TIERRA
GEOTECHNICAL • MATERIALS
ENGINEERING

April 15, 2008

Astorino
11770 US Highway One
Suite 205
Palm Beach Gardens, FL 33408

Attention: Mr. Jimmy Centanni

Re: Geotechnical Engineering Study
Roberto Clemente Park-Recreational Building
Miami, Florida
TIERRA Project No. 6611-08-012

Dear Jimmy:

TIERRA, Inc. is pleased to submit our Geotechnical Engineering Study Report for the referenced project. The purpose of this study was to investigate the subsurface conditions at the site, evaluate, provide foundation recommendations, and perform a Bore Hole Permeability (BHP) test. This report presents the subsurface condition encountered, foundation recommendations, and the result of the permeability test.

PROJECT INFORMATION

Based on the information provided to this office, we understand that a new 8,000 square feet building is planned within the Robert Clemente Park in Miami, Florida. The one-story structure will have shallow footings, slab-on-grade, masonry walls, bond and tie beams for the walls, and metal roof deck. Structural loading information has not been provided at this time.

SUBSURFACE CONDITIONS

Subsurface conditions at the site were explored with three (3) Standard Penetration Test (SPT) borings drilled to a depth of 20 feet below the existing grade and located as shown on the attached Sheet 1.

In general, the soil test borings encountered soft to medium hard limestone below the upper 2 to 6 feet of sand and limerock fill.

Groundwater levels were measured in the borings when first encountered. The groundwater was encountered between about 11 and 12 feet below the ground surface. Groundwater levels are expected to fluctuate with seasonal fluctuations. We expect the groundwater to, typically, fluctuate within about 2 ft from where it was encountered during the drilling operation.

The above subsurface description is of a generalized nature to highlight the major subsurface stratification features and material characteristics. The soil boring profiles should be reviewed for specific information at individual boring locations. These records include soil descriptions, stratifications, and Standard Penetration resistances. The stratifications shown on the soil profiles represent the conditions only at the actual boring location. Variations may occur and should be expected at other locations.

The stratifications represent the approximate boundary between subsurface materials and the actual transition may be gradual. Samples collected for classification and laboratory testing will be retained for 30 days from the date of this report and then will be discarded.

BORE HOLE PERMEABILITY TEST RESULT

One (1) BHP test was performed using the usual open-hole, constant head methodology. The hole was 15 feet deep, and was drilled with a 6-inch diameter solid stem auger so that soil samples could be retrieved for visual classification by an engineer. The borings were completed as open well with gravel pack (6-20 silica sand). The well screen slot widths were 0.020 inches. Water from the drill rig tank was then pumped into the open well, and the amount of water required maintaining constant head was recorded.

The result of our field permeability test is presented below:

LOCATION	DEPTH (feet)	SOIL DESCRIPTION	HYDRAULIC CONDUCTIVITY (cfs/ft^2 per foot of Head Induced)
BHP-1	0 – 2	Sand and limerock (FILL)	1.17×10^{-4}
	2 - 15	Tan Limestone	

Groundwater Depth: 11.5 feet below existing grade

EVALUATION AND RECOMMENDATIONS

The geotechnical study completed for the proposed development confirms that the site is suitable for the planned construction when viewed from a soil mechanics and foundation engineering perspective. Subsurface conditions at the site are not expected to impose any major geotechnical constraints or limitations on the proposed construction. The structure may be supported on shallow spread foundations and employ conventional slab-on-grade for the ground floor.

Recommendations for the geotechnical aspects of site preparation, foundation design and related construction are presented in the following sections of this report.

Site Preparation

After removal of the topsoil (if any) to the suitable sand and limerock fill or limestone stratum, the footprint of the proposed structure should be proofrolled with a heavy vibratory roller such as an Ingersoll-Rand SD100D or equivalent in the presence of Tierra personnel to ensure any loose fill is compacted. The proofrolling operation should encompass the entire footprint of the structure plus a 5-foot wide perimeter that extends beyond the maximum lines of the superstructure.

