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## **SUMMARY OF FINDINGS**

### **PROPOSED TOWNHOUSE DEVELOPMENT COUNTRYSIDE EXECUTIVE GOLF COURSE PINELLAS COUNTY, FLORIDA**

File: countryside / ~~am~~ . Geotech

Beazer Homes  
2630 S. Faulkenburg Road  
Riverview, Florida 33569

September 16, 2004

Attention: Mr. Steve Gamm

**RE: Summary of Findings &  
Preliminary Recommendations  
Proposed Townhouse Development  
Countryside Executive Golf Course  
Pinellas County, Florida  
Our File: DES 045290**

Dear Mr. Gamm:

In accordance with your request and authorization **DRIGGERS ENGINEERING SERVICES, INC.** has performed a program of preliminary exploratory borings within the planned development areas. The following presents the results of our preliminary findings.

**SCOPE OF SERVICES**

**SOIL BORINGS** - To investigate generalized subsurface conditions throughout the planned development area, a series of fifteen (15) Standard Penetration Test (SPT) borings was conducted. The borings were typically terminated at a depth of 30 feet with a few borings extended deeper due to soft conditions identified near the termination depth.

Seven (7) classification borings were also conducted within potential pond areas to complement the program of SPT borings. The shallow classification borings were advanced to a nominal depth of 8 feet below present grade.

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## **GENERALIZED SUBSURFACE CONDITIONS**

**SOIL CONDITIONS** - It appears from the soil borings conducted that the course has generally received about 3 to 4 feet of fill to create the current course grades. Several of the borings have identified shallow highly organic zones below the apparent fill materials which may represent the original ground surface prior to site filling. Laboratory testing and visual examination suggests organic contents ranging from about 2% which is considered minimal to greater than 10%, which is considered excessive.

Our exploratory borings, have also revealed the presence of buried debris to depths of up to 15 feet below present grade at the northern end of the subject site. Based on the small diameter boreholes, it appears that the debris consists of wood and vegetative material. Beneath the debris, where encountered, the borings identified sands with variable silt and clay fines content the surface of the limestone formation at 18 feet to greater than 30 feet below present grade. The borings which did not penetrate the debris, also revealed sands with variable silt and clay fines content to the surface of the limestone formation, where encountered.

It must be recognized, however, that the actual depth of the debris is often times difficult to assess utilizing the Standard Penetration Test (SPT) method of sampling due to the small diameter of the sampler. Furthermore, checking the general makeup and size of the debris constituents cannot be thoroughly assessed with this methodology. Accordingly, we recommend performing a series of test pits to allow a broader view of subsurface conditions. Test pits consist of excavating narrow trenches utilizing backhoe equipment.

**GROUNDWATER CONDITIONS** - Groundwater was encountered during the course of our investigation at depths ranging from 3.2 to 7.6 feet below present. We would expect that the primary differences in the depth to groundwater can be attributed to the variability of the surface topography. It is important to recognize that the current investigation took place during a period of increased rainfall. Thus, we would anticipate that the groundwater levels recorded would closely represent the expected normal seasonal high groundwater levels. However, refinement of these anticipated high groundwater levels could be achieved with more detailed topographic information coupled with specific elevations at the actual boring locations.

Notwithstanding the above, you will note that the majority of the proposed pond areas are adjacent to current wetland features. It is our understanding that seasonal high water tables have already been established within these wetlands. Accordingly, it would be prudent at this time to utilize those water levels for pond design purposes.

### **PRELIMINARY EVALUATION**

It is our understanding that the planned development will include two to three-story residential structures. Although structural details and loading conditions have yet to be developed, we would anticipate the structures will be supported primarily by load bearing walls with the potential for some isolated columns.

**AERIAL PHOTOGRAPHY REVIEW** - Our review of historical aerial photography did not reveal excavation or dumping activities on the subject site. However, it should be noted that the available aerial photographs are typically spaced several years apart. Therefore, various activities that may have occurred on site may not have been detected by aerial photography.

Also, our review of historical aerials did not reveal the presence of any low-lying or wetland areas that do not currently exist. However, due to the poor quality of some of the older aerial photographs, it cannot visually be reliably verified whether or not the wetland or low-lying areas may have been modified historically.

