• Geotechnical Engineering
• Construction Materials Engineering & Testing
• Soils • Asphalt • Concrete

April 27, 2010

Karnes City United Methodist Church
201 North Esplanade Street
Karnes City, Texas 78118

Attention: Reverend Ken Houston

SUBJECT: Supplement No. 1
SUBSURFACE INVESTIGATION, LABORATORY TESTING PROGRAM AND FOUNDATION RECOMMENDATIONS FOR THE PROPOSED KARNES CITY UNITED METHODIST CHURCH ADDITIONS
201 North Esplanade Street
Karnes City, Texas
RETL Job No.: G108399

Dear Reverend Houston,

Opening

As requested by Mr. J.M. Nunn, P.E., of Hill Country Structural, Inc. RETL is providing supplemental foundation recommendations for the above referenced project. Three copies of this supplemental report are being forwarded herewith. Please ensure one copy is inserted into each of the original reports dated June 13, 2008. Additionally, one PDF copy of this report is being electronically forwarded to Mr. J.M. Nunn, P.E., of Hill Country Structural, Inc.

Project Description

It is understood that a wood framed structure will be constructed in the vicinity of the test borings. Based on information provide to RETL by Mr. J.M. Nunn, P.E., of Hill Country Structural, Inc., the structure will utilize a slab-on-grade foundation.

Slab-on-Grade Recommendations

A slab-on-grade foundation is feasible to support the proposed structure planned for construction at this site. It should be noted that rigid exterior walls and interior partitions are subject to distress with even the slightest soil related foundation movements. Interior and exterior grade beams should be founded a minimum of 2 to 2 ½-feet, respectively, below the finished floor slab elevations. Interior and exterior grade beams can be designed for a net allowable unit soil bearing pressure of **2,000 psf**. The net allowable unit soil bearing pressure provided utilizes a safety factor of 3.

The beams should be a minimum of 12-inches wide to reduce the potential for localized shear failure and the beams should be spaced a maximum of 18-feet apart, in both directions. The Structural Engineer may vary beam depths and spacing based on his/her experience designing and constructing similar type structures on sites with similar subsurface soil conditions.

The *"Design of Slab-On-Ground Foundations"* published by the Wire Reinforcement Institute, Inc. (Aug., 1981) utilizes the design criteria provided in the table below:

WRI Design Criteria	
Climatic Rating (Cw)	17
Effective Plasticity Index	28
Soil/Climatic Rating Factor (1-C)	0.13
Maximum Beam Spacing (ft)	18

Based on our calculations, to reduce the PVR to approximately 1-inch, a value typically considered acceptable for structures similar to the proposed structure, it will be necessary to remove the expansive soils to a minimum depth of 5-feet, moisture condition and compact the exposed subgrade soils, and place a minimum of 6-feet of properly compacted non-expansive select fill soils into the excavation. The site improvement operations will result in a finished concrete floor slab elevation 1 ½-feet above the average existing grade at the site. Additional, undercutting and replacement may be required to further reduce the PVR based on architectural or structural considerations or if the finished floor slab elevation is something other than 1 ½-feet above the average existing grade at the site.

Soil supported floor slabs are subject to vertical movements, as discussed previously. Even slight differential movements can cause distress to interior wall partitions and rigid exterior walls or facades supported by shallow slab-on-grade foundations resulting in cosmetic damage. This amount of movement should be understood and addressed during the design phase of the proposed structure planned for construction at this site.

Site Preparation

In areas where a soil-supported floor slab is to be constructed, it is recommended to perform the site preparation to reduce the PVR to 1-inch. The recommended site preparation will require removal of all of the natural in-situ subgrade clay soils, vegetation and all loose or excessively organic materials to a minimum depth of 5-feet and the excavation should extend a minimum of 5-feet outside the perimeter of the proposed structure (building and any appurtenances including sidewalks, ramps, porches, stoops and canopies constructed adjacent to the building). The exposed subgrade soils should be compacted to a minimum density of 95-percent of the maximum dry density as determined by the standard Proctor (ASTM D698) and at or above the optimum moisture content. If any soft areas are identified, the soils should be removed and recompacted in place. Upon completion of the subgrade preparations, 6-feet of properly compacted non-expansive select fill soils shall be placed into the excavation in order to achieve the desired building pad elevation. The select fill shall be placed in such a manner as to create a building pad of uniform thickness across the footprint of the proposed structure. Excavation of grade beams may proceed after placement of select fill is complete.