Structural fill used to raise the sites to structure bottom levels should consist of clean sand and/or sand and gravel (ASTM D 2487), with a maximum of 12 percent passing the U.S. Standard No. 200 sieve. The structural fill should be placed in 12-inch thick loose lifts, near the optimum moisture content for compaction, and be compacted to at least 95 percent of maximum dry density (ASTM D 1557).

Following site preparation as discussed herein, the foundation areas should be excavated and the footings earth formed and poured in-the-dry. Footing excavations in the rock should be made with an excavator or backhoe with a welded plate. The welded plate will enable in a relatively smooth excavation and minimize over-excavation of the limestone. Prior to placing the steel for the footings, the footing subgrade should be probed by a Tierra representative.

If structural fill is required to achieve design grade, each lift of compacted engineered fill should be tested by a representative of Tierra prior to placement of subsequent lifts. The edges of compacted fill should extend 5 feet beyond the edges of building prior to sloping.

Foundation Recommendation

The recreation building can be supported on footings bearing directly on the limestone stratum with an allowable bearing pressure of 3,500 pounds per square foot (psf). Footings should bottom at least 24 inches below final grade. Footings supporting individual columns should have a minimum width of 36 inches and continuous footings a minimum width of 24 inches, even if the geometry produces a bearing pressure less than the allowable.

Settlement of foundations based in the in-situ granular soils and/or engineered fill will occur as an elastic response of the soils to the building loads applied. For foundations that are based on soils prepared as discussed herein, we estimate that total and differential foundation settlements should be less than 1 inch and ½ inch, respectively. In our opinion, these settlements are within the range considered tolerable for the type of structure planned. Because the subsoils at the site are granular in nature, settlement should occur as the loads are applied to foundations and should essentially be complete by the time the building construction is finished.

The foundation excavations should be observed by a representative of Tierra prior to steel or concrete placement to assess that the foundation materials are capable of supporting the design loads and are consistent with the materials discussed in this report. Loose soil zones encountered at the bottom of the footing excavations should be removed to the competent limestone stratum as directed by the Tierra's representative. Cavities formed as a result of excavation of loose soil zones should be backfilled with lean concrete or dense graded compacted crushed stone.

Floor Slab Recommendations

Following stripping and surface soil preparation as described herein, the building pad areas should be leveled and filled to subfloor elevation before placing concrete. Our experience indicates that floor slabs constructed without a vapor barrier will often experience future problems associated with moisture and mildew. Therefore, we recommend interior floor slab subgrade soils be covered with a vapor barrier (such as visqueen, normally 6 mil thick) before constructing the slab-on-grade floor.

After following proper site preparation procedures as described above, slab-on-grade construction may be used for the ground floor slabs, walkways, and driveways. The slabs should be adequately reinforced to carry the loads that are to be applied. The ground floor slab design, if based on elastic methods, should employ a modulus of subgrade reaction of 200 pounds per cubic inch (pci). To help avoid potential problems with cracking because of differential loadings, the floor slabs should be liberally jointed and separated from columns and walls.

The friction factor between the soil and floor slabs should be taken as 0.35 without the vapor barrier. A friction factor of 0.21 should be used for the vapor barrier-soil interface.

CONSTRUCTION CONSIDERATIONS

It is recommended that TIERRA be retained to provide observation and testing of construction activities involved in the foundation, earthwork, and related activities of this project. TIERRA cannot accept any responsibility for any conditions that deviate from those described in this report, nor for the performance of the foundation if not engaged to also provide construction observation and testing for this project.

Excavations

Subsoils found at the site consist primarily of sand and limerock fill or limestone. Above normal excavation efforts should be expected to excavate the limestone or fill.

In Federal Register, Volume 54, No. 209 (October 1989), the United States Department of Labor, Occupational Safety and Health Administration (OSHA) amended its "Construction Standards for Excavations, 29 CFR, part 1926, Subpart P." This document was issued to better ensure the safety of workmen entering trenches or excavations. It is mandated by this federal regulation that excavations, whether they be utility trenches, basement excavations or footing excavations, be constructed in accordance with the new OSHA guidelines. It is our understanding that these regulations are being strictly enforced and if they are not closely adhered, the owner and the contractor could be liable for substantial penalties.

The contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottoms. The contractor's "responsible person", as defined in 29 CFR Part 1926, should evaluate the soil exposed in the excavations as part of the contractor's safety

procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations.

We are providing this information solely as a service to our client. TIERRA does not assume responsibility for construction site safety or the contractor's or other parties' compliance with local, state, and federal safety or other regulations.

REPORT LIMITATIONS

The recommendations submitted are based on the available subsurface information obtained by TIERRA. If deviations from the subsurface conditions noted in this report are encountered during construction, TIERRA should be notified immediately to determine if changes in the preliminary foundation recommendations are required. If TIERRA is not retained to perform these functions, TIERRA 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 generally accepted professional geotechnical engineering practices in the local area. No other warranties are implied or expressed.

After the plans and specifications are more complete, the geotechnical engineer should be retained and provided the opportunity to review the final design plans and specifications to check that our engineering recommendations have been properly incorporated into the design documents.

This geotechnical report has been prepared for the exclusive use of Astorino, for the specific application to the Recreation building at the Roberto Clemente Park in Miami, Florida.

CLOSURE

We appreciate the opportunity to perform this Geotechnical Study and look forward to continued participation during the design and construction phase of this project. If you have any questions pertaining to this report, or if we may be of further service, please contact our office.

Respectfully submitted,

TIERRA, INC.

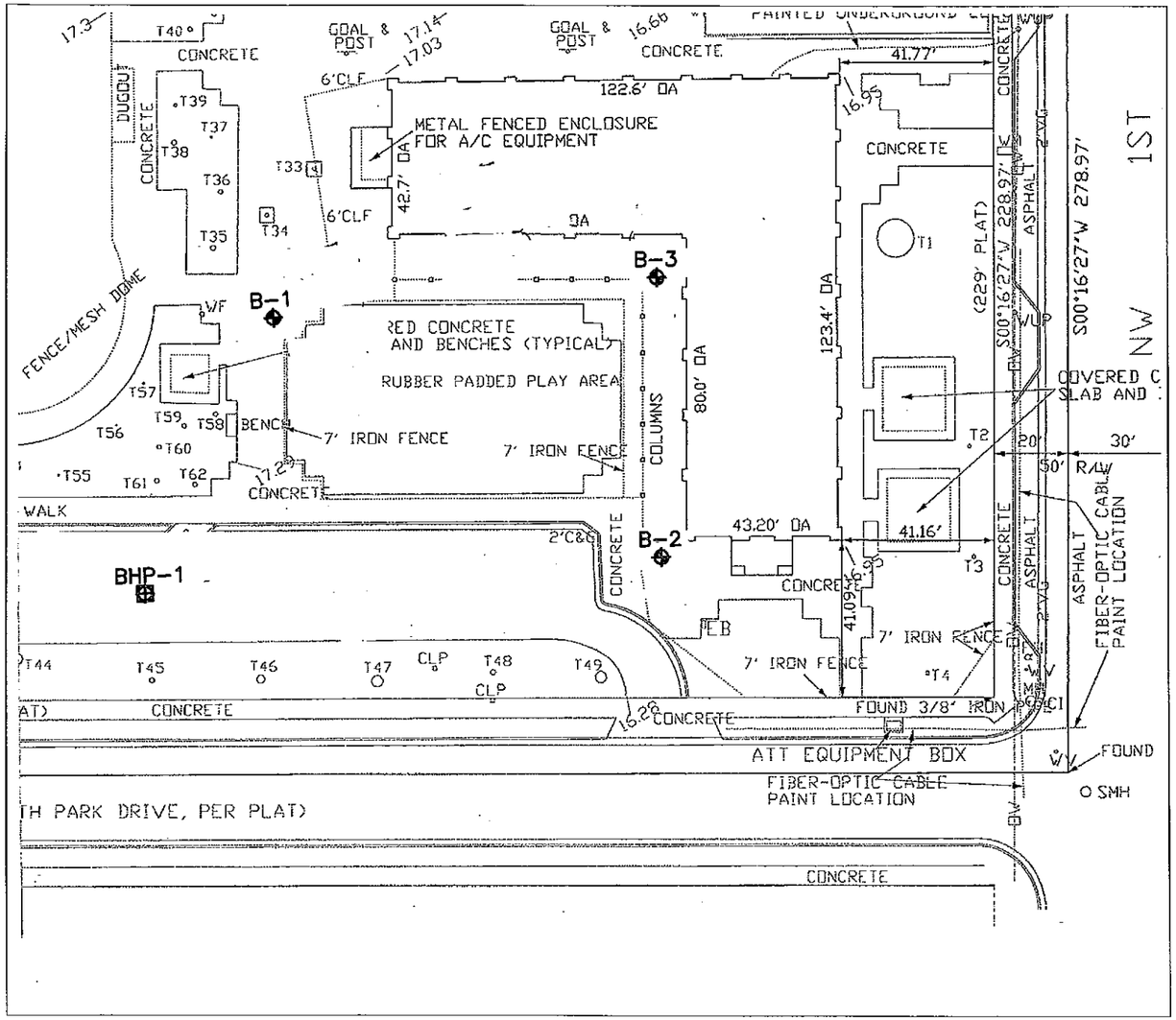
Raj Krishnasamy, P.E.
Vice President
FL. Registration No. 53567

