GEOTECHNICAL EXPLORATION
GRACE COVENANT BAPTIST CHURCH
LAKE CITY, COLUMBIA COUNTY, FLORIDA
CTI PROJECT NO. 07-00506-01

--- Prepared for ---

Grace Covenant Baptist Church
4471 US Highway 90 West
Lake City, Florida 32055

--- Prepared by ---

Cal-Tech Testing, Inc.
P. O. Box 1625
Lake City, Florida 32056-1625

October 12, 2007

Cal-Tech Testing, Inc.
• Engineering
• Geotechnical
• Environmental
LABORATORIES

P.O. Box 1625 • Lake City, FL 32056 Tel. (386) 755-3633 • Fax (386) 752-5456
4784 Rosselle Street • Jacksonville, FL 32254 Tel. (904) 381-8901 • Fax (904) 381-8902
2230 Greensboro Highway • Quincy, FL 32351 Tel. (850) 442-3495 • Fax (850) 442-4008

October 12, 2007

Grace Covenant Baptist Church
4471 US Highway 90 West
Lake City, Florida 32055

Attention: Pastor Russell Taylor

Subject: Report of Geotechnical Exploration
Proposed Grace Covenant Baptist Church
Pinemount Road, Lake City, Columbia County, Florida
CTI project No. 07-00506-01

Dear Pastor Taylor:

Cal-Tech Testing, Inc. (CTI) has completed the geotechnical exploration for the proposed Grace Covenant Baptist Church. This report briefly outlines our understanding of the planned construction, describes the field exploration, presents the collected data, and provides our geotechnical engineering evaluation of the subsurface conditions, with respect to the planned construction and estimated structural loading conditions. Also included in this report are our recommendations for the design and construction of the building foundations.

Introduction

The purpose of this exploration was to develop information concerning the site and subsurface conditions in order to evaluate site preparation requirements and foundation support recommendations for the proposed Grace Covenant Baptist Church. The subject project is located on the west side of Pinemount Road (CR 252) approximately 2,000 feet south of U.S. Highway No. 90 in Lake City, Columbia County, Florida.

We have not been provided Site Plans by Mr. Wayne Brad Baker, P.E. Based on these plans and our conversation with Mr. Baker, we understand the initial phase of development will consist of constructing an approximately 10,170 SF building (indicated as Stage I, Phase I on the attached Field Exploration Plan). This building will be one-story structure with associated parking and driveway areas. We assume that column, wall, and floor loads will not exceed 100 kips, 4 klf, and 150 psf, respectively. We also anticipate that finished floor elevation will be at or near the existing ground surface with new earthwork fill not to exceed 3 feet to achieve desired finished subgrade elevations.

Field Program

Our field program consisted of performing three (3) Standard Penetration Test (SPT) borings within the proposed Stage I, Phase I building area. These borings were extended to a depth of 15 feet below the existing ground surface. All borings were performed on October 11, 2007 and were located in the field by our personnel. The building corners were staked by others prior to our arrival. The attached Field Exploration Plan indicates the approximate location of each SPT boring.

The sampling and penetration procedures of the **SPT** borings were accomplished in general accordance with **ASTM D-1586**, using a power rotary drill rig. The standard penetration tests were performed by driving a standard 1-3/8" I.D. and 2" O.D. split spoon sampler with a 140 pound hammer falling 30 inches. The number of hammer blows required to drive the sampler a total of 18 inches, in 6-inch increments, were recorded. The penetration resistance or "*N*" value is the summation of the last two 6-inch increments and is illustrated on the attached boring records adjacent to their corresponding sample depths. The penetration resistance is used as an index to derive soil parameters from various empirical correlations.

The Generalized Subsurface Profile presents the descriptions of the subsurface conditions encountered at the time of our field program, and also provide the penetration resistances recorded during the drilling and sampling process. The stratification lines and depth designations on the boring records represent the approximate boundary between the various soils encountered, as determined in the field by our personnel. In some cases, the transition between the various soils may be gradual.

Site & Subsurface Conditions

At the time of our exploration, the ground surface was cleared of grass and appeared relatively level. No standing/ponding water was observed during our visit. Typically, the soil profile as disclosed by SPT borings B-1 through B-3 initially consisted of about 12 inches of gray to brown, silty fine sand (SP-SM). This surficial layer was underlain by about 6 to 6½ feet of reddish to light tan, slightly silty fine sand (SP). Beneath this stratum, the soil profile consisted of about 7½ to 8 feet of light gray and reddish tan, clayey fine sand (SC). In general, these soils have a very loose to dense relative density with "*N*" values ranging from 2 to 37 Blows Per Foot (BPF). The very loose soils were encountered within the upper 4 feet of the existing ground surface.

At the time of drilling, the groundwater was not encountered in any of the SPT borings. Groundwater levels should be expected to fluctuate due to seasonal climatic variations, changes in surface water runoff patterns across the site, construction activity, and other interrelated site-specific factors. Since groundwater level variations are anticipated, design drawings and specifications should accommodate such possibilities and construction planning should be based upon the assumption that variations will occur.

Sinkhole Potential

Sinkholes are primarily caused by an advanced state of internal soil erosion or reveling action, which under certain circumstances can lead to ground subsidences. This internal soil erosion is a very slow process by which soil particle usually migrate under the influence of a hydraulic gradient to underlying karsted and/or fractured limestone formation. There are several indicators generally associated with an advanced state of long term internal soil erosion such as noticeable surface depressions and very loose to soft soil zones just above the limestone rock formation. Based on U.S.G.S. records, a number of sinkhole occurrences within a 3 mile radius of the subject site have been reported to the Florida Geological Survey sinkhole database.