**FOUNDATION CONDITIONS** - As mentioned previously, several of the borings have noted buried debris and/or shallow highly organic soils. Utilization of conventional footing and slab-on-grade construction would likely result in unacceptable total and differential settlements over the life of the structure, where the debris is present. Accordingly, supporting structures in those areas will necessitate either over-excavation and replacement of the debris, where present, or the use of a pile foundation system. Also, several of the borings have encountered shallow, variably organic soils, that could produce significant immediate and long-term settlement. The settlements associated with some of the shallower organic soils will be dependent on the organic content and thickness of the zone. Areas where a significant thickness of highly organic soils are present would also likely warrant an over-excavation and replacement alternative or pile foundations.

**OVER-EXCAVATION** - Where debris is present, support of the structures on conventional shallow foundations would necessitate the removal of the rubble and debris followed by replacement with suitable structural fill compacted in lifts from the bottom of the excavation to the proposed grade. Of importance, however, is the fact that the over-excavation process will extend well below the current groundwater surface necessitating the use of dewatering equipment to maintain the excavation in a drained condition to facilitate backfilling and compaction. Another item to consider is the fact that the removed rubble and debris will require disposal. Your environmental consultant will be instrumental in determining whether the materials to be excavated has any environmental impacts. In this regard, we suggest you have your environmental consultant available when the supplemental test pit excavations are performed.

Shallow organic deposits may also require removal depending on the organic content and thickness of the zone. Given the relatively shallow depth to the organics, over-excavation and replacement, where necessary, would likely represent the most positive and economical alternative as compared to pile foundations.

**DEEP FOUNDATIONS** - Support of the structures (foundations and structural floor slab) can also be accomplished utilizing pile foundations. The most efficient pile type will depend on structural loading conditions. However, we would anticipate that treated timber piles with a nominal 8-inch diameter tip and 10-inch diameter butt should be capable of developing a 15 ton compression capacity when driven to an average depth of 25 feet below present grade. Also, 10-inch and 12-inch, square prestressed concrete piles should be capable of developing compression capacities of greater than 30 to 40 tons, respectively. Should the decision be made to utilize a pile foundation system, deeper test borings will be warranted during the design stage to evaluate deeper subsurface conditions in order to provide the most cost effective alternatives.

Your attention is directed to the fact that depending on the make-up of the debris, damage to the piles could occur while attempting to drive through the debris zone. Therefore, pending the results of the supplemental studies, it may be necessary for the contractor to plan for the potential need for excavation equipment such as a track-hoe to remove large debris where present or attempt pre-punching to bypass obstructions.

Augered cast-in-place (ACIP) piling was also considered. However, this foundation alternative would incur increased difficulty in the penetration of the auger through large buried debris and would probably result in significant grout overruns within nested debris, if present.

**PAVEMENTS** - Based on the limited number of soil borings conducted throughout the site, some of the areas planned for pavements are probably also underlain by debris. Accordingly, it would be expected that the pavements may also undergo long-term settlements in these areas where significant debris is encountered. Generally, it is not economically feasible to remove and replace extensive debris zones for pavement construction. Considering the anticipated traffic, installation of an appropriate geogrid reinforcement should be considered to minimize potholes and sharp discontinuities in pavement grades. It is generally advisable to remove debris from below utilities.

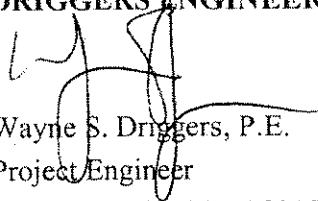
**NEED FOR FURTHER INVESTIGATION** - As previously mentioned, the northern portion of the site is underlain by apparent debris. Also, several of the borings have revealed variably organic soils within the upper 6 feet throughout the balance of the site. Therefore, at this time, we recommend performing a series of backhoe test pits throughout the site. Test pits involve excavation of a narrow trench in order to view, on a broader scale, the nature and limits of the debris and variably organic soils identified in several of the soil borings. The small diameter boreholes conducted to-date do not lend themselves to this qualitative assessment.

It should also be recognized that additional SPT borings will certainly be warranted within the structure areas to provide final foundation recommendations.

**DRIGGERS ENGINEERING SERVICES, INC.**, appreciates this opportunity to be of service to you on this project and we look forward to working with you in the future should you decide to further pursue this site.

Respectfully submitted,

**DRIGGERS ENGINEERING SERVICES, INC.**



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