surface elevation. Pile installation lengths may vary depending on final grade beam elevation and soil conditions. Once the required torque is achieved (and maintained per specifications, above) prior to the recommended approximate depth of installation, and be in acceptable soil conditions, the pile should be considered acceptable.
- Minimum center-to-center distances of helical piles shall be no less than twice the average diameter of the proposed production piles (in no case less than 30-inches).
- Existing structures in the vicinity of the proposed construction must be taken into consideration during pile installation procedures. Caution shall be exercised to avoid excessive vibration, and levels shall be monitored to verify compliance with regulations. Care must be taken in order to prevent excessive vibration.

ANTICIPATED SETTLEMENT

Provided that foundations and soils (existing and fill material), are engineered and constructed in accordance with our recommendations and specifications the maximum total foundation settlement is expected to be less than 1 inch. Differential settlement between adjacent foundations is expected to be ½ of total settlement.

SOIL EROSION

The possibility exists for erosion to occur on soils providing structural support for any proposed or existing footings/foundations. This should be considered and addressed during the design and construction process for both existing soil and structurally placed fill material in support of any footings/foundations. This geotechnical report does not address this condition, its possibility of occurring, or its prevention.

REPORT LIMITATIONS

The recommendations submitted are based on the available subsurface information obtained by Nelco Testing & Engineering Services, Inc. (NTES) and design details provided by Kimley-Horn for the proposed project. If there are any revisions to the nature, design or location of proposed structures, NTES should be notified immediately to determine if changes in recommendations are required. If NTES is not retained to perform these functions, NTES will not be responsible for the impact of those conditions of the project.

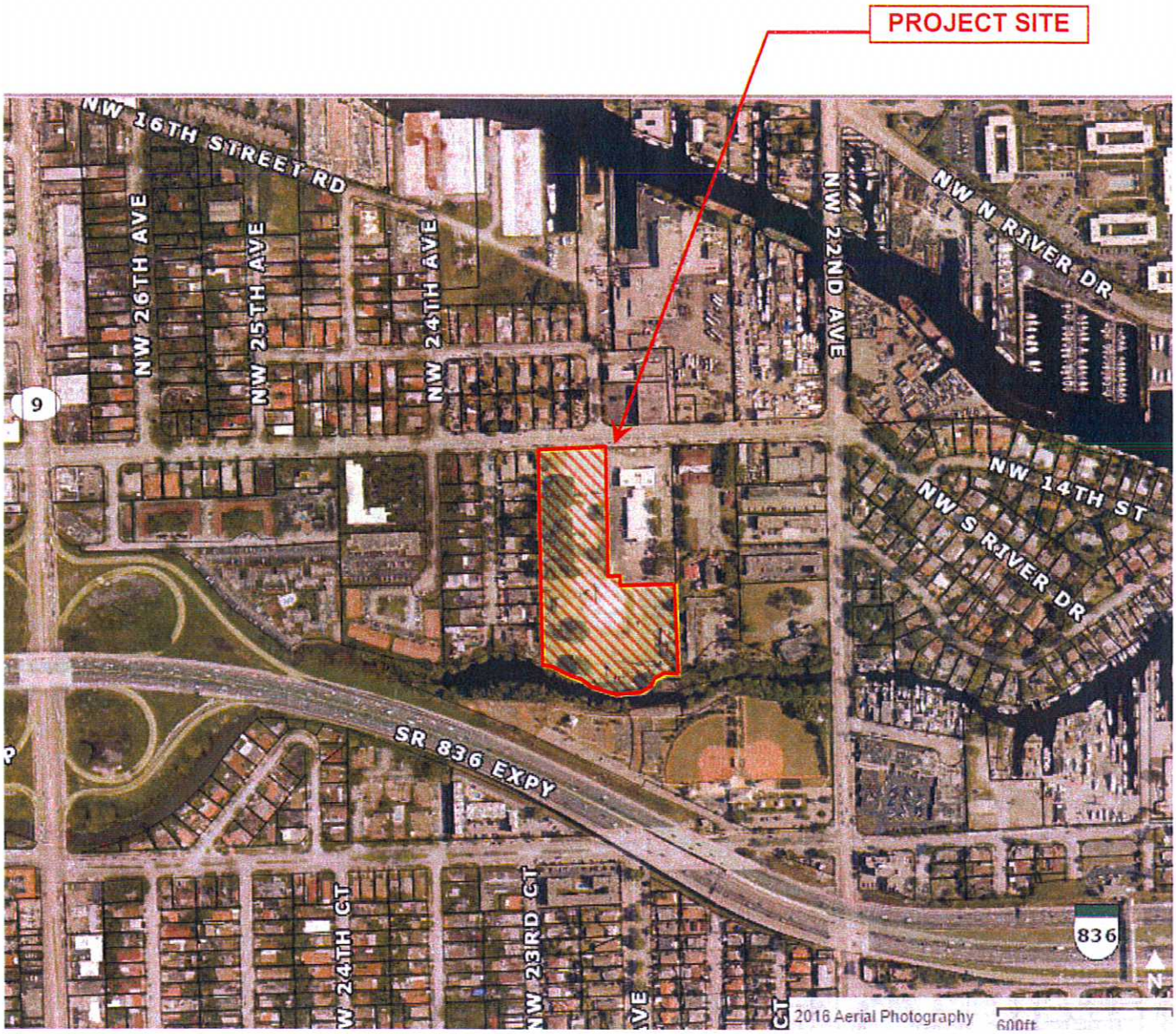
The geotechnical engineer warrants that the findings, recommendations, specifications, or professional advice contained herein have been made in accordance with ASTM specifications, and generally accepted professional geotechnical engineering practices in the local area. No other warranties are implied or expressed. Evaluations expressed in this report are based on field observations and data collected during exploration. Variations throughout the sub-surface profile may exist between designated boring locations, and in inaccessible areas with existing structures. These may not become evident until construction operations have commenced. Should any variations become evident, NELCO Testing and Engineering Services, Inc. must be notified. A reevaluation of the information and professional opinions expressed in this report may be necessary.

