
**MIAMI WOMEN'S CLUB SEAWALL & BAYWALK
VICINITY OF N. BAYSHORE DRIVE AND NW 16TH STREET
CITY OF MIAMI, FLORIDA
CITY OF MIAMI PROJECT No. B-30731**

**REPORT OF SUBSURFACE EXPLORATION AND
GEOTECHNICAL ENGINEERING EVALUATIONS**

PREPARED FOR: BCC ENGINEERING, INC.

PREPARED BY: GEOSOL, INC.

JANUARY 11, 2012



January 11, 2012

BCC Engineering, Inc.
7300 North Kendall Drive, Suite 400
Miami, FL 33156

Attention: Mr. Ricardo A. Ayala, P.E.
Project Manager

Re: **Report of Subsurface Exploration and Geotechnical Engineering Evaluations**
Miami Women's Club Seawall & Baywalk
Vicinity of N. Bayshore Drive and NW 16th Street
City of Miami, Florida
City of Miami Project No. B-30731
GEOSOL Project No. 211172

Dear Mr. Ayala:

Geosol, Inc. (GEOSOL) is pleased to submit this report presenting the results of our geotechnical services for the above-referenced project. The services were provided in accordance with our proposal No. P-210225-R1 dated January 5, 2011. You provided authorization to perform our services on December 7, 2011 by means of an e-mail transmittal.

The results of our field exploration and laboratory testing programs for the proposed seawall and baywalk as well as our geotechnical engineering evaluations are presented in the accompanying report.

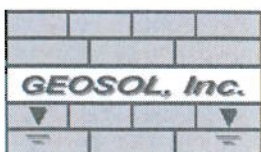
GEOSOL appreciates the opportunity to work on this interesting project. If you have any question or need additional information, please do not hesitate to call our office.

Sincerely,



Reinaldo Villa, P.E.
Project Geotechnical Engineer
Florida License No. 72242

cc: Addressee (4)
File (1)



5795-A NW 151st Street
Miami Lakes, FL 33014
Phone (305) 828-4367; Fax (305) 828-4235
E-mail: geosolusa@bellsouth.net

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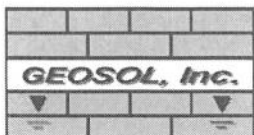
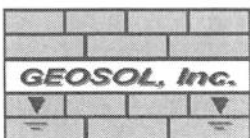


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INTRODUCTION

Project Information

As we understand it, the project will consist of replacing an existing seawall and constructing a new walkway behind the Miami Women's Club, which is located at the vicinity of N. Bayshore Drive and NW 16th Street in Miami-Dade County, Florida. We understand that the total length of the project is about 300 to 400 feet.

Specifically, the geotechnical services for this project required the performance of Standard Penetration Test (SPT) borings for use in the design of the proposed seawall replacement as well as for the proposed baywalk. The results of the field exploration and laboratory testing programs were used to investigate the subsurface and groundwater conditions and to provide geotechnical engineering recommendations for the proposed seawall and baywalk.

Purpose

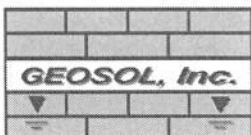
The purpose of this study was to evaluate the underground conditions (i.e. subsurface and groundwater) in light of the proposed construction. This report presents the results of our field exploration, laboratory testing, geotechnical engineering evaluations, and considerations for the proposed construction.



SCOPE OF SERVICES

The scope of services consisted of providing the following services:

1. Discussing with BCC Engineering, Inc. (BCC) the scope of the geotechnical services.
2. Performing site reconnaissance, locating and coordinating for existing utilities.
3. Obtaining a permit from the City of Miami Public Works Department for excavation in the city Right-of-Way (ROW).
4. Providing Maintenance of Traffic (MOT) control during the drilling operations.
5. Drilling three (3) Standard Penetration Test (SPT) borings to depths of 45 feet below grades for use in seawall analyses and design as well as to provide site preparation recommendations for the proposed baywalk.
6. Measuring groundwater levels at the boring locations.
7. Backfilling the boreholes using grout and restoring the sites to their original conditions.
8. Visually examining and classifying all recovered soil samples from in the laboratory using the Unified Soil Classification System (USCS) and the American Association of State Highway and Transportation Officials (AASHTO) soil classification system. The laboratory testing program includes grain-size analyses, percent passing the No. 200 sieve, moisture content determination and environmental classification testing.
9. Evaluating the results of the SPT boring information.
10. Deriving soil/rock parameters for use in the design of the proposed seawall by others.
11. Providing discussions of critical design or construction considerations based on the subsurface and groundwater conditions developed from the results of the geotechnical investigations.
12. Preparing a geotechnical engineering report summarizing the field testing data, subsurface and groundwater conditions, geotechnical evaluations and recommendations.



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SITE CONDITIONS

Our understanding of the site conditions is based on our initial field review and our observations during the performance of the field exploration program. We have appended a Site Vicinity Map that identifies the location of the study area, which is presented in Sheet 1 of Appendix “A”. A test location plan is presented in Sheet 2 of Appendix “A”. Specifically, the proposed seawall and baywalk will be constructed behind the Miami Women’s Club, which is located at 1737 North Bayshore Drive in the City of Miami, Florida. Margaret Pace Park is located toward the east terminus of the project and Biscayne Bay borders the proposed seawall and baywalk on the south.

FIELD EXPLORATION

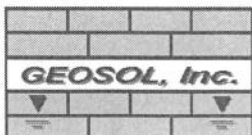
General

The field exploration program for this study included the performance of Standard Penetration Test (SPT) borings for use in seawall design and to provide site preparation recommendations for the proposed baywalk. Specifically, a total of three (3) SPT borings were performed to depths of 45 feet below existing. The tests were performed as close as possible to the locations requested by BCC considering existing utilities and equipment accessibility constraints.

The test locations were marked in the field by a representative of GEOSOL utilizing the aerial photographs depicting the proposed test locations provided by BCC on December 28, 2010, existing landmarks and standard taping procedures. The “as-drilled” locations for each test were obtained by utilizing a hand-held Global Positioning System (GPS) device and should be considered approximate to within a few feet. The latitude and longitude coordinates obtained with the GPS device were converted to northing and easting utilizing the software “Corpscon” developed by the United States Army Corps of Engineers. The ground surface elevations at each test location have not been provided to us at this point. A summary of the approximate test locations is presented on Table “A” below and in the Boring Location Plan in Appendix “A”.

TABLE “A” – APPROXIMATE TEST LOCATIONS

| BORING No. | BORING DEPTH (FEET) | APPROXIMATE TEST LOCATION (FEET) | | GROUND SURFACE ELEVATION (FEET) |
|------------|---------------------|----------------------------------|-----------|---------------------------------|
| | | NORTHING | EASTING | |
| TB-1 | 45 | 530937.85 | 924183.35 | N/A |
| TB-2 | 45 | 531026.89 | 924181.81 | N/A |
| TB-3 | 45 | 531092.99 | 924174.17 | N/A |



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Standard Penetration Test (SPT) Borings

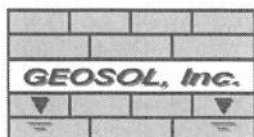
The SPT boring procedures were conducted in general conformance with ASTM D-1586. All SPT borings were performed utilizing a truck-mounted drill rig (Foremost Mobile B-53) using a recently calibrated automatic hammer. After seating the sampler 6 inches, the number of successive blows required to drive the sampler 12 inches into the soil constitutes the test result commonly referred to as the "N"-value. The "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 N-value information for each SPT boring is presented in the Test Boring Records that are included in Appendix "A".

Water Level Measurements

Water level depths were obtained during the performance of the test boring operations. They are noted on the Test Boring Records in Appendix "A". In relatively pervious soils/rocks, such as sandy (granular) soils and porous limestone, the indicated depths are usually reliable groundwater levels. Seasonal variations, tidal conditions, temperature variations, land uses, and recent rainfall conditions may influence the depth of groundwater levels.

Traffic Control

Flagmen, barricades, cones, and sign devices were continuously used in general compliance with FDOT Roadway and Traffic Design Standards Index Drawings.



LABORATORY TESTING PROGRAM

General

Representative samples collected from the test borings were visually reviewed in the laboratory by a Geotechnical Engineer to confirm the field classifications. The soil samples were then classified using the Unified Soil Classification System (USCS) in general accordance with the American Society of Testing and Materials (ASTM) test designation D-2488 and ASTM D-2487. Additionally, soil samples were classified using the American Association of State Highway and Transportation Officials (AASHTO) Soil Classification System in general accordance with the ASTM test designation D-3282. The classification was based on visual observations with the aids of limited laboratory testing, which consisted of moisture content, grain-size analysis, and percent passing the No. 200 sieve. The tests were performed on selected samples believed to be representative of the materials encountered. A summary of the laboratory test results is provided in Table No. 1 in Appendix "B" of this report. Also, GEOSOL performed environmental classification testing on a water sample obtained from an SPT boring location. The test results are summarized in Table 2 of Appendix "B".

Moisture Content

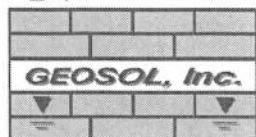
The laboratory moisture content test consists of the determination of the percentage of moisture contents in selected samples in general accordance with FDOT Test Designation FM1-T265 (ASTM Test Designation D-2216, titled "Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures"). Briefly, the moisture content is determined by weighing a sample of the selected material and then drying it in a warm oven. Care is taken to use a gentle heat so as not to destroy any organics. The sample is removed from the oven and re-weighed. The difference of the two weights is the amount of moisture removed from the sample. The weight of the moisture divided by the weight of the dry soil sample is the percentage by weight of moisture in the sample. The test results are summarized in Table No. 1 of Appendix "B".

