Alpha Geotechnical and Testing Services, Inc.
Certificate of Authorization No. 00007967

Foundation Evaluations
Environmental Studies
Construction Materials Testing

March 21, 2008
File No. 08-1893

Mr. William S. Blizzard
4503 West Sylvan Ramble Street
Tampa, FL 33609

Subject: Subsurface Exploration and Foundation Evaluation for New Pile Supported Home, Lot 4, Block 1, Southern Dunes, Unit1, Bald Island, Florida

Dear Mr. Blizzard:

As authorized by you, Alpha Geotechnical and Testing Services has completed the subsurface soil exploration for the subject project. The primary purpose of this exploration was to evaluate subsurface conditions encountered in two test borings conducted in the anticipated building footprint. This evaluation provides you with recommendations for foundation design parameters for a new off-grade residence building.

As a summary of our findings and recommendations, the near surface site soils are generally very loose to loose sands until about 15 ½' to 17 ½' below the surface. Next, and of particular concern is the presence of very loose clayey sands found in the northeast boring location until about 35' deep. Pile foundations will certainly need to penetrate deeper than these relatively "weak" strata. The other bore at the southwest building corner encountered medium dense sand with clay lenses until about 29' deep where the relatively weak clayey sand layers were penetrated from 29' to about 39'. Dense well-cemented clayey sand were finally found 40' to 42 ½' deep. **We have calculated that a 12" x 12" pre-stressed, driven pile should exhibit an allowable axial capacity of 15 tons when driven to a depth of about 40' below existing land surface at the northeast building corner.** Although this capacity may actually be attained at a higher elevation than predicted, pile order lengths should be sufficient for this deeper, "worst case" condition. Of course if a higher capacity is needed, some piles may need to penetrate deeper. To comply with requirements of the Florida Department of Environmental Protection, imported fill that may be needed to supplement disturbed areas on the site should consist of fine sands with silt and clay content less than 5% to closely match existing surface soils.

The recommendations submitted in this report are based upon the data obtained from the soil borings presented on Figure 1 and the structure loading conditions outlined. This report does not reflect any variations that may occur between or away from the borings. Possible variations may not become evident until during the course of construction or during additional investigation. If variations then appear evident, it will be necessary to reevaluate the recommendations of this report after performing a site visit. If modifications in the design or location of the facility are made, we should be notified to review the applicability of the conclusions and recommendations in this report. **Finally, we recommend a review of final design drawings and specifications by our office, to determine if recommendations made herein have been properly interpreted and implemented.**

This exploration only deals with the near surface soil deposits. It is not intended to include analysis of deeper soil or rock strata where cavities and caverns may exist. This report documents our findings and recommendations and has prepared exclusively for use by our Client and their Consultants only for this project.

Yours truly,
Alpha Geotechnical and Testing Services, Inc.

3/21/08

Stephen P. Shanley, PE
FL #40653

1.0 PROJECT DESCRIPTION

Upon our arrival, the site area was heavily vegetated at the west end adjacent to State Road 370 and the remainder seaward was sparsely vegetated, mostly sand covered. The planned single story with loft residence is to be situated in a low lying portion of the site between dunes to the east and a high embankment to the west. From a site plan provided by you, existing land within the building footprint is about elevation +5' to +7'. We anticipate the maximum point loads for driven piles will be about 15 tons. The recommendations contained in this report will not necessarily apply if loading conditions are in excess of these estimates, so please advise if needed.

2.0 FIELD EXPLORATION

Two soil test borings were conducted at the site, with one to a depth of 43' and the other to 41.5'. The borings were conducted by the Standard Penetration Test (SPT) method, in accordance with ASTM D 1586. The SPT method allows us to determine soil types as well as consistency (relative hardness). Because bore hole integrity could not be maintained, steel casing pipe was advanced to 20' below the surface in the northeast boring and to 15' deep in the southwest boring during the drilling operations. The locations of the borings are shown on the attached Figure 1. The locations were determined using taped measurements from existing site features using the drawing supplied by you.