Select Fill

Imported non-expansive select fill material used at this site should be homogeneous, free from deleterious materials, have a maximum liquid limit of 40 percent and a plasticity index (PI) between 7 and 18. The fill should be placed in no greater than 8-inch thick loose lifts and shall be compacted to a minimum density of 95-percent of the maximum dry density as determined by the standard Proctor (ASTM D698) and at, or above, the optimum moisture content. The Geotechnical Engineer shall approve select fill utilized at this site.

Earthwork and Foundation Acceptance

Exposure to the environment may weaken the soils at the foundation bearing level if excavations remain open for a long period of time. Therefore, it is recommended that the foundation excavation be extended to final grade and that the foundation be constructed as soon as possible to minimize potential damage to the bearing soils. The foundation bearing level should be free of loose soil, ponded water or debris and should be observed prior to concreting by the Geotechnical Engineer, or his designated representative.

Foundation concrete should not be placed on soils that have been disturbed by rainfall or seepage. If the bearing soils are softened by surface water intrusion, or by desiccation, the unsuitable soils must be removed from the foundation excavation and be replaced with properly compacted select fill prior to placement of concrete.

The Geotechnical Engineer, or his designated representative, should monitor subgrade preparation and placement of select fill. As a guideline, a minimum of one in-place density test should be performed on the subgrade soils and each subsequent lift of fill for each 2,000 sq. ft. of slab area, or a minimum of three in-place density tests per testing interval, whichever is greater. Any areas not meeting the required compaction should be recompacted and retested until compliance is met.

Vapor Retarder

A vapor retarder with a permeance of less than 0.3 US perms (ASTM E96) should be placed under the concrete floor slab on the ground to reduce the transmission of water vapor from the supporting soil through the concrete slab and to function as a slip sheet to reduce subgrade drag friction. Polyethylene film with a minimum thickness of 10 mils (0.25 mm) is typically used for reduced vapor transmission and durability during and after its installation. The vapor retarder should be installed according to the ASTM E1643, "*Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.*" All penetrations through the vapor retarder should be sealed to ensure its integrity. The vapor retarder should be taped around all openings to ensure the effectiveness of the barrier. Grade stakes should not be driven through the barrier and care should be taken to avoid punctures during reinforcement and concrete placement. Placement of slab concrete directly on the vapor retarder increases the risks of surface dusting, blistering and slab curling making good concrete practice critical. A low water to cement ratio concrete mix design combined with proper and adequate curing procedures will help ensure a good quality slab.

Where vapor transmission is not a concern, elimination of the vapor retarder may provide improvements in finishing characteristics and reductions in the risks of surface dusting, blistering and slab curling. However, exposure of portions of the subgrade or granular layer, such as at blockouts for columns or utility penetrations, to inclement weather during construction may create excessive or deficient moisture conditions beneath portions of the slab that have already been placed. Blockouts for slab penetrations should be protected if a vapor retarder is omitted. ACI 302.1R-96 "*Guide for Concrete Floor and Slab Construction*" recommends that a vapor retarder or vapor barrier be used only when required by the specific application.

Often, because of design and construction details that occur on a project, questions arise concerning soil conditions and Rock Engineering and Testing Laboratory, Inc. (RETL), would be pleased to continue its role as the Geotechnical Engineer during project implementation.

RETL also has great interest in providing materials testing and observation services during the construction phase of this project. If you will advise us of the appropriate time to discuss these engineering services, we will be pleased to meet with you at your convenience.

Sincerely,

Christopher A. Rock, P.E.
Branch Manager