Grain-Size Analysis

The grain-size analyses were conducted in general accordance with the FDOT Test Designation FM1-T88 (ASTM Test Designation D-422, titled "Particle-Size Analysis of Soils"). The grain-size analysis test measures the percentage passing the No. 200 Sieve. In this manner, the grain-size distribution of a soil is measured. The percentage by weight passing the No. 200 Sieve is the amount of silt and clay sized particles. The test results are summarized in Table 1 of Appendix "B".

Environmental Classification

Environmental classification testing was performed on a water sample obtained from an SPT boring location during the field exploration program. The testing performed included pH, resistivity, sulfate and chloride content. The results of the testing were evaluated based on the criteria established in the FDOT *Structures Design Guidelines*, Section 1.3. Based on the criteria in Section 1.3, the laboratory test results yielded environmental classifications of extremely aggressive for both the steel and concrete substructure and slightly aggressive for the superstructures. We have included the test results in Table 2 of Appendix "B".



GENERALIZED SUBSURFACE CONDITIONS

Miami-Dade County Regional Geology

The Miami area of southern Florida is underlain by an alternating sequence of cemented and uncemented Pleistocene sedimentary deposits (Pleistocene Epoch, deposited 10,000 to 2 million years before the present). A near surface Miami Limestone Formation is underlain by a wide variety of loose to dense quartz sands and coarse to fine-grained hard to very hard limestones and sandstones (Fort Thompson Formation). However, in many portions of Miami-Dade, surface sand deposits of the Pamlico Formation and man-made (artificial) fill are encountered. The Pamlico sands and man-made (artificial) fill have a thickness of approximately three (3) to seven (7) feet and overlie the Miami Limestone Formation. In the west part of the county, portions of the Everglades interfingers with the Pamlico sands. The Everglades soils consist of peat, organic silt and calcareous silt marl. The Everglades soils also have a thickness of three (3) to seven (7) feet and overlie the Miami Limestone Formation.

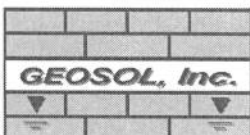
Although the Miami Limestone Formation can be very porous and have a sponge-like, open interconnected network of vugs and small voids, large cavities do not exist and there is no potential for sinkhole activity. The rock formations encountered in the Miami area are typically much softer than the "bedrock" formations encountered in other areas of the country.

The strength of the limestone as well as its deformation characteristics depends upon the degree of cementation of the formation and its alteration by solutioning and weathering subsequent to deposition. One of the most important characteristics of the limestone encountered in the project area is the degree of erosion. Past surface solutioning of the limestone has resulted in formation called "pinnacle rock". In some cases nearly vertical cylindrical-shaped solution cavities are filled with surficial fine sands extending below the groundwater level. The subsurface conditions encountered at the site are presented in the following section.

Miami-Dade County Soil Survey

The *Soil Survey of Miami-Dade County Area, Florida*, published by the United States Department of Agriculture (USDA), was reviewed for general near-surface soil information within the general project vicinity. This information indicates that there is one (1) primary mapping unit within the project vicinity, as follows:

- ❖ Urban Land (15): consists of areas that are more than 85 percent covered by commercial space, residential space, public facilities, airports, streets, sidewalks, and other structures. The soils in open areas consist of lawns, parks, vacant lots and playgrounds. The surface soils and fill materials are underlain by the porous natural limestone formation.



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SITE SUBSURFACE CONDITIONS

General

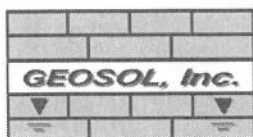
The subsurface conditions disclosed by the test borings performed for this study are generally consistent with the regional geology described above. Detailed information is presented in the Test Boring Records in Appendix “A”. The stratification shown is based on visual examination of recovered samples and interpretation of the field boring logs. Specifically, we have identified six (6) strata along the project alignment (except the asphalt pavement) and they are described in Table “B” below.

TABLE “B” – SUMMARY OF SUBSURFACE STRATIGRAPHY

| STRATUM No. | MATERIAL DESCRIPTION | USCS SYMBOL | AASHTO GROUP |
|--------------------|-----------------------------------------------------------------------------------------------------|--------------------|---------------------|
| 0 | Asphalt Pavement | N/A | N/A |
| 1 | Dark Brown Organic Silty Fine SAND (TOPSOIL) | OL | A-8 |
| 2 | Brown Clean to Slightly Silty Fine to Medium SAND with Trace of Limerock and Shell Fragments (FILL) | SP/ SP-SM | A-3 |
| 3 | Brown Silty Fine to Medium SAND (FILL) | SM | A-2-4 |
| 4 | Light Brown to Orange-Brown Sandy LIMESTONE (MIAMI LIMESTONE FORMATION) | N/A | N/A |
| 5 | Light Gray Fine to Coarse SAND with Little Limestone Fragments (FORT THOMPSON FORMATION SAND) | SP | A-1-b |
| 6 | Orange-Brown Sandy LIMESTONE (FORT THOMPSON FORMATION LIMESTONE) | N/A | N/A |

Groundwater Conditions

Groundwater levels were measured in the completed boreholes during the drilling operations. Measurements made in the test locations disclosed the water table to be at depths ranging from 2.8 to 3.5 feet below the ground surface. It is to be noted that borings were performed during the dry season. Therefore, during the wet season the groundwater may be 12 to 24 inches higher than the levels measured at the test boring locations.



GEOTECHNICAL SOIL/ROCK DESIGN PARAMETERS

The geotechnical design parameters for this study were obtained on the basis of empirical relationships between the SPT "N"-values and the shear strength of the soil/rock strata, statistical evaluation of the field data, our local experience and literature review. Table "C" below presents the recommended soil/rock parameters for use in seawall analyses and design.

TABLE "C"- SUMMARY OF GEOTECHNICAL DESIGN SOIL/ROCK PARAMETERS

| GENERAL MATERIAL TYPE | UNIT WEIGHT (PCF) | | FRICTION ANGLE (Degrees) | COHESION (psf) | WALL FRICTION (Degrees) | EARTH PRESSURE COEFFICIENTS | | |
|-----------------------------------------------|-------------------|----------------|--------------------------|----------------|-------------------------|-----------------------------|---------|----------|
| | TOTAL | EFFECTIVE | | | | ACTIVE | PASSIVE | AT-REST |
| | γ_{total} | γ_{eff} | | | | ϕ | C | δ |
| Granular Fill (Strata 2 & 3) | 110 | 48 | 32 | - | 10 | 0.31 | 3.25 | 0.47 |
| Miami Limestone Formation (Stratum 4) | 115 | 53 | - | 4,000 | - | - | - | - |
| Fort Thompson Formation Sand (Stratum 5) | 110 | 48 | 34 | - | 11 | 0.28 | 3.54 | 0.44 |
| Fort Thompson Formation Limestone (Stratum 6) | 115 | 53 | - | 4,000 | - | - | - | - |

Note: 1) Strata 0 and 1 are the asphalt pavement and topsoil, respectively.

DESIGN OF PROPOSED SEAWALL

We understand that a seawall will be required replace the existing wall that is located behind the Miami Women's Club. The proposed seawall may be designed using the soil/rock parameters presented in Table "C" of this report. The type and design of seawalls was not included in our scope of services and we are assuming this will be performed by others.



ENGINEERING EVALUATIONS AND RECOMMENDATIONS FOR PROPOSED BAYWALK

General

We understand that a new baywalk will be constructed behind the Miami Women's Club. Based on the results of our study, the subsurface conditions are suitable for the planned construction. The following sections present site preparation recommendations for construction of the proposed baywalk.

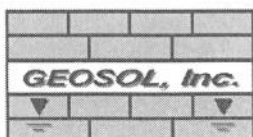
Site Preparation

Site preparation shall be in accordance with sections 110 and 120 of the FDOT *Standard Specifications for Road and Bridge Construction* and FDOT Standard Indices 500 and 505. The following are our discussions regarding the utilization and the site preparation requirements of the subsurface soils.

- ❖ The material from Stratum 0 is the asphalt pavement.
- ❖ The material from Stratum Number 1 is topsoil (A-8) and considered to be unsuitable (muck). It shall be removed during clearing and grubbing in accordance with Section 110 of the FDOT Standard Specifications.
- ❖ The materials from Strata Numbers 2 and 5 (A-1-b and A-3) are considered to be select and should be utilized in accordance with FDOT Standard Index 505.
- ❖ The materials from Stratum Number 3 (A-2-4) are considered to be select and should be utilized in accordance with FDOT Standard Index 505. Certain types of A-2-4 material are likely to retain excess moisture and may be difficult to dry and compact. They should be used in the embankment above the water level existing at time of construction.
- ❖ The material from Strata Numbers 4 and 6 are the Miami Limestone and Fort Thompson Limestone Formations, respectively. These materials may be difficult to dewater, excavate and/or penetrate and may require special equipment to do so.

Fill Material

The embankment fill should consist of select material, meeting the requirements of Standard Index 505 and shall be constructed in general accordance of Section 120.8 of the FDOT *Standard Specifications for Road and Bridge Construction*.