3.0 SUBSURFACE CONDITIONS

3.1 General

Subsurface conditions encountered during our field exploration are shown on the soil boring profiles presented on Figure 1. The stratification lines represent the approximate boundaries between the soil layers, but subtle changes in the soil matrix may make these changes more gradual than the boundary lines tend to illustrate.

The soil descriptions shown adjacent to the boring profiles on the Figure are based on a visual/manual classification procedure in accordance with the methodology presented in ASTM D 2488. We supplemented these with a few laboratory classification tests to confirm our classifications in accordance with the Unified Soil Classification System (ASTM D 2487).

3.2 Soil Conditions

Subsurface conditions were found to vary somewhat from one boring to the other in the zone from about 13' to 29' deep. Otherwise, they were found to be fairly similar. Following is a generalized description of the subsurface conditions found.

White sand was encountered in both borings until about 5 ½' to 6 ½' deep. From the "N-values" obtained by driving the sampling device, these near surface sandy soils are in a generally very loose condition. Fine to coarse sand in a loose to medium dense condition was next penetrated until about 13' to 15 ½' in both borings. Loose, greenish gray clayey sand was next found from 15 ½' deep until 18' in the northeast boring (designated test hole 'A' on Figure 1). On the other hand, loose fine to coarse sand with silt was present from 13' to 17 ½' in the southwest boring (test hole 'B'). The southwest boring next advanced into medium dense fine to coarse sand with green and red fat clay lenses from 17 ½' to 29'.

Apparent heavily weathered limestone altered to calcareous sand and clay in a very loose condition was then penetrated in the test hole 'A' from 18' to 35' and in boring 'B' from 29' to 39 ½'. This stratum transitioned to calcareous fat clay then clayey sand in test hole 'A' until 42 ½' deep. These deeper transitional strata were typically found to be loose, becoming medium dense. Finally, well cemented dense to hard calcareous materials were encountered at the terminus of the two bores. It is within this stratum that driven piles should be embedded.

Variations from the above generalization exist at each of the borings; the reader is advised to examine the individual boring profiles on the attached Figure 1.

3.3 Groundwater Conditions

During drilling, we observed a groundwater level at the site about 4' to 5' deep. This water table should be expected to fluctuate, dependant on weather and tidal conditions. **At times, groundwater may be expected within about 1' of the ground surface.**

4.0 LABORATORY TESTING PROGRAM

Laboratory testing was performed on selected samples to aid in soil classification and to further define the engineering properties of the soils. The laboratory tests included Natural Moisture Content (ASTM D 2216), Percent Finer than the U.S. No. 200 Sieve (ASTM D 1140, to assess percent silt and clay) and Atterberg Limits tests (ASTM D 4318, to evaluate plasticity characteristics). The test results are presented on Figure 1 adjacent to the soil boring profiles, at the respective depths from which the samples were recovered.

5.0 ENGINEERING EVALUATION AND RECOMMENDATIONS

5.1 General

In view of our findings, subsurface soil conditions do appear adequate to satisfactorily support the planned residence building on a deep foundation system consisting of driven piles. **However, owing to the relatively loose calcareous sediments found particularly in the northeast test hole 'A' from 18' to 36 ½' deep, piles will likely need to penetrate at least 39' to 40' to achieve an allowable capacity of 15 tons.**

Although this exploration does not deal with active sinkhole activity, we are suspicious that the very loose calcareous materials found in both borings in the approximate 20' to 35' zone may be susceptible to future chemical weathering that could allow subsidence of the ground above. It is therefore, prudent in our opinion that piles should extend through these suspect materials to the more competent bearing stratum around 40' below the surface.

