tierra
SOUTH FLORIDA
GEOTECHNICAL ENGINEERING MATERIAL TESTING INSPECTION SERVICES

March 26, 2009

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

Attention: Mr. Jose Baella, Associate AIA, Project Manager

Re: Geotechnical Engineering Study
Proposed Williams Park Community Center
City of Miami, Florida
TSF Project No. 7111-09-056

Dear Jose:

TIERRA SOUTH FLORIDA, Inc. (TSF) is pleased to submit our Geotechnical Engineering Study Report for the referenced project. This report includes the results of field testing, recommendations for foundation design, as well as general site development.

EXECUTIVE SUMMARY

An exploration and evaluation of the subsurface conditions have been completed for the proposed Williams Park Community Center to be constructed in the City of Miami, Florida. In general, the subsurface conditions consisted of sandy (fill) followed by sandy limestone extending to the boring termination depth. The results of this exploration indicate that the subsurface conditions at the site are generally suitable for the use of shallow foundations for support of the proposed building. A moderate amount of site preparation will be required to increase shear strength and reduce foundation and floor slab settlements to acceptable levels. The floor slab can be grade-supported.

It should be noted that small concrete fragments were noted within the fill. It should be noted that debris can be encountered during footing excavations. If encountered, the unsuitable material should be removed and replaced with properly compacted fill under the supervision of geotechnical engineer. Details related to site development, foundation design, and construction considerations are included in subsequent sections of this report.

It is our opinion that the foundation soils, plus a minimum of five feet, are suitable to support the planned addition on shallow foundations proportioned for a net bearing pressure of 3,000 pounds per square foot (psf) or less. The owner/designer should not rely solely on this Executive Summary and must read and evaluate the entire contents of this report prior to utilizing our engineering recommendations.

PROJECT INFORMATION

Based on the information provided to this office, we understand that a new 4,336 square feet building is planned within the Williams Park in Miami, Florida. The one-story structure will be supported on shallow foundations, 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; however, for this type of structure we have assumed column and wall loads in the order of 100 kips and 2.5 kips per linear feet, respectively.

The site is currently occupied by a playground, one-story CBS building and concrete sidewalks/pavers.

SUBSURFACE CONDITIONS

Subsurface conditions at the site were explored with four (4) Standard Penetration Test (SPT) borings drilled to a depth of 15 feet below the existing grade, plus a Borehole Permeability (BHP) test to a depth of 15 feet below grade in asphalt parking lot area. Approximate boring locations are shown on the attached Sheet 1.

In general, the soil test borings encountered 2± feet of sand with limerock fragments (fill) followed by sand and/or sandy limestone to the boring termination depth. It should be noted that at boring location B-2, small concrete fragments were noted within the fill. It would be prudent that a few shallow test pits be excavated in the area to better determine the quality of the in-place fill.

Groundwater levels were measured in the boring when first encountered. The groundwater was encountered between about 9 and 10 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.

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

To prepare for construction, existing structures should be removed and backfilled with properly compacted fill as recommended in this report. Existing utilities should be identified and removed or re-routed as required. Underground pipes that cannot be removed should be pressure grouted. Any unsuitable material encountered during site preparation should be removed and replaced with properly compacted structural fill.

Following demolition of existing structures, removal of topsoil/vegetation (if any), 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 TSF personnel to ensure any loose fill is compacted. The proofrolling operation should encompass the entire footprint of the construction plus a 5-foot wide perimeter that extends beyond the maximum lines of the superstructure.

Near the existing building (within 50 feet), proofrolling should consist of compaction with a large diameter smooth drum roller operating in static mode. Ground vibrations induced by the compaction operations should be closely monitored to assess if there is a potential impact to the existing building.

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 inspected by a TSF representative. If the bottom of footing lies within the limerock fill, then the subgrade should be compacted to at least 95 percent of maximum dry density (ASTM D 1557).

If structural fill is required to achieve design grade, each lift of compacted engineered fill should be tested by a representative of TSF 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 building expansion/renovation, which we understand will be one story, can be supported on footings bearing directly on the limestone stratum with an allowable bearing pressure of 3,000 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 TSF 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 TSF'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 TSF be retained to provide observation and testing of construction activities involved in the foundation, earthwork, and related activities of this project. TSF 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.

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. TSF 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 TSF. If deviations from the subsurface conditions noted in this report are encountered during construction, TSF should be notified immediately to determine if changes in the preliminary foundation recommendations are required. If TSF is not retained to perform these functions, TSF 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 proposed Williams Park Community Center to be constructed in the City of 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 SOUTH FLORIDA, INC.