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Pavement Design Suggestions

We recommend that stabilized subgrade and base materials support the proposed pavement for the baywalk. After placement of the first 12 inches of new fill after final subgrade elevations have been achieved, that Limerock Bearing Ratio (LBR) tests be performed per every 10,000 square feet of subgrade. If the LBR values are less than 40, we recommend that the subgrade be stabilized to depths of 12 inches to achieve minimum Limerock Bearing Ratio (LBR) values of 40. The subgrade should be compacted to at least 95 percent of maximum dry density as determined by the modified Proctor test (ASTM D-1557). Based on the results of our SPT borings, it appears that the existing subgrade soils most likely have an LBR value of 40.

CONSTRUCTION SUGGESTIONS

The following are our suggestions for the installation of the proposed seawall based on the results of the test borings.

1. It should be noted that sheet pile refusal may occur on a random and unpredictable basis since zones of dense soils revealed by the test borings may be encountered. In this case, we recommend that predrilling be considered prior to the installation of the sheet piles. Predrilling is required in order to prevent refusal conditions, damage of the structural section of the sheeting and minimize vibrations-induced settlements to nearby structures. Following predrilling, the sheet piles should be set in place and vibrated to the required tip elevations.
2. The sheet pile installation equipment will produce vibration and noise levels that may be considered disturbing to people and can produce vibrations noticeable in structures. The potential for damage to any adjacent structures during the sheet pile installations will be dependent on the distance from the adjacent structures to the location of the sheet piles installation, the subsurface conditions, and the level of sensitivity of the structure to any type of vibration. The recommendations provided in Section 455-1.1 in the latest version of the FDOT *Standard Specifications for Road and Bridge Construction* should be followed for the protection of the existing structures during sheet piling operations. All those structures and or utilities located adjacent to the proposed excavation shall be surveyed as well as monitored for vibrations and settlements in accordance with Section 455-1.1 of the latest version of the FDOT *Standard Specifications for Road and Bridge Construction*.



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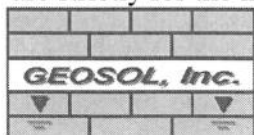
3. The select fill used as backfill should be tested and approved prior to acquisition and placement. Density tests to confirm compaction should be preformed in each fill lift before the next lift is placed. Any fill indicating less than above compaction requirements should be recompacted until the required density is obtained.
4. The baywalk subgrade should be compacted to not less than 98 percent modified Proctor maximum dry density (AASHTO T-180).
5. Prior to initiating compaction operations, we recommend that representative samples of the select fill material to be used and acceptable in-place soils be collected and tested to determine their compaction and classification characteristics. The maximum dry density, optimum moisture content, gradation, and plasticity characteristics should be determined. These tests are needed for compaction quality control of the select fill and existing soils and to determine if the fill material is acceptable.
6. The pavement areas should have a stabilized subgrade having a minimum thickness of 12 inches and an LBR of 40 placed to a depth of at least 12 inches below the base course. The base course should have a minimum thickness of 6 inches, and a minimum LBR of 100 meeting the requirements in Section 911 of the latest version of the FDOT *Standard Specifications for Road and Bridge Construction*.
7. The stabilized subgrade should be compacted to an equivalent density of 98 percent of the modified Proctor maximum dry density (AASHTO T-180). The base material should be compacted to 98 percent of the modified Proctor maximum dry density. The base course should also have a minimum carbonate content of 70 percent. The entire pavement thicknesses should be based on the design requirements.

REPORT LIMITATIONS

Our professional services have been performed, our findings obtained, and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. This company is not responsible for the conclusions, opinions or recommendations made by others based on these data. No other warranties are expressed or implied.

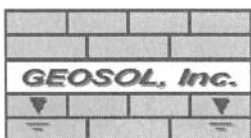
The scope of the investigation was intended to specifically evaluate subsurface conditions within the influence of the proposed project. The analyses and recommendations submitted in this report are based upon the data obtained from the test borings performed at the locations indicated. If any subsoil variations become evident during the course of this project, a re-evaluation of the recommendations contained in this report will be necessary after we have had an opportunity to observe the characteristics of the conditions encountered. The applicability of the report should also be reviewed in the event significant changes occur in the design.

The scope of our services does not include any environmental assessment or investigation for the presence or absence of hazardous or toxic materials in the soil, groundwater, or surface water within or beyond the site studied. Any statements in this report regarding odors, staining of soils, or other unusual conditions observed are strictly for the information of our client.



APPENDIX "A"

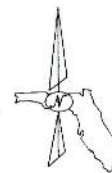
Sheet 1: Site Vicinity Map
Sheet 2: Boring Location Plan
Test Boring Records



APPROXIMATE SITE LOCATION



SITE VICINITY MAP



COUNTY: MIAMI-DADE, FLORIDA

REFERENCE: GOOGLE EARTH, 2012

DATE: JANUARY, 2012

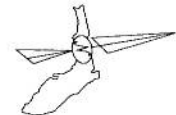
SITE VICINITY MAP
 MIAMI WOMEN'S CLUB SEAWALL & BAYWALK
 VICINITY OF N. BAYSHORE DR. & N.W. 16TH STREET
 MIAMI-DADE COUNTY, FLORIDA



| | | | | | |
|----------------|----|--------------|------------|------------------|--------|
| DRAWN | RV | SCALE | N.T.S. | PROJ. No. | 211172 |
| CHECKED | OR | DATE | JAN., 2012 | SHEET | 1 |



BORING LOCATION PLAN



LEGEND

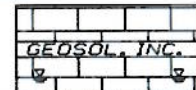
● TB-1: APPROXIMATE TEST BORING LOCATION

COUNTY: MIAMI-DADE, FLORIDA

REFERENCE: GOOGLE EARTH, 2012

DATE: JANUARY, 2012

BORING LOCATION PLAN
 MIAMI WOMEN'S CLUB SEAWALL & BAYWALK
 VICINITY OF N. BAYSHORE DR. & N.W. 16TH STREET
 MIAMI-DADE COUNTY, FLORIDA



| | | |
|------------------------------|-----------------------------------|------------------------------------|
| <small>DRAWN</small> RV | <small>SCALE</small> N.T.S. | <small>PROJ. No.</small> 211172 |
| <small>CHECKED</small> OR | <small>DATE</small> JAN., 2012 | <small>SHEET</small> 2 |



















| GEOSOL, Inc. MIAMI LAKES, FL | | | | TEST BORING RECORD (ASTM D-1586) | | | | BORING No. TB-1 | |
|--------------------------------------------------------------------------------------|--------------|-------------|------------------|-------------------------------------|--------------------------|------------------|--------|----------------------------------------------------------------------------------------------------------------|---------|
| PROJECT NAME: MIAMI WOMEN'S CLUB SEAWALL AND BAYWALK | | | | | | | | SHEET No. 1 OF 2 | |
| CLIENT: BCC ENGINEERING, INC. | | | | | | | | GEOSOL PROJECT No. 211172 | |
| BORING LOCATION: NORTHING (ft):530937.85 EASTING (ft): 924183.35 ELEVATION (ft): N/A | | | | | | | | | |
| GROUNDWATER (FEET): 3.3 | | | | CASING | SAMPLE | CORE | TUBE | DATUM (ft): N/A | |
| DATE | TIME | DEPTH (ft) | CASING L (ft) | TYPE DIA.(in) | NW 3 | SS 1 - 3/8 ID | | DATE START: 12/28/2011 | |
| | | | 38 | WT.(lbs) | | 140 | | DATE FINISH: 12/28/2011 | |
| | | | | FALL(in) | | 30 | | DRILLER: R.Morales | |
| | | | | | | | | EQUIP./HAMMER: B-53/ AUTO. | |
| DEPTH, ft | SAMPLE No. | STRATUM No. | BLOWS /6" | N Value (bpf) | SYMBOL | | | MATERIAL DESCRIPTION | REMARKS |
| | | | | | | | | 0 to 2": Asphalt Pavement | |
| 1 | S-1 | | 7 | 13 | | | | 2" to 3": Brown Slightly Silty Fine to Medium SAND with Trace of Limerock Fragments (FILL; SP-SM / A-3) | |
| 2 | | | 6 | | | | | | |
| 3 | S-2 | | 7 | 8 | | | | | |
| 4 | | | 5 | | | | | | |
| 5 | S-3 | | 4 | 8 | | | | | |
| 6 | | | 4 | | | | | | |
| 7 | S-4 | | 4 | 5 | | | | | |
| 8 | | | 3 | | | | | | |
| 9 | S-5 | | 5 | 5 | | | | | |
| 10 | | | 4 | | | | | | |
| 11 | | | 4 | | | | | | |
| 12 | | | 3 | | | | | | |
| 13 | | | 5 | | | | | | |
| 14 | S-6 | | 4 | 11 | | | | 3' to 23': Brown to Light Gray Fine to Medium SAND with Trace of Limerock and Shell Fragments (FILL; SP / A-3) | |
| 15 | | | 6 | | | | | | |
| 16 | | | 5 | | | | | | |
| 17 | | | 5 | | | | | | |
| 18 | | | | | | | | | |
| 19 | S-7 | | 4 | 8 | | | | | |
| 20 | | | 3 | | | | | | |
| 21 | | | 5 | | | | | | |
| 22 | | | 6 | | | | | | |
| 23 | | | | | | | | | |
| 24 | S-8 | | 8 | 19 | | | | 23' to 28': Light Gray Sandy LIMESTONE (MIAMI LIMESTONE FORMATION) | |
| 25 | | | 9 | | | | | | |
| | | | 10 | | | | | | |
| | | | 12 | | | | | | |
| BLOWS/FT. | DENSITY | BLOWS/FT. | CONSISTENCY | SAMPLE IDENTIFICATION | | | SYMBOL | | |
| 0-3 | Very Loose | 0-1 | Very Soft | | - H - Hand Auger | | | - FILL | |
| 3-8 | Loose | 1-3 | Soft | | - S - Split Spoon | | | - SAND | |
| 8-24 | Medium Dense | 3-6 | Medium Stiff | | - T - Thin Wall Tube | | | - ORGANIC SOILS / MUCK | |
| 24-40 | Dense | 6-12 | Stiff | | - U - Undisturbed Piston | | | - SILT | |
| > 40 | Very Dense | 12-24 | Very Stiff | | - C - Diamond Core | | | - CLAY | |
| | | > 24 | Hard | | - W - Wash Sample | | | - LIMESTONE | |
| | | | | | | | | - SANDSTONE | |