Based on our evaluation of the test borings, the subsoil conditions in the area, and the occurrence frequency of sinkholes in the site vicinity, it is our professional opinion the explored area has no greater risk of damage due to sinkhole activity than the development of structures in other areas within the vicinity of the subject site.

USDA/SCS Soil Survey

Cursory review of the Columbia County, Florida USDA Soil Survey indicates the proposed building is underlain by the **Chipley Fine Sand (Soil Map Unit No. 20),** 0% to 5% slopes: Typically, the surface layer of this map unit is approximately 7 inches thick and consists of gray fine sand. Beneath the surface layer, the soils in this area consist of very pale brown with yellow mottles, light gray with very pale brown mottles to about 40 inches. These soils are underlain by 40 inches of very pale brown and brownish yellow, white, and yellowish mottles; and white and brownish yellow and yellow mottles. The soil survey indicates the apparent[1] high water table at about 2 to 3 feet below the ground surface, during the period of December to April.

Foundation Recommendations

Based on the data obtained during this exploration, and the anticipated structural loading and grading conditions, it is our opinion the proposed building can be supported on a conventional shallow foundation system. This shallow foundation system may be designed using a maximum allowable soil bearing pressure of 2,000 psf on newly compacted structural fill. A detailed settlement analysis was beyond the scope of this exploration. However, based on our experience, the assumed loads, and the available site and subsurface information, we anticipate the new building should experience total and differential settlements of less than 1 inch and ½-inch, respectively. We note that these settlement estimates are based on the structural loading and site grading assumptions stated previously. If the grading or structural assumptions are incorrect, we should be notified so that we can reevaluate our recommendations.

---

[1] *Thick zone of free water in the soil indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soils.*

Site Clearing/Grading

Initial site preparation should consist of the removal of vegetation and topsoil that fall within the construction areas and to at least five feet beyond this area. The perimeter areas may need to be graded to help direct surface water runoff away from the planned construction areas.

Foundation Size and Bearing Depth

The minimum width recommended for isolated spread-type footings and continuous wall footings is 24 and 18 inches, respectively. Even though the maximum allowable soil bearing pressure may not be realized, these minimum width recommendations should still control the size of the foundations. All exterior footings should bear at a depth of at least 18 inches below the exterior final grades. Interior footings should bear at a depth of at least 18 inches below the interior floor slab. These recommended minimum-bearing depths should provide the necessary confinement for the foundation bearing level soils.

Bearing Material

Foundations should bear in either natural soils, or in compacted structural fill/backfill. If sandy soils exist at the footing bearing level, they should be compacted to a minimum of 95 percent of the modified Proctor maximum dry density (ASTM D-1557). Compaction should not be attempted on clayey soils at the footing bearing level. Rather they should be excavated using a smooth bucket/shovel, and replaced with a working platform of 10 to 12-inches of coarse concrete aggregate or two to three inches of lean concrete mud mat.

Site & Fill Compaction

After the clearing/stripping operations have performed, we recommend the site soils be compacted to densities equivalent to 95 percent of the modified Proctor maximum dry density (ASTM D-1557). To compact the exposed and underlying soils, we recommend using a vibratory roller that has a static at-drum weight on the order of four to five tons and a drum diameter on the order of four feet. The initial compaction operations should also consist of at least eight overlapping passes of the vibratory roller in each direction. This compactive effort should help improve the overall uniformity and bearing conditions of the near-surface soils.

Using a roller meeting the above requirements, structural fill required to raise the site to the planned finish grades may then be placed in loose lifts not exceeding 12 inches in thickness, and should then be compacted to densities similar to those recommended above. For ease of construction and compaction, we recommend that structural fill consist of a non-plastic, inorganic, granular soil containing less than 10 percent material passing the 200 mesh sieve (i.e., relatively clean sand). The upper fine sands encountered in our borings should meet these criteria.

The test borings indicated the presence of very loose sandy soils within the upper 3½ feet of the existing ground surface. These soils are considered suitable for reuse as structural fill, however, they are not considered acceptable for the support of the proposed building in their current conditions. To improve the density of the supporting soils, the upper 3½ feet of the site soils should be overexcavated, and recompacted as indicated herein.

Report Limitations

This report has been prepared for the exclusive use of the **Grace Covenant Baptist Church Lake City, Columbia County, Florida,** for the specific application to the project discussed herein. Our conclusions and recommendations have been rendered using generally accepted standards of geotechnical engineering practice in the State of Florida. No other warranty is expressed or implied. **CTI** is not responsible for the interpretations, conclusions, opinions, or recommendations of others based on the data contained herein. We note that the assessment of environmental conditions for the presence of pollutants in the soil, rock, or groundwater at the site was beyond the scope of the exploration. Field observations, monitoring, and quality assurance testing during earthwork and foundation installation are an extension of the geotechnical design. We recommend that the owner retain these services and that **CTI** be allowed to continue our involvement in the project through these phases of construction. During construction, we accept no responsibility for job site safety; which is the sole responsibility of the contractor.

We appreciate the opportunity to provide our engineering analysis and evaluation of the subsurface conditions at this site. Please contact us if you have any questions concerning this report or if we may be of any further service to you.

Very truly yours,
Cal-Tech Testing, Inc.

Linda Creamer, CEO, DBE

Linda M. Creamer
President – CEO

10/12/07

Nabil O. Hmeidi, P.E.
Senior Geotechnical Engineer
Licensed, Florida No. 57842

Distribution: *Addressee (2 copies*
Mr. Brad Baker, P.E. – Baker Engineering, Inc. (1 copy)
Mr. Chase Gregory – TMA, Inc. (1 copy)

APPENDIX

FIELD EXPLORATION PLAN &
GENERALIZED SUBSURFACE PROFILE