10/12/09

François Thomas, P.E.
Principal Engineer
FL. Registration No. 56381

Attachments: Boring location Plan/Soil Profiles-Sheet 1
SFWMD-Usual Open-Hole Test Evaluation

TIERRA
GEOTECHNICAL • MATERIALS ENGINEERING

USUAL OPEN - HOLE TEST EVALUATION
SOUTH FLORIDA WATER MANAGEMENT METHOD

Client:	ASTORINO	Test No.:	BHP-1	Date:	03/18/09
Project:	Williams Park Community Center	Well Depth:	15.0 feet	Analyst:	FT
Job No.:	7111-09-056	Location:	Asphalt Parking Lot		

Elapsed Time (min)		Flow Rate (gpm)
0	721.00	0.00
1	724.80	3.80
2	728.60	3.80
3	732.40	3.80
4	736.20	3.80
5	739.90	3.70
6	743.60	3.70
7	747.30	3.70
8	751.00	3.70
9	754.70	3.70
10	758.40	3.70
Constant Flow Rate (gpm)		3.70

Equation for K Value: 4Q

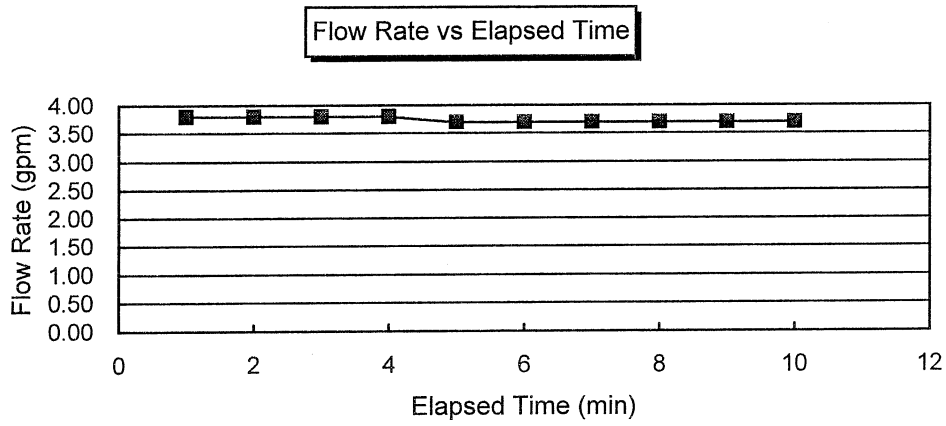
pi*d(2H2^2 + 4H2Ds + H2d)

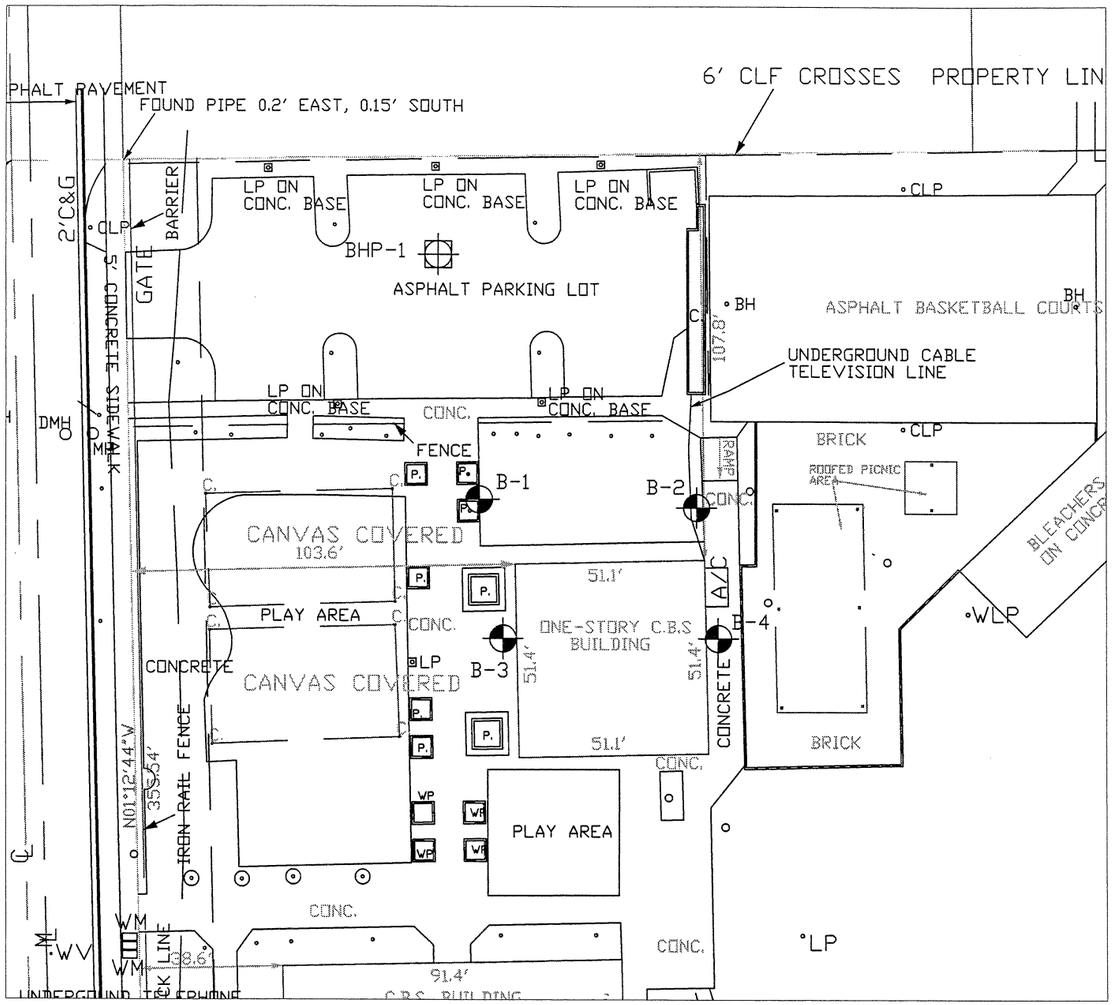
Soil profile BHP:

