



Project No. ASR08-009-00  
March 7, 2008

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Mr. Bart Swider  
San Antonio Housing Authority Task Force  
459 Precious Drive  
San Antonio, Texas 78237

**RE: Consulting Engineering Services  
Supplemental Information  
Slab Cracking Observations and Moisture Investigation  
436 Precious  
San Antonio, Texas**

Dear Mr. Swider:

**Raba-Kistner Consultants, Inc. (R-K)** is pleased to report the results of concrete coring, observations, and limited laboratory testing performed during our site visit held on February 21, 2008. This work is a part of our ongoing monitoring of slab moisture conditions. It is not the intent of this letter to summarize the work efforts that have been performed and documented in our initial report, **R-K Project No. ASR08-009-00**, dated February 14, 2008, but to summarize the results of our latest work and to provide recommendations from this data.

### **LIMITATIONS**

The information provided in this document is directed to San Antonio Housing Authority Task Force (Client), and may not contain information for others and/or for other uses. The comments, opinions, and recommendations submitted in this report are based on our visual observations and concrete coring performed at the site, the field data and limited laboratory testing, the information presented in our original report, and our understanding of the project information provided to us by others. Additional conditions may exist or may have existed at the time of our observation. This report includes observation and testing information regarding the home as obtained by **R-K** and from various other sources. Our comments and recommendations are based upon that data. If the information described in this document, some of which was provided by others, is incorrect or if additional information becomes available, **R-K** may need to revise the comments and opinions presented in this document. Illustrative digital photographs were taken by **R-K** during this observation and will remain in our file.

### **BACKGROUND INFORMATION**

The findings of our original Building Distress Study have been provided in our report dated February 14, 2008, **R-K Project No. ASR08-009-00**. In accordance with the approved work scope to assess the cause(s) of the damage to the previously install linoleum floor covering in the kitchen, **R-K** has performed concrete coring of the floor slab, visual observations of the vapor barrier, and limited laboratory testing of the surficial fill materials and native clay soils obtained from the core holes.

## **CORING ACTIVITIES**

On Thursday, February 2, 2008, Jesse H. Aguilar, P.E., with **R-K**, made a site visit to the home to observe and supervise concrete coring performed by Mr. Raymond Meinhart with Geotest Services at select locations across the floor slab. The cores were removed by using a motorized diamond bit hand operated coring assembly. The following information describes the cores that were obtained:

### **Core No. 1 - Kitchen**

Core No. 1 was obtained within the kitchen at the location where the Moisture Vapor Emission Test (MVER) No. 1 was previously performed. This location, measured to be approximately 7-ft east and 3-ft north of the southwest corner of the kitchen, coincides with the location where the homeowner previously reported to the Client that a bubble formed beneath the linoleum and emitted water when the bubble was punctured. The core diameter measured about 5 inches and the core was about 5-1/8 inches long. Reinforcing steel was encountered during the coring operations for this core, and was identified as a No. 3 reinforcing steel bar. In addition, a portion of a brick masonry unit was also embedded within the core. We anticipate that the brick masonry unit was used to raise the reinforcing steel above the ground surface at the time of construction.

It should be noted that, at the direction of the Client, Core No. 1 was left open to observe if any moisture would accumulate within the hole. Based on the verbal information provided to us by the Client, no standing water has been observed within the core hole. In addition, the core hole has been scheduled to be backfilled and capped with ready-mix concrete up to the adjacent floor slab surface elevation this afternoon.

### **Core No. 2 – Northeast Bedroom (Left-Rear Bedroom)**

The second core was performed in the northeast bedroom approximately 4 ft south and 3 ft east of the northwest corner of the bedroom. The core diameter measured about 5 inches and the core was about 5-1/4 inches long. No reinforcing steel or brick masonry was encountered within the core.

Upon removing the cores from the slab, a vapor barrier was observed within each core hole. The portion of vapor barrier located within both core holes was removed to allow for the sampling of the surficial soils beneath this core location. In general, the vapor barrier appeared to be in fair condition with some penetrations resulting from the fill materials puncturing the barrier. The results of the soil sampling and limited laboratory testing are presented in the *Laboratory Testing* section of this report.

Surficial soil samples obtained from both core holes were collected during our observations and transported to our laboratory for visual classification and soil testing. Soil samples were obtained with the use of a hand-held Geoprobe™ sampler. It should be noted that a 1/2-inch diameter copper water line was cut during the coring operations for Core No. 2. Once the soil samples were obtained, the probe hole was backfilled with a granular backfill and portions of the

concrete slab located around the core hole were chipped out by Mr. Meinhart to allow for the repair of the water line. The water line was repaired that same afternoon by representatives with Bryco Plumbing, a licensed plumbing contractor retained by Mr. Meinhart. Once the plumbing repair was completed, a 10 mil vapor barrier was installed at the bottom of the core hole and the hole was patched with ready-mix concrete up to the adjacent floor slab surface elevation.

**CONCRETE MOISTURE TESTING**

In-situ moisture testing of the concrete cores, below the slab surface, was conducted. As part of this test procedure, approximately 3/8-inch diameter pilot holes, spaced about 3/4-inches apart were drilled into the cores to a depth of about 1-1/2 inches. Qualitative moisture readings were measured by placing electrodes, from a Delmhorst BD-2100 hand-held moisture meter, in contact with the bottom of the pilot holes. For this particular instrument, moisture readings ranging from 0 to 85 are considered dry; readings ranging from 85 to 95 exhibit a moisture condition between dry and wet; and readings greater than 95 reflect wet concrete matrix conditions. The results for Core No. 1 were measured to range between 89 and 91, indicating that the moisture conditions within the concrete varies between a dry to wet condition. The results in Core No. 2 revealed that the concrete is in a dry state, with moisture conditions ranging from 58 to 60.

**LABORATORY TESTING**

Select samples were tested to determine moisture content, plasticity, and percent passing a No. 200 sieve. The results of the laboratory testing are provided in the following table.

Core No.	Sample No.	Depth (inches)	Material Description	Moisture Content	Liquid Limit	Plastic Limit	Plasticity Index	% Passing No. 200 Sieve
1	1	5-1/8 to 9-1/2	Fill Materials: tan, clayey sand with gravel	12	-	-	-	24
	2	9-1/2 to 21-1/2	Dark gray fat clay	-	-	-	-	-
	3	21-1/2 to 31	Dark gray fat clay	25	64	20	44	-
2	1	5-1/4 to 6-1/4	Fill Materials: tan sand	-	-	-	-	-
	2	6-1/4 to 22	Dark gray fat clay	26	-	-	-	-
	3	22 to 28	Dark gray fat clay	25	-	-	-	-

- Indicates no laboratory testing performed on this sample

### **PLUMBING TESTING**

On the basis of a telephone conversation held with Mr. Edward Pape, with the San Antonio Housing Authority Task Force, on Monday, March 3, 2008, it is our understanding that a hydrostatic plumbing test