| | |
|------------------------------------------------------|------------------|
| PROJECT NAME: MIAMI WOMEN'S CLUB SEAWALL AND BAYWALK | SHEET No. 2 OF 2 |
|------------------------------------------------------|------------------|

| | |
|-------------------------------|---------------------------|
| CLIENT: BCC ENGINEERING, INC. | GEOSOL PROJECT No. 211172 |
|-------------------------------|---------------------------|





















| DEPTH, ft | SAMPLE No. | STRATUM No. | BLOWS / 6" | N Value (bpf) | SYMBOL | MATERIAL DESCRIPTION | REMARKS |
|-----------|------------|-------------|------------|---------------|--------|-------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|
| 26 | | | | | | 23' to 28': Light Gray Sandy LIMESTONE (MIAMI LIMESTONE FORMATION) | BORING TERMINATED AT DEPTH OF 40 FT. BOREHOLE GROUTED |
| 27 | | | | | | | |
| 28 | | | | | | | |
| 29 | S-9 | | 7 | 14 | | | |
| 30 | | | 8 | | | | |
| 31 | | | 6 | | | | |
| 32 | | | 7 | | | | |
| 33 | | | | | | 28' to 39.5': Light Gray Fine to Coarse SAND with Little Limestone Fragments (FORT THOMPSON FORMATION SAND; SP / A-1-b) | |
| 34 | S-10 | | 10 | 21 | | | |
| 35 | | | 9 | | | | |
| 36 | | | 12 | | | | |
| 37 | | | 10 | | | | |
| 38 | | | | | | | |
| 39 | S-11 | | 7 | 11 | | | |
| 40 | | | 6 | | | | |
| 41 | | | 5 | | | | |
| 42 | | | | | | | |
| 43 | | | | | | | |
| 44 | | | | | | | |
| 45 | | | | | | | |
| 46 | | | | | | | |
| 47 | | | | | | | |
| 48 | | | | | | | |
| 49 | | | | | | | |
| 50 | | | | | | | |

| BLOWS/FT. | DENSITY | BLOWS/FT. | CONSISTENCY | SAMPLE IDENTIFICATION | SYMBOL |
|-----------|--------------|-----------|--------------|--------------------------|------------------------|
| 0-3 | Very Loose | 0-1 | Very Soft | - H - Hand Auger | - FILL |
| 3-8 | Loose | 1-3 | Soft | - S - Split Spoon | - SAND |
| 8-24 | Medium Dense | 3-6 | Medium Stiff | - T - Thin Wall Tube | - ORGANIC SOILS / MUCK |
| 24-40 | Dense | 6-12 | Stiff | - U - Undisturbed Piston | - SILT |
| > 40 | Very Dense | 12-24 | Very Stiff | - C - Diamond Core | - CLAY |
| | | > 24 | Hard | - W - Wash Sample | - LIMESTONE |
| | | | | | - SANDSTONE |

| GEOSOL, Inc. MIAMI LAKES, FL | | | | TEST BORING RECORD (ASTM D-1586) | | | | BORING No. TB-2 | | | | |
|--------------------------------------------------------------------------------------|--------------|-------------|------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|------------------------|---------|----------------|-------------|-----|
| PROJECT NAME: MIAMI WOMEN'S CLUB SEAWALL AND BAYWALK | | | | | | | SHEET No. 1 OF 2 | | | | | |
| CLIENT: BCC ENGINEERING, INC. | | | | | | | GEOSOL PROJECT No. 211172 | | | | | |
| BORING LOCATION: NORTHING (ft):531026.89 EASTING (ft): 924181.81 ELEVATION (ft): N/A | | | | | | | | | | | | |
| GROUNDWATER (FEET): 3.5 | | | | | | | CASING | SAMPLE | CORE | TUBE | DATUM (ft): | N/A |
| DATE | TIME | DEPTH (ft) | CASING L (ft) | TYPE | | NW | SS | | | DATE START: | 12/28/2011 | |
| | | | 38 | DIA.(in) | | 3 | 1 - 3/8 ID | | | DATE FINISH: | 12/28/2011 | |
| | | | | WT.(lbs) | | | 140 | | | DRILLER: | R.Morales | |
| | | | | FALL(in) | | | 30 | | | EQUIP./HAMMER: | B-53/ AUTO. | |
| DEPTH, ft | SAMPLE No. | STRATUM No. | BLOWS / 6" | N Value (bpf) | SYMBOL | MATERIAL DESCRIPTION | | | REMARKS | | | |
| 1 | S-1 | | 5 | 5 |  | 0 to 1": Asphalt Pavement | | | | | | |
| 2 | | | 3 | | | | | | | | | |
| 3 | S-2 | | 2 | 6 |  | 1" to 4.7': Brown Slightly Silty Fine to Medium SAND with Trace of Limerock Fragments (FILL; SP-SM / A-3) | | | | | | |
| 4 | | | 1 | | | | | | | | | |
| 5 | S-3 | | 2 | 6 |  | | | | | | | |
| 6 | | | 4 | | | | | | | | | |
| 7 | S-4 | | 2 | 8 |  | 4.7' to 9': Brown Silty Fine to Medium SAND (FILL; SM / A-2-4) | | | | | | |
| 8 | | | 3 | | | | | | | | | |
| 9 | S-5 | | 4 | 7 |  | | | | | | | |
| 10 | | | 3 | | | | | | | | | |
| 11 | | | 4 | | | | | | | | | |
| 12 | | | | | | | | | | | | |
| 13 | | | | | | | | | | | | |
| 14 | S-6 | | 3 | 7 |  | | | | | | | |
| 15 | | | 2 | | | | | | | | | |
| 16 | | | 5 | | | | | | | | | |
| 17 | | | 7 | | | | | | | | | |
| 18 | | | | | | | | | | | | |
| 19 | S-7 | | 3 | 9 |  | 9' to 23': Brown to Light Gray Fine to Medium SAND with Little Limerock and Shell Fragments (FILL; SP / A-3) | | | | | | |
| 20 | | | 4 | | | | | | | | | |
| 21 | | | 5 | | | | | | | | | |
| 22 | | | 5 | | | | | | | | | |
| 23 | | | | | | | | | | | | |
| 24 | S-8 | | 6 | 21 |  | 23' to 28': Light Gray to Light Brown Sandy LIMESTONE (MIAMI LIMESTONE FORMATION) | | | | | | |
| 25 | | | 11 | | | | | | | | | |
| | | | 10 | | | | | | | | | |
| | | | 13 | | | | | | | | | |
| BLOWS/FT. | DENSITY | BLOWS/FT. | CONSISTENCY | SAMPLE IDENTIFICATION | | | SYMBOL | | | | | |
| 0-3 | Very Loose | 0-1 | Very Soft |  | - H - Hand Auger | |  | - FILL | | | | |
| 3-8 | Loose | 1-3 | Soft |  | - S - Split Spoon | |  | - SAND | | | | |
| 8-24 | Medium Dense | 3-6 | Medium Stiff |  | - T - Thin Wall Tube | |  | - ORGANIC SOILS / MUCK | | | | |
| 24-40 | Dense | 6-12 | Stiff |  | - U - Undisturbed Piston | |  | - SILT | | | | |
| > 40 | Very Dense | 12-24 | Very Stiff |  | - C - Diamond Core | |  | - CLAY | | | | |
| | | > 24 | Hard | | - W - Wash Sample | | | - LIMESTONE | | | | |
| | | | | | | | | - SANDSTONE | | | | |

| DEPTH, ft | SAMPLE No. | STRATUM No. | BLOWS / 6" | N Value (bpf) | SYMBOL | MATERIAL DESCRIPTION | REMARKS |
|-----------|------------|-------------|------------|---------------|--------|-----------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|
| 26 | | | | | | 23' to 28': Light Gray to Light Brown Sandy LIMESTONE (MIAMI LIMESTONE FORMATION) | BORING TERMINATED AT DEPTH OF 40 FT. BOREHOLE GROUTED |
| 27 | | | | | | | |
| 28 | | | | | | | |
| 29 | S-9 | | 6 | 16 | | | |
| 30 | | | 9 | | | | |
| 31 | | | 7 | | | | |
| 32 | | | 10 | | | | |
| 33 | | | | | | 28' to 39': Light Gray Fine to Coarse SAND with Little Limestone Fragments (FORT THOMPSON FORMATION SAND; SP / A-1-b) | |
| 34 | S-10 | | 7 | 23 | | | |
| 35 | | | 12 | | | | |
| 36 | | | 11 | | | | |
| 37 | | | 13 | | | | |
| 38 | | | | | | | |
| 39 | S-11 | | 9 | 13 | | | |
| 40 | | | 6 | | | | |
| 41 | | | 7 | | | | |
| 42 | | | 8 | | | | |
| 43 | | | | | | | |
| 44 | | | | | | | |
| 45 | | | | | | | |
| 46 | | | | | | | |
| 47 | | | | | | | |
| 48 | | | | | | | |
| 49 | | | | | | | |
| 50 | | | | | | | |