Please note analysis and recommendations mentioned in this report are obtained from the borings performed at the indicated locations on the "Soil Boring Test Location Sketch" included in this report. Local variations outside of the vertical reach of the boring locations may be encountered. Descriptions represent our interpretation of the subsurface data and observations at the specific boring locations, on the date tested.

This geotechnical report has been prepared by NTES for the intended use of Kimley-Horn and the specific application to the named project as described. Any third party use of this report should be conducted with the expressed written permission of NTES.

APPENDIX A

- Project Location Map
- Standard Penetration Test Boring Location Sketch



PROJECT LOCATION MAP

FERN-ISLE REDEVELOPMENT PROJECT
2300 NW 14th STREET
MIAMI, FLORIDA

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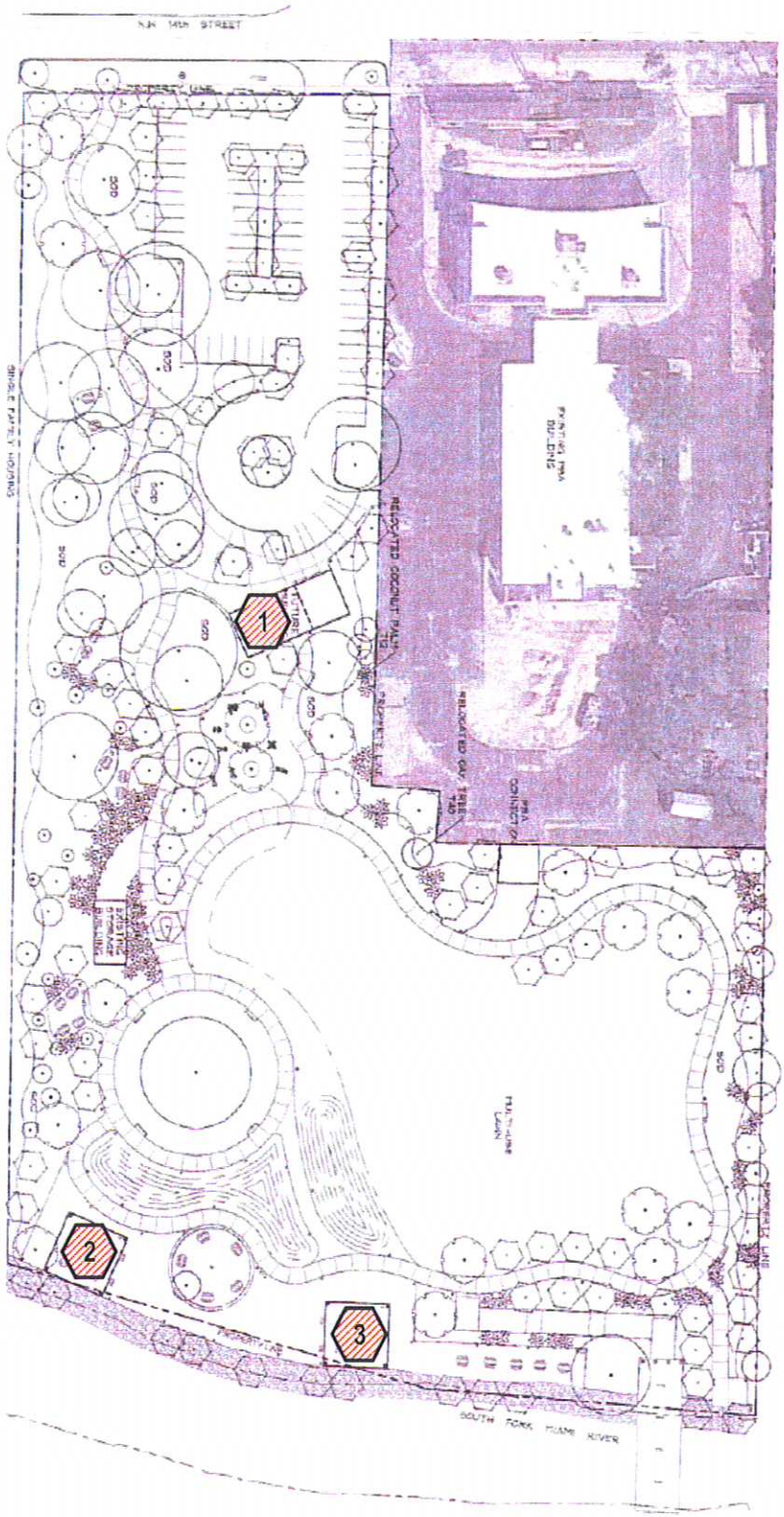
Soil Boring Test Location Sketch



Soil Boring Test Location

VMB Venkatesan

3/14/17

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APPENDIX B

- Standard Penetration Test Boring Logs

STANDARD PENETRATION TEST BORING LOG

Nelco Testing & Engineering Services, Inc.
13370 SW 131 Street, Suite 105
Miami, Florida 33186

Client: Kimley-Horn	**Date: February 27, 2017**
Project: Fern-Isle Redevelopment Project	**Job Number: B-170367**
Project Location: 2300 NW 14 Street, Miami, Florida	**Test Boring Number: 1**

Depth	Strata Name	Description	SAMPLE Number	Blow Count 6"	Blow Count 6"	N-Value
0	Sand with some gravel	*Brown (with some limestone gravel)*	1	5	11	20
1				9	4	
2			2	3	5	11
3		*Tan (with some limestone gravel)*		6	4	
4			3	5	5	10
5				5	2	
6			4	4	2	5
7				3	4	
8	Sand	*Tan*	5	3	4	8
9				4	6	
10			6	5	4	10
11				6	5	
12			7	4	5	11
13				6	8	
14			8	6	4	X
15	End of Boring					
16						
17						
18						
19						
20						