0 - 1 in	Asphalt
1 - 6 in	Sandy limerock
6 in - 15 ft	Tan sandy LIMESTONE

Where: k = **4.19E-04 cfs/ft^2 Hydraulic conductivity**

H2 = 9.00 ft Depth to water table

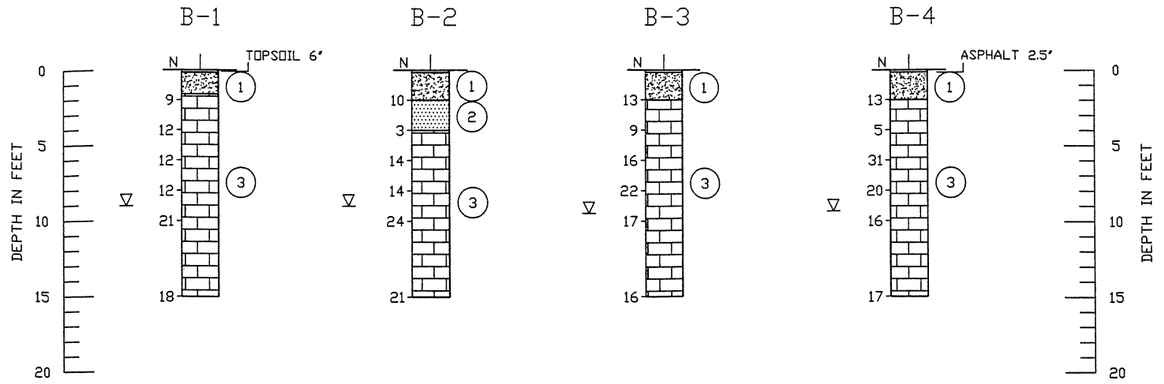




SPT BORINGS APPROXIMATE LOCATIONS

BOREHOLE PERMEABILITY TEST APPROXIMATE LOCATIONS

BORING LOCATION PLAN



LEGEND

(1) BROWN / LIGHT BROWN SAND WITH LIMEROCK FRAGMENTS (SP)(FILL)

(2) LIGHT BROWN TO BROWN SAND, OCASSIONALLY WITH ROOTS (SP)

(3) LIGHT BROWN TO LIGHT GRAY SANDY 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: MM CHECKED BY: RK	APPROVED BY: RK DATE: 03/23/2009	ENGINEER OF RECORD: RAJ KRISHNASAMY, P.E. FLORIDA LICENSE NO.: 53567	TIERRA SOUTH FLORIDA 2765 Vista Parkway Suite 9 West Palm Beach, Florida 33411 Phone: 561-687-8536 Fax: 561-687-8570 FL Cert. No.: 28073	SCALE: 1"=40'	PROJECT NUMBER: 7111-09-056	GEOTECHNICAL ENGINEERING SERVICES WILLIAMS PARK PROPOSED COMMUNITY CENTER MIAMI, FLORIDA	SHEET 1