| BLOWS/FT. | DENSITY | BLOWS/FT. | CONSISTENCY | SAMPLE IDENTIFICATION | SYMBOL |
|-----------|--------------|-----------|--------------|--------------------------|------------------------|
| 0-3 | Very Loose | 0-1 | Very Soft | - H - Hand Auger | - FILL |
| 3-8 | Loose | 1-3 | Soft | - S - Split Spoon | - SAND |
| 8-24 | Medium Dense | 3-6 | Medium Stiff | - T - Thin Wall Tube | - ORGANIC SOILS / MUCK |
| 24-40 | Dense | 6-12 | Stiff | - U - Undisturbed Piston | - SILT |
| > 40 | Very Dense | 12-24 | Very Stiff | - C - Diamond Core | - CLAY |
| | | > 24 | Hard | - W - Wash Sample | - LIMESTONE |
| | | | | | - SANDSTONE |

| GEOSOL, Inc. MIAMI LAKES, FL | | | | TEST BORING RECORD (ASTM D-1586) | | | | BORING No. TB-3 | |
|---------------------------------------------------------------------------------------|--------------|-------------|------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|---------------------------|-----------------|-------------|
| PROJECT NAME: MIAMI WOMEN'S CLUB SEAWALL AND BAYWALK | | | | | | | SHEET No. 1 OF 2 | | |
| CLIENT: BCC ENGINEERING, INC. | | | | | | | GEOSOL PROJECT No. 211172 | | |
| BORING LOCATION: NORTHING (ft): 531092.99 EASTING (ft): 924174.17 ELEVATION (ft): N/A | | | | | | | | | |
| GROUNDWATER (FEET): 2.8 | | | | CASING | SAMPLE | CORE | TUBE | DATUM (ft): | N/A |
| DATE | TIME | DEPTH (ft) | CASING L (ft) | TYPE DIA.(in) | | | | DATE START: | 12/28/2011 |
| | | | 38 | WT.(lbs) | 140 | | | DATE FINISH: | 12/28/2011 |
| | | | | FALL(in) | 30 | | | DRILLER: | R.Morales |
| | | | | | | | | EQUIP./HAMMER: | B-53/ AUTO. |
| DEPTH, ft | SAMPLE No. | STRATUM No. | BLOWS /6" | N Value (bpf) | SYMBOL | MATERIAL DESCRIPTION | | REMARKS | |
| 1 | S-1 | | 3 | 9 |  | 0 to 2": Dark Brown Organic Silty Fine SAND with Grass (TOPSOIL; OL / A-8) | | | |
| 2 | S-2 | | 4 | 13 |  | | | | |
| 3 | | | 7 | | | | | | |
| 4 | | | 6 | | | | | | |
| 5 | S-3 | | 7 | 14 |  | | | | |
| 6 | | | 8 | | | | | | |
| 7 | S-4 | | 6 | 7 |  | 2" to 23': Brown Fine to Medium SAND with Trace of Limerock and Shell Fragments (FILL; SP / A-3) | | | |
| 8 | | | 4 | | | | | | |
| 9 | S-5 | | 3 | 3 |  | | | | |
| 10 | | | 2 | | | | | | |
| 11 | | | 1 | | | | | | |
| 12 | | | 2 | | | | | | |
| 13 | | | 2 | | | | | | |
| 14 | S-6 | | 5 | 10 |  | | | | |
| 15 | | | 4 | | | | | | |
| 16 | | | 6 | | | | | | |
| 17 | | | 7 | | | | | | |
| 18 | | | | | | | | | |
| 19 | S-7 | | 3 | 8 |  | | | | |
| 20 | | | 4 | | | | | | |
| 21 | | | 4 | | | | | | |
| 22 | | | 5 | | | | | | |
| 23 | | | | | | | | | |
| 24 | S-8 | | 6 | 16 |  | 23' to 28': Light Gray to Orange-Brown Sandy LIMESTONE (MIAMI LIMESTONE FORMATION) | | | |
| 25 | | | 9 | | | | | | |
| | | | 7 | | | | | | |
| | | | 8 | | | | | | |
| BLOWS/FT. | DENSITY | BLOWS/FT. | CONSISTENCY | SAMPLE IDENTIFICATION | | SYMBOL | | | |
| 0-3 | Very Loose | 0-1 | Very Soft |  | - H - Hand Auger |  | - FILL | | |
| 3-8 | Loose | 1-3 | Soft |  | - S - Split Spoon |  | - SAND | | |
| 8-24 | Medium Dense | 3-6 | Medium Stiff |  | - T - Thin Wall Tube |  | - ORGANIC SOILS / MUCK | | |
| 24-40 | Dense | 6-12 | Stiff |  | - U - Undisturbed Piston |  | - SILT | | |
| > 40 | Very Dense | 12-24 | Very Stiff |  | - C - Diamond Core |  | - CLAY | | |
| | | > 24 | Hard |  | - W - Wash Sample |  | - LIMESTONE | | |
| | | | | | | | - SANDSTONE | | |

| GEOSOL, Inc. MIAMI LAKES, FL | | | TEST BORING RECORD (ASTM D-1586) | | | | BORING No. TB-3 | |
|------------------------------------------------------|------------|--------------|-------------------------------------|---------------|--------------|--------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|--|
| PROJECT NAME: MIAMI WOMEN'S CLUB SEAWALL AND BAYWALK | | | | | | SHEET No. 2 OF 2 | | |
| CLIENT: BCC ENGINEERING, INC. | | | | | | GEOSOL PROJECT No. 211172 | | |
| DEPTH, ft | SAMPLE No. | STRATUM No. | BLOWS / 6" | N Value (bpf) | SYMBOL | MATERIAL DESCRIPTION | REMARKS | |
| 26 | | | | | | 23' to 28': Light Gray to Orange Brown Sandy LIMESTONE (MIAMI LIMESTONE FORMATION) | BORING TERMINATED AT DEPTH OF 40 FT. BOREHOLE GROUTED | |
| 27 | | | | | | | | |
| 28 | | | | | | | | |
| 29 | S-9 | | 6 | 13 | | | | |
| 30 | | | 7 | | | | | |
| 31 | | | 6 | | | | | |
| 32 | | | 8 | | | | | |
| 33 | | | | | | 28' to 38.8': Light Gray Fine to Coarse SAND Little Limestone Fragments (FORT THOMPSON FORMATION SAND; SP / A-1-b) | | |
| 34 | S-10 | | 12 | 24 | | | | |
| 35 | | | 10 | | | | | |
| 36 | | | 14 | | | | | |
| 37 | | | 12 | | | | | |
| 38 | | | | | | 38.8' to 40': Orange-Brown Sandy LIMESTONE (FORT THOMPSON FORMATION LIMESTONE) | | |
| 39 | S-11 | | 6 | 14 | | | | |
| 40 | | | 6 | | | | | |
| 41 | | | 8 | | | | | |
| 42 | | | 10 | | | | | |
| 43 | | | | | | | | |
| 44 | | | | | | | | |
| 45 | | | | | | | | |
| 46 | | | | | | | | |
| 47 | | | | | | | | |
| 48 | | | | | | | | |
| 49 | | | | | | | | |
| 50 | | | | | | | | |
| BLOWS/FT. | | DENSITY | BLOWS/FT. | | CONSISTENCY | SAMPLE IDENTIFICATION | | |
| 0-3 | | Very Loose | 0-1 | | Very Soft | - H - Hand Auger | | |
| 3-8 | | Loose | 1-3 | | Soft | - S - Split Spoon | | |
| 8-24 | | Medium Dense | 3-6 | | Medium Stiff | - T - Thin Wall Tube | | |
| 24-40 | | Dense | 6-12 | | Stiff | - U - Undisturbed Piston | | |
| > 40 | | Very Dense | 12-24 | | Very Stiff | - C - Diamond Core | | |
| | | | > 24 | | Hard | - W - Wash Sample | | |
| | | | | | | - FILL | | |
| | | | | | | - SAND | | |
| | | | | | | - ORGANIC SOILS / MUCK | | |
| | | | | | | - SILT | | |
| | | | | | | - CLAY | | |
| | | | | | | - LIMESTONE | | |
| | | | | | | - SANDSTONE | | |

APPENDIX "B"

Table 1 – Summary of Laboratory Test Results

Table 2 – Summary of Environmental Classification Test Results

Moisture Content Test Results

Material Passing No. 200 Sieve Test Results

Grain-Size Analysis Test Results and Curves

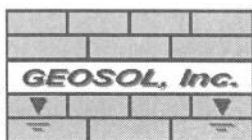
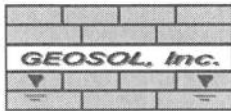