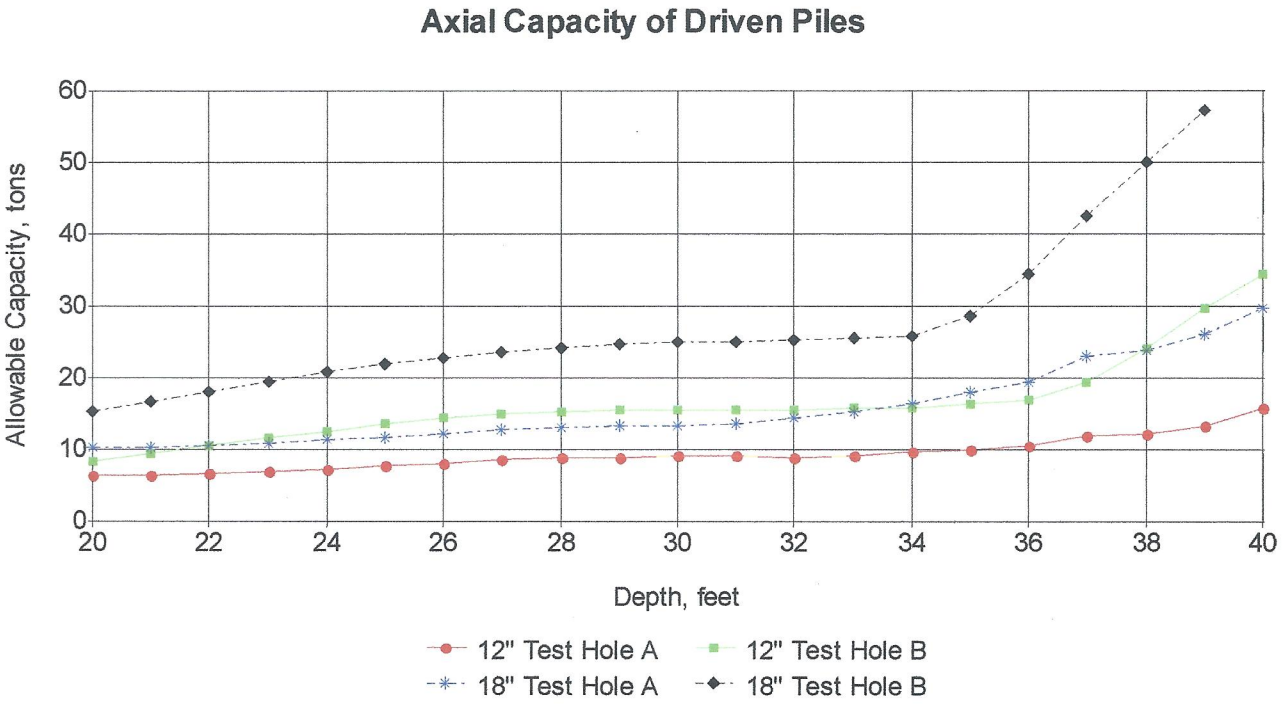
We understand that the Florida Department of Environmental Protection may require imported fill to supplement disturbed areas on the site should be similar to existing site soils. Therefore, such imported fill should consist of fine sands with silt and clay content less than 5%.

5.2 Deep Foundation Design

We have analyzed the axial capacity of a single, square, pre-stressed concrete driven pile using the Florida Department of Transportation's computerized program *SPT 97* (based on Research Bulletin RB 121). A typical pile width of 12" and 18" was checked at a variety of embedment depths based on information obtained from the boring results (see capacity graph on the next page).

Because of possible variation in consistency of the soil layers, we believe it prudent to drive all piles to a minimum tip elevation of 39' below existing ground. **However, from the data gathered from our borings, we anticipate some piles will likely be driven to depths of up to 40' to 42' below the surface.**

A settlement of no more than about ¼" of the pile tip is anticipated after constructed and loaded. We do not believe it will be necessary to perform any load testing of the piles to confirm our analyses but pile installation should be monitored by qualified personnel as discussed in the following section.



5.3 Pile Installation

1 After confirming the locations and final disposition of possible underground utilities (including possible on-site septic systems that may need to be removed), the precise location of the planned piles should be determined by surveying.

2. For driven piles, requirements and installation should be performed in strict accord with FDOT's *Standard Specifications for Road and Bridge Construction* section A455, latest edition. When the pile driving equipment has been selected, we recommend that the design driving blow count be determined by the minimum design *Engineering News Record* Blow Count or *Boston Building Code* Blow Count. The reason for the is that current practice is to utilize the Wave Equation form of analysis, but for this size project the Wave Equation method is not recommended.