4/15/08

Ramakumar V. Vedula, P.E.
Principal Engineer

Attachments: Sheet 1

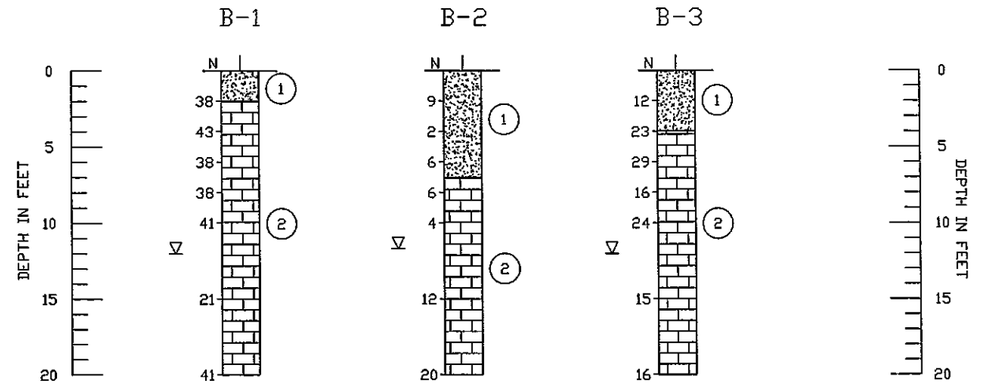
J:\Tierra Documents\Projects\2008 Projects\6611-08-012.Roberto Clemente Park (Astorino)\6611-08-012.Roberto Clemente Park Recreaction Building_rpt.doc



SPT BORINGS APPROXIMATE LOCATIONS

BOREHOLE PERMEABILITY TEST APPROXIMATE LOCATIONS

BORING LOCATION PLAN



LEGEND

1. TAN SAND WITH VARYING MIX OF LIMEROCK (FILL)
2. LIGHT BROWN LIMESTONE

▽ GROUNDWATER TABLE

N SPT N-VALUE IN BLOWS/FOOT FOR 12 INCHES OF PENETRATION (UNLESS OTHERWISE NOTED)

SP UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D 2488) GROUP SYMBOL AS DETERMINED BY VISUAL REVIEW

SOIL PROFILES

DRAWN BY: JO CHECKED BY: RK	APPROVED BY: RK DATE: 04/08	ENGINEER OF RECORD: RAJ KRISHNASAMY, P.E. FLORIDA LICENSE NO.: 53567	TIERRA 2765 Vista Parkway Suite 10 West Palm Beach, Florida 33411 Phone: 561-687-8536 Fax: 561-687-8570 FL Cert. No.: 6486	SCALE: NOTED	PROJECT NUMBER: 6611-08-012	GEOTECHNICAL ENGINEERING SERVICES ROBERTO CLEMENTE PARK RECREATIONAL BUILDING MIAMI-DADE, FLORIDA	SHEET 1