TABLE 1 - SUMMARY OF LABORATORY TEST RESULTS
MIAMI WOMEN'S CLUB SEAWALL & BAYWALK
MIAMI-DADE COUNTY, FLORIDA
GEOSOL PROJECT No.: 211172

| BORING NUMBER | SAMPLE NUMBER | USCS SYMBOL | AASHTO GROUP | Sample Depth (FEET) | Sieve Analysis (Percent Passing) | | | | | | | Atterberg Limits (%) | | | Organic Content (%) | Natural Moisture Content (%) | | |
|---------------|---------------|-------------|--------------|---------------------|----------------------------------|------|------|----|-----|-----|-----|----------------------|------|--------------|---------------------|------------------------------|---------------|------------------|
| | | | | | 1" | 3/4" | 3/8" | #4 | #10 | #40 | #60 | #100 | #200 | Liquid Limit | | | Plastic Limit | Plasticity Index |
| TB-1 | 3 | SP | A-3 | 4.0 - 6.0 | 100 | 100 | 99 | 97 | 96 | 86 | 51 | 9 | 2 | - | - | - | - | 24 |
| TB-1 | 6 | SP | A-3 | 13.0 - 15.0 | - | - | - | - | - | - | - | - | 5 | - | - | - | - | 22 |
| TB-3 | 5 | SP | A-3 | 8.0 - 10.0 | 100 | 100 | 92 | 89 | 87 | 67 | 33 | 7 | 2 | - | - | - | - | 21 |
| TB-2 | 4 | SM | A-2-4 | 6.0 - 8.0 | - | - | - | - | - | - | - | - | 29 | - | - | - | - | 38 |
| TB-2 | 9 | SP | A-1-b | 28.0 - 30.0 | 100 | 100 | 92 | 82 | 68 | 36 | 18 | 6 | 1 | - | - | - | - | 17 |



**TABLE 2 - SUMMARY OF ENVIRONMENTAL CLASSIFICATION TEST RESULTS
 MIAMI WOMEN'S CLUB SEAWALL & BAYWALK
 MIAMI-DADE COUNTY, FLORIDA
 GEOSOL PROJECT No. 211172**

| Sample Location | Sample Type | Depth (ft) | pH | Resistivity (ohm-cm) | Chloride (ppm) | Sulfate (ppm) | FDOT ENVIRONMENTAL CLASSIFICATION | |
|-----------------|-------------|------------|-----|----------------------|----------------|---------------|-----------------------------------|----------|
| | | | | | | | Steel | Concrete |
| TB-2 | Water | 3.5 | 7.9 | 68 | 5,100 | 678 | EA | EA |

NOTES: (1) The following FDOT laboratory test methods were utilized.

FM5-550: pH FM5-552: Chlorides
 FM5-551: Resistivity FM5-553: Sulfates

- (2) SA: SLIGHTLY AGGRESSIVE
- (3) MA: MODERATELY AGGRESSIVE
- (4) EA: EXTREMELY AGGRESSIVE

FDOT Criteria for Substructure Environmental Classification (FDOT Structures Design Guidelines 2011)

| Classification | Environmental Condition | Units | Steel | | Concrete | |
|-------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|--------|--------|------|----------|--------|
| | | | Water | Soil | Water | Soil |
| Extremely Aggressive (If any of these conditions exist) | pH | | < 6.0 | | < 5.0 | |
| | Cl | ppm | > 2000 | | > 2000 | |
| | SO ₄ | ppm | N.A. | | > 1500 | > 2000 |
| | Resistivity | Ohm-cm | < 1000 | | < 500 | |
| Slightly Aggressive (If all of these conditions exist) | pH | | > 7.0 | | > 6.0 | |
| | Cl | ppm | < 500 | | < 500 | |
| | SO ₄ | ppm | N.A. | | < 150 | < 1000 |
| | Resistivity | Ohm-cm | > 5000 | | > 3000 | |
| Moderately Aggressive | This classification must be used at all sites not meeting requirements for either slightly aggressive or extremely aggressive environments. | | | | | |
| pH = acidity (-log ₁₀ H ⁺ ; potential of Hydrogen), Cl = chloride content, SO ₄ = Sulfate content. | | | | | | |

MOISTURE CONTENT TEST RESULTS (ASTM D-2216)

PROJECT NAME: MIAMI WOMEN'S CLUB SEAWALL & BAYWALK
LOCATION: MIAMI-DADE COUNTY, FL
PROJECT No.: 211172
DATE: 1/10/2012

| | | | | | |
|----------------------------|-------|-------|-------|-------|-------|
| Boring No. | TB-3 | TB-2 | TB-2 | TB-1 | TB-1 |
| Sample No. | 5 | 9 | 4 | 6 | 3 |
| Sample Depth (Feet) | 8-10 | 28-30 | 6-8 | 13-15 | 4-6 |
| Tare No. | 5 | 504 | 20 | 25 | 24 |
| Tare plus wet soil (grams) | 381.5 | 373.5 | 343.5 | 354.5 | 441.5 |
| Tare plus dry soil (grams) | 318.0 | 322.0 | 251.5 | 292.0 | 357.0 |
| Water W_w (grams) | 63.5 | 51.5 | 92.0 | 62.5 | 84.5 |
| Tare (grams) | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 |
| Dry soil W_s (grams) | 309.0 | 313.0 | 242.5 | 283.0 | 348.0 |
| Water Content w (%) | 20.6 | 16.5 | 37.9 | 22.1 | 24.3 |

MATERIAL PASSING THE # 200 SIEVE TEST RESULTS (AASHTO T-11)

PROJECT NAME: MIAMI WOMEN'S CLUB SEAWALL & BAYWALK
LOCATION: MIAMI-DADE COUNTY, FL
PROJECT No.: 211172
DATE: 1/10/2012

| | | |
|------------------------------------------|-------|-------|
| Boring No. | TB-2 | TB-1 |
| Sample No. | 4 | 6 |
| Sample Depth (Feet) | 6-8 | 13-15 |
| Original Dry Weight of Soil (grams) | 242.5 | 283 |
| Weight of Soil After Washing (grams) | 173.0 | 269.5 |
| Weight of Soil Passing 200 Sieve (grams) | 69.5 | 13.5 |
| Percent of Soil Passing 200 Sieve (%) | 28.7 | 4.8 |

Note: The percent passing the No. 200 sieve results presented above were determined using the wash method.

GRAIN SIZE DATA SHEET

DATE: 1/10/2012

PROJECT NAME: **MIAMI WOMEN'S CLUB SEAWALL & BAYWALK**
 GEOSOL PROJECT No. **211172**
 GENERAL LOCATION: **MIAMI-DADE, FLORIDA**

Boring No. **TB-3**
 Sample No. **5**
 Depth (feet) **8-10**

SOIL DESCRIPTION: **Brown Fine to Medium SAND with Little Limerock Fragments (FILL; SP / A-3)**

| | | | | Tare # | Dry Wt. - Tare Wt. | | |
|------------|-------------|----------------------------|------------|-----------|------------------------------|----------------------------|--|
| | | | | 5 | 309.0 | | |
| Sieve Size | Sieve Sizes | Cumulative Wt. Retained | % RETAINED | % PASSING | % PASSING TOTAL SAMPLE | WEIGHT RETAINED (Grams) | |
| 75 | 75mm 3" | 0.0 | 0.0 | 100 | 100 | 0.0 | |
| 50 | 50mm 2" | 0.0 | 0.0 | 100 | 100 | 0.0 | |
| 37.5 | 37.5mm 1.5" | 0.0 | 0.0 | 100.0 | 100.0 | 0.0 | |
| 25 | 25mm 1" | 0.0 | 0.0 | 100.0 | 100.0 | 0.0 | |
| 19 | 19mm 3/4" | 0.0 | 0.0 | 100.0 | 100.0 | 0.0 | |
| 9.5 | 9.5mm 3/8" | 24.5 | 7.9 | 92.1 | 92.1 | 24.5 | |
| 4.75 | 4.75mm #4 | 33.5 | 10.8 | 89.2 | 89.2 | 9.0 | |
| 2.36 | 2 mm #10 | 41.0 | 13.3 | 86.7 | 86.7 | 7.5 | |
| 0.6 | 425um #40 | 102.0 | 33.0 | 67.0 | 67.0 | 61.0 | |
| 0.3 | 250um #60 | 208.5 | 67.5 | 32.5 | 32.5 | 106.5 | |
| 0.15 | 150um #100 | 287.0 | 92.9 | 7.1 | 7.1 | 78.5 | |
| 0.075 | 75um #200 | 302.5 | 97.9 | 2.1 | 2.1 | 15.5 | |
| PAN | - | 309.0 | 100.0 | 0.0 | 0.0 | 6.5 | |

NOTES:

ASTM D 2487 Classification of Soil for Engineering Purposes

| | |
|---------------|-----------------|
| Coarse Gravel | < 3" and > 3/4" |
| Fine Gravel | < 3/4" and > #4 |

| | |
|-------------|------------------|
| Coarse Sand | < #4 and > #10 |
| Medium Sand | < #10 and > #40 |
| Fine Sand | < #40 and > #200 |