   We recommend that the design driving blows be achieved for at least the last 12 inches of driving, and at least 50 percent of the design driving blows should be achieved in the prior foot. However, once design driving blows are achieved in some fraction of the last foot (less than ½ foot), driving may stop to avoid damaging the pile.

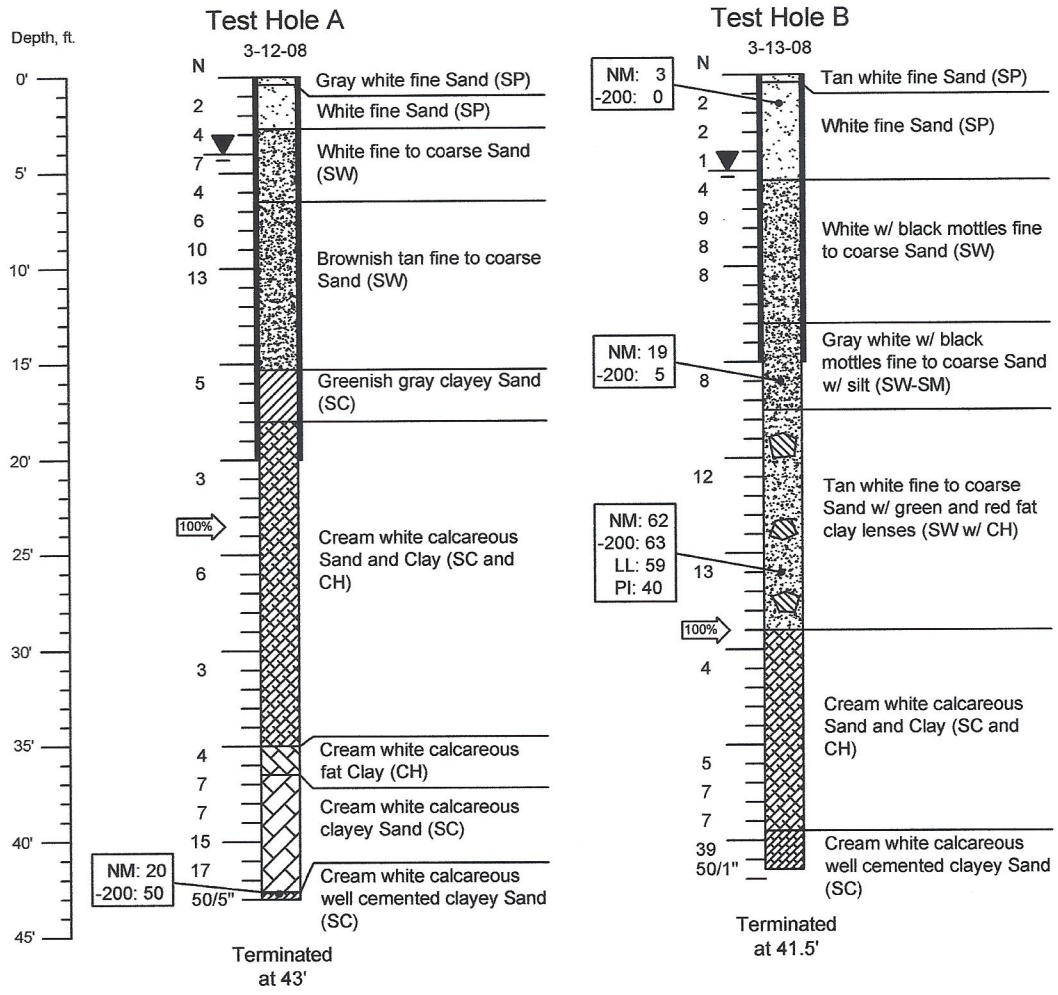
   This is not a strict requirement, but it may be advisable for you to plan pile order lengths, which would allow installation to at least 42' below the surface. While this may require cut-offs, these are substantially easier to accomplish than splices. Of course, you must add on the amount of pile required to achieve connection elevation to your building support. Although not necessary, piles may be inserted into pre-formed holes or "jetted" to approximately 15 to 20 feet below the surface, but the last 5 feet of pile penetration must be driven without jetting. Concrete piles should be pre-stressed with a minimum compressive strength of 4,000 psi.