Water Level: February 27, 2017

Standard Penetration Test N-value Blows/ft: 10 30 50 70 90

Per ASTM - D 1586, Standard Penetration Test

STANDARD PENETRATION TEST BORING LOG

Nelco Testing & Engineering Services, Inc.
13370 SW 131 Street, Suite 105
Miami, Florida 33186

Client: Kimley-Horn	**Date: February 27, 2017**
Project: Fern-Isle Redevelopment Project	**Job Number: B-170367**
Project Location: 2300 NW 14 Street, Miami, Florida	**Test Boring Number: 2**

Depth	Water Level	Symbol	Strata Name	Description	SAMPLE Number	Blow Count 6"	Blow Count 6"	N-Value
0								
1			Sand with some gravel	*Brown (with some limestone gravel)*	1	1 8	5 6	13
2					2	7 9	8 8	17
3								
4	▼ February 27, 2017				3	4 2	3 1	5
5			Sand with some muck	*Dark brown (with some muck)*				
6					4	1 1	1 4	2
7								
8			Sand	*Brown*	5	8 8	6 10	14
9			Sandy limestone	*Tan, sandy, soft*				
10			Sand with some gravel	*Tan (with some limestone gravel)*	6	5 2	3 4	5
11								
12				*Brown (with some limestone gravel)*	7	6 7	6 6	13
13								
14					8	6	5	X
15			End of Boring					
16								
17								
18								
19								
20								

Standard Penetration Test N-value Blows/ft: 10 30 50 70 90

Per ASTM - D 1586, Standard Penetration Test

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STANDARD PENETRATION TEST BORING LOG

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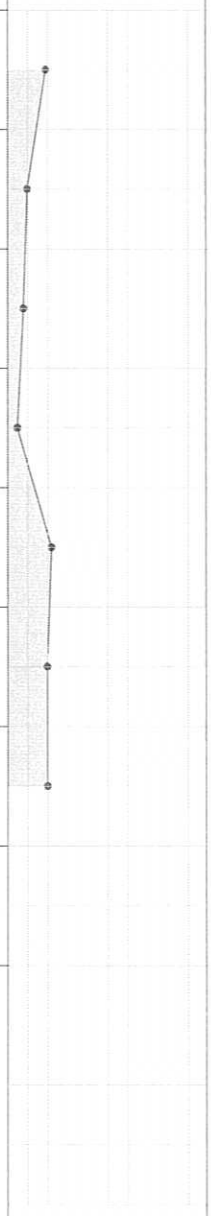
Miami, Florida 33186

Client: Kimley-Horn	**Date: February 27, 2017**
Project: Fern-Isle Redevelopment Project	**Job Number: B-170367**
Project Location: 2300 NW 14 Street, Miami, Florida	**Test Boring Number: 3**

Depth	Water Level	Symbol	Strata Name	Description	SAMPLE Number	Blow Count 6"	Blow Count 6"	N-Value
0								
1			Sand with some gravel, tile and wood pieces	*Brown (with some limestone gravel, tile and wood pieces)*	1	5	9	19
2						10	7	
3					2	8	7	10
4			Sand with some gravel	*Brown (with some limestone gravel)*		3	6	
5					3	7	4	8
6	▼ February 27, 2017		Muck	*Dark brown*		1	1	
7			Silty sand	*Dark brown*	4	1	1	5
8						4	4	
9			Sandy limestone	*Tan, sandy, soft*	5	10	10	22
10						12	15	
11					6	11	10	20
12						10	8	
13					7	3	9	20
14			Sand with some gravel	*Tan (with some limestone gravel)*		11	8	
15					8	6	4	X
			End of Boring					
16								
17								
18								
19								
20								

Standard Penetration Test N-value Blows/ft: 10 30 50 70 90



Per ASTM - D 1586, Standard Penetration Test