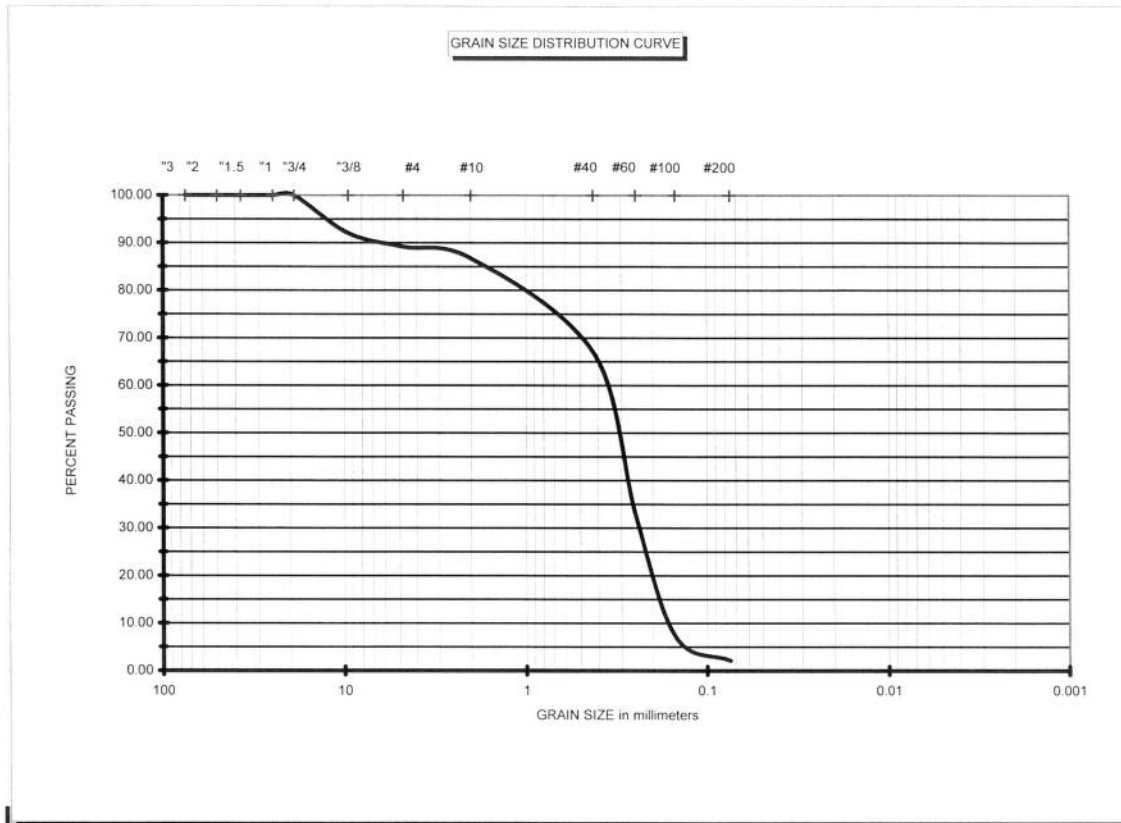
Cu = D60 / D10
 Cc = (D30)² / (D10 x D60)
 1000 um = 1 mm

tested by: O. Riccobono computed by: O. Riccobono checked by: D.R.

GRAIN SIZE DATA SHEET

DATE: 1/10/2012

PROJECT NAME: **MIAMI WOMEN'S CLUB SEAWALL & BAYWALK**
 GEOSOL PROJECT No. **211172**
 GENERAL LOCATION: **MIAMI-DADE, FLORIDA**



| | | | | |
|-------------------------------------------------------------|-----------------|-------------|------------------|---------------------------------------------|
| ASTM D 2487 Classification of Soil for Engineering Purposes | | Coarse Sand | < #4 and > #10 | $C_u = D_{60} / D_{10}$ |
| Coarse Gravel | < 3" and > 3/4" | Medium Sand | < #10 and > #40 | $C_c = (D_{30})^2 / (D_{10} \times D_{60})$ |
| Fine Gravel | < 3/4" and > #4 | Fine Sand | < #40 and > #200 | |

BORING # TB-3 SAMPLE # 5 Depth (feet) 8-10

SOIL DESCRIPTION: **Brown Fine to Medium SAND with Little Limerock Fragments (FILL; SP / A-3)**

Natural Moisture Content: **20.6%**

GRAIN SIZE DATA SHEET

DATE: 1/10/2012

PROJECT NAME: **MIAMI WOMEN'S CLUB SEAWALL & BAYWALK**
 GEOSOL PROJECT No. **211172**
 GENERAL LOCATION: **MIAMI-DADE, FLORIDA**

Boring No. **TB-2**
 Sample No. **9**
 Depth (feet) **28-30**

SOIL DESCRIPTION: Light Gray Fine to Coarse SAND with Little Limestone Fragments
 (FORT THOMPSON FORMATION SAND; SP / A-1-b)

| Tare # | Dry Wt. - Tare Wt. |
|--------|-----------------------|
| 504 | 313.0 |
| | |

| Sieve Size | Sieve Sizes | Cumulative Wt. Retained | % RETAINED | % PASSING | % PASSING TOTAL SAMPLE | WEIGHT RETAINED (Grams) |
|------------|-------------|----------------------------|------------|-----------|------------------------------|----------------------------|
| 75 | 75mm 3" | 0.0 | 0.0 | 100 | 100 | 0.0 |
| 50 | 50mm 2" | 0.0 | 0.0 | 100 | 100 | 0.0 |
| 37.5 | 37.5mm 1.5" | 0.0 | 0.0 | 100.0 | 100.0 | 0.0 |
| 25 | 25mm 1" | 0.0 | 0.0 | 100.0 | 100.0 | 0.0 |
| 19 | 19mm 3/4" | 0.0 | 0.0 | 100.0 | 100.0 | 0.0 |
| 9.5 | 9.5mm 3/8" | 24.0 | 7.7 | 92.3 | 92.3 | 24.0 |
| 4.75 | 4.75mm #4 | 57.5 | 18.4 | 81.6 | 81.6 | 33.5 |
| 2.36 | 2 mm #10 | 99.5 | 31.8 | 68.2 | 68.2 | 42.0 |
| 0.6 | 425um #40 | 202.0 | 64.5 | 35.5 | 35.5 | 102.5 |
| 0.3 | 250um #60 | 256.5 | 81.9 | 18.1 | 18.1 | 54.5 |
| 0.15 | 150um #100 | 293.5 | 93.8 | 6.2 | 6.2 | 37.0 |
| 0.075 | 75um #200 | 309.5 | 98.9 | 1.1 | 1.1 | 16.0 |
| PAN | - | 313.0 | 100.0 | 0.0 | 0.0 | 3.5 |

NOTES:

ASTM D 2487 Classification of Soil for Engineering Purposes

| | |
|---------------|-----------------|
| Coarse Gravel | < 3" and > 3/4" |
| Fine Gravel | < 3/4" and > #4 |

| | |
|-------------|------------------|
| Coarse Sand | < #4 and > #10 |
| Medium Sand | < #10 and > #40 |
| Fine Sand | < #40 and > #200 |

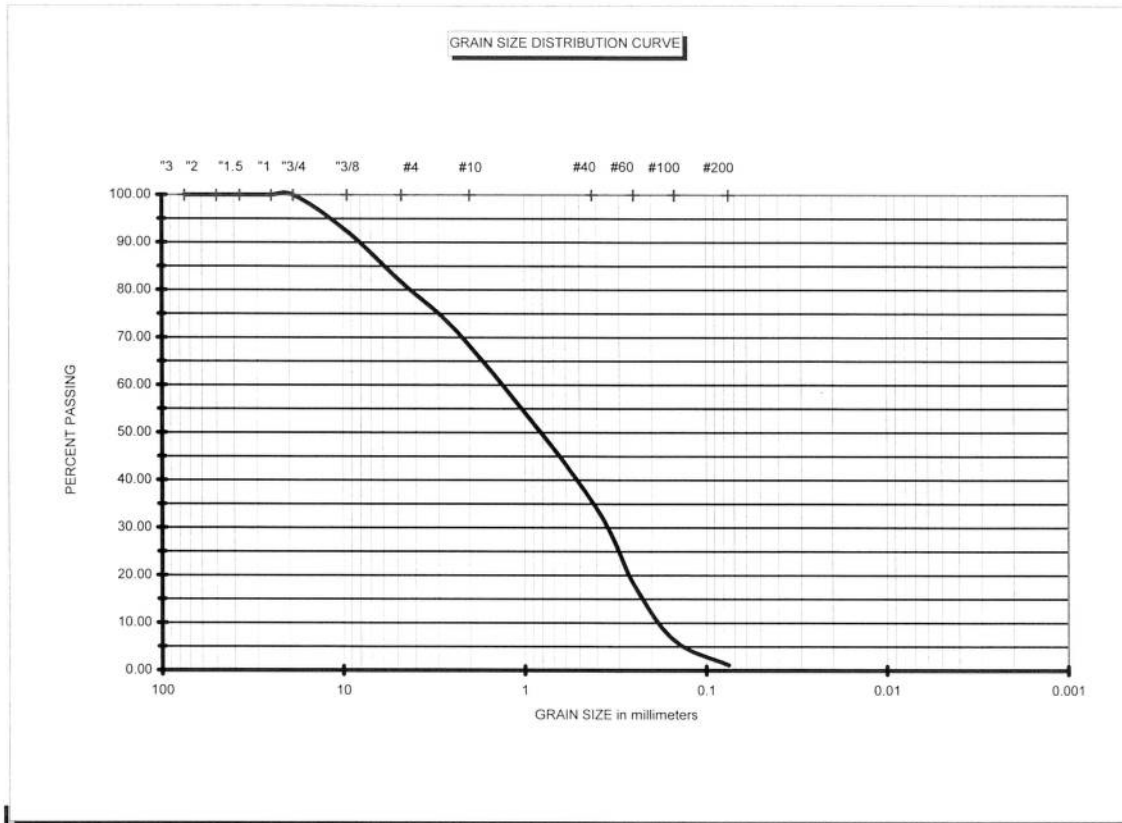
Cu = D60 / D10
 Cc = (D30)² / (D10 x D60)
 1000 um = 1 mm

tested by: O. Riccobono computed by: O. Riccobono checked by: D.R.