3. Alpha Geotechnical and Testing Services should be employed by the owner to observe pile installation to document that the proper depth and driving of piles is achieved.

END OF REPORT

File: 900z -08-1893 blizzard bald island pile house

Soil Boring Profiles and Locations



NOTES

1) Although the borings represent the subsurface conditions at their respective locations, it should be understood that significant differences could exist between borings and these may not be discovered until construction or later.

2) Borings were performed with a Simco model 2800 drill rig in accordance with ASTM D 1586.

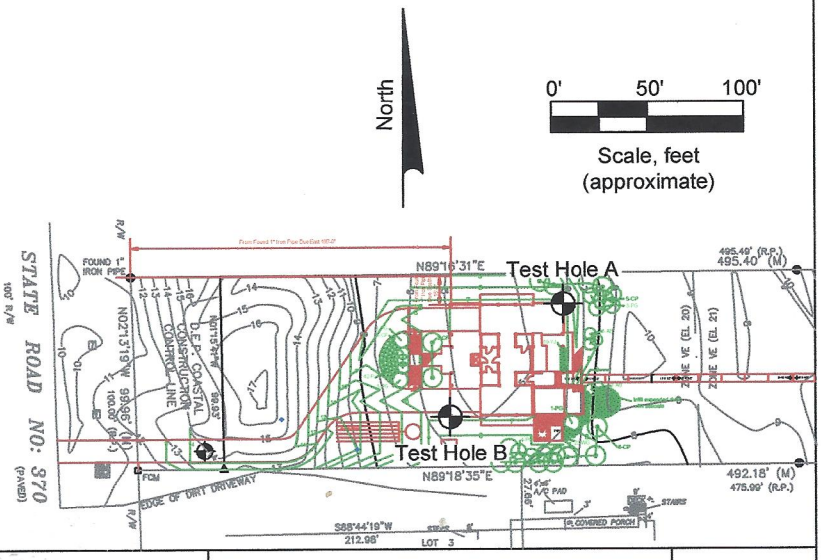
Penetration Resistance and Soil Properties on Basis of Standard Penetration Test [1]

Sands (Fairly Reliable)		Clays (Rather Unreliable)	
Number of Blows per foot, N	Relative Density	Number of Blows per foot, N	Consistency
		Below 2	Very soft
0-4	Very loose	2-4	Soft
4-10	Loose	4-8	Medium
10-30	Medium	8-15	Stiff
30-50	Dense	15-30	Very stiff
Over 50	Very dense	Over 30	Hard

1- Table 5.3 from Peck, Hanson, Thornburn, Foundation Engineering, 2nd Edition, 1973

LEGEND

- N - Standard Penetration Test "N-value". Number of blows from 140-pound hammer to advance sampler last 12" of an 18" drive. Exception: e.g. 50/1" means 50 blows to advance 1".
- 100% - Drill fluid loss.
- | | - 3" casing to prevent fluid loss.
- NM - Natural Moisture Content, %.
- -200 - Finer than # 200 sieve, %.
- OC - Organic content (weight basis), %
- LL - Liquid Limit, %.
- PI - Plastic Index (LL - Plastic Limit), %.
- (SC) - Unified Soil Classification System, clayey sand (typical).
- ▼ - Groundwater level, if present.



Alpha Geotechnical and Testing Services, Inc.
Certificate of Authorization No. 00007967
4770-B Woodlane Circle
Tallahassee, FL 32303
(850) 514-4171 Fax: 514-4173

Stephen P. Shanley, PE
FL #40653
March 21, 2008

Subsurface Exploration and Foundation Evaluation for
New Residence: Lot 4, Block 1, Southern Dunes
Bald Island, Florida

Figure 1

File: 08-1893 blizzard bald island