GRAIN SIZE DATA SHEET

DATE: 1/10/2012

PROJECT NAME: **MIAMI WOMEN'S CLUB SEAWALL & BAYWALK**
 GEOSOL PROJECT No. **211172**
 GENERAL LOCATION: **MIAMI-DADE, FLORIDA**



| | | | | |
|-------------------------------------------------------------|-----------------|-------------|------------------|---------------------------------------------|
| ASTM D 2487 Classification of Soil for Engineering Purposes | | Coarse Sand | < #4 and > #10 | $C_u = D_{60} / D_{10}$ |
| Coarse Gravel | < 3" and > 3/4" | Medium Sand | < #10 and > #40 | $C_c = (D_{30})^2 / (D_{10} \times D_{60})$ |
| Fine Gravel | < 3/4" and > #4 | Fine Sand | < #40 and > #200 | |

BORING # TB-2 SAMPLE # 9 Depth (feet) 28-30

SOIL DESCRIPTION: **Light Gray Fine to Coarse SAND with Little Limestone Fragments**

Natural Moisture Content: **16.5%**

GRAIN SIZE DATA SHEET

DATE: 1/10/2012

PROJECT NAME: **MIAMI WOMEN'S CLUB SEAWALL & BAYWALK**
 GEOSOL PROJECT No. **211172**
 GENERAL LOCATION: **MIAMI-DADE, FLORIDA**

Boring No. **TB-1**
 Sample No. **3**
 Depth (feet) **4-6**

SOIL DESCRIPTION: Brown to Light Gray Fine to Medium SAND with Trace of Limerock Fragments (FILL; SP / A-3)

| Tare # | Dry Wt. - Tare Wt. |
|--------|-----------------------|
| 24 | 348.0 |
| | |

| Sieve Size | Sieve Sizes | Cumulative Wt. Retained | % RETAINED | % PASSING | % PASSING TOTAL SAMPLE | WEIGHT RETAINED (Grams) |
|------------|-------------|----------------------------|------------|-----------|------------------------------|----------------------------|
| 75 | 75mm 3" | 0.0 | 0.0 | 100 | 100 | 0.0 |
| 50 | 50mm 2" | 0.0 | 0.0 | 100 | 100 | 0.0 |
| 37.5 | 37.5mm 1.5" | 0.0 | 0.0 | 100.0 | 100.0 | 0.0 |
| 25 | 25mm 1" | 0.0 | 0.0 | 100.0 | 100.0 | 0.0 |
| 19 | 19mm 3/4" | 0.0 | 0.0 | 100.0 | 100.0 | 0.0 |
| 9.5 | 9.5mm 3/8" | 4.0 | 1.1 | 98.9 | 98.9 | 4.0 |
| 4.75 | 4.75mm #4 | 11.0 | 3.2 | 96.8 | 96.8 | 7.0 |
| 2.36 | 2 mm #10 | 14.5 | 4.2 | 95.8 | 95.8 | 3.5 |
| 0.6 | 425um #40 | 49.5 | 14.2 | 85.8 | 85.8 | 35.0 |
| 0.3 | 250um #60 | 171.0 | 49.1 | 50.9 | 50.9 | 121.5 |
| 0.15 | 150um #100 | 318.0 | 91.4 | 8.6 | 8.6 | 147.0 |
| 0.075 | 75um #200 | 340.0 | 97.7 | 2.3 | 2.3 | 22.0 |
| PAN | - | 348.0 | 100.0 | 0.0 | 0.0 | 8.0 |

NOTES:

ASTM D 2487 Classification of Soil for Engineering Purposes

| | |
|---------------|-----------------|
| Coarse Gravel | < 3" and > 3/4" |
| Fine Gravel | < 3/4" and > #4 |

| | |
|-------------|------------------|
| Coarse Sand | < #4 and > #10 |
| Medium Sand | < #10 and > #40 |
| Fine Sand | < #40 and > #200 |

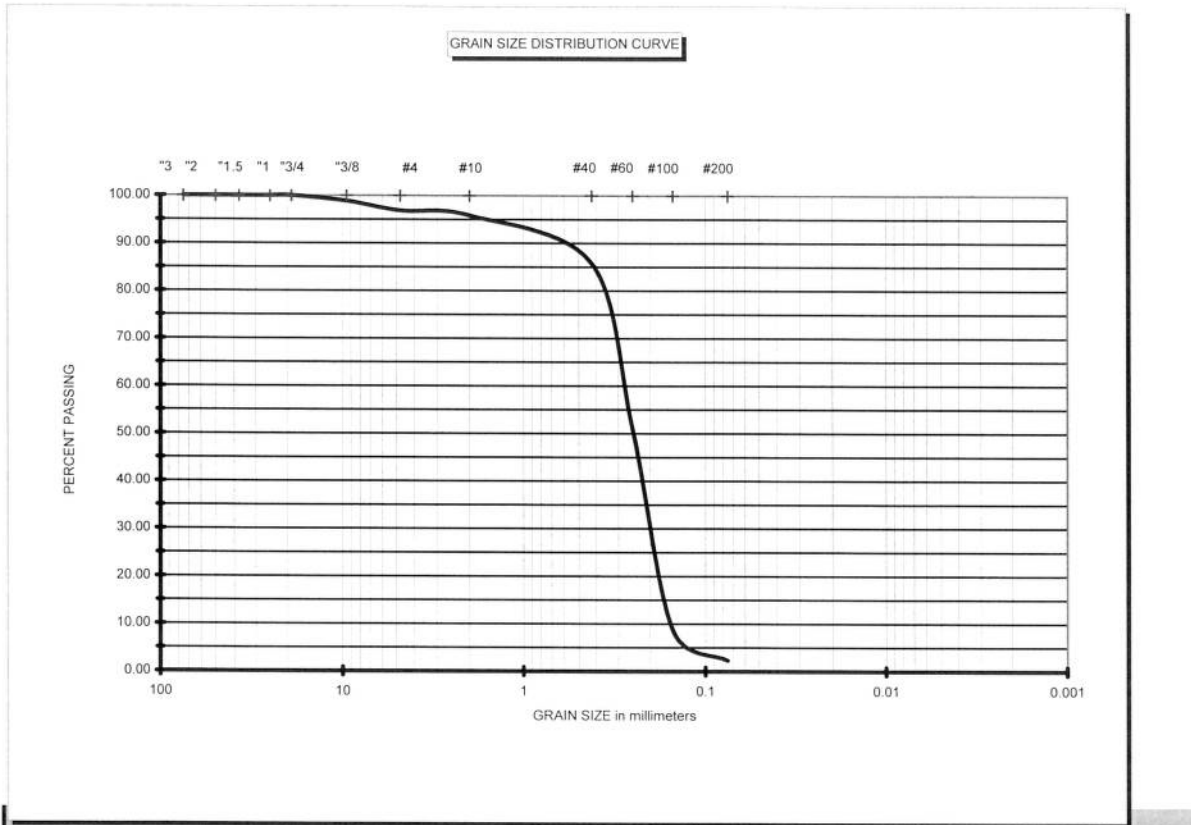
Cu = D60 / D10
 Cc = (D30)² / (D10 x D60)
 1000 um = 1 mm

tested by: O. Riccobono computed by: O. Riccobono checked by: D.R.

GRAIN SIZE DATA SHEET

DATE: 1/10/2012

PROJECT NAME: MIAMI WOMEN'S CLUB SEAWALL & BAYWALK
GEOSOL PROJECT No. 211172
GENERAL LOCATION: MIAMI-DADE, FLORIDA



| | | | | |
|-------------------------------------------------------------|-----------------|-------------|------------------|---------------------------------------------|
| ASTM D 2487 Classification of Soil for Engineering Purposes | | Coarse Sand | < #4 and > #10 | $C_u = D_{60} / D_{10}$ |
| Coarse Gravel | < 3" and > 3/4" | Medium Sand | < #10 and > #40 | $C_c = (D_{30})^2 / (D_{10} \times D_{60})$ |
| Fine Gravel | < 3/4" and > #4 | Fine Sand | < #40 and > #200 | |

BORING # TB-1 SAMPLE # 3 Depth (feet) 4-6

SOIL DESCRIPTION: Brown to Light Gray Fine to Medium SAND with Trace of Limerock Fragments (FILL; SP / A-3)

Natural Moisture Content: 24.3%



ANALYTICAL RESULTS

Project: Miami Women's Club Seawall & Baywalk
 Pace Project No.: 3546534

Sample: TB-2 **Lab ID: 3546534001** Collected: 12/28/11 14:00 Received: 12/30/11 16:25 Matrix: Water

| Parameters | Results | Units | PQL | MDL | DF | Prepared | Analyzed | CAS No. | Qual |
|---------------------------------|------------------------------------------|------------|------|------|-----|----------|----------------|------------|------|
| 4500H+ pH, Electrometric | Analytical Method: SM 4500-H+B | | | | | | | | |
| pH at 25 Degrees C | 7.9 | Std. Units | 0.10 | 0.10 | 1 | | 01/04/12 14:25 | | Q |
| Resistivity | Analytical Method: EPA 120.1 Resistivity | | | | | | | | |
| Resistivity | 68.0 | ohms-cm | | | 1 | | 01/03/12 16:00 | | |
| 300.0 IC Anions 28 Days | Analytical Method: EPA 300.0 | | | | | | | | |
| Chloride | 5100 | mg/L | 500 | 250 | 100 | | 01/06/12 02:23 | 16887-00-6 | |
| Sulfate | 678 | mg/L | 100 | 50.0 | 20 | | 12/31/11 12:18 | 14808-79-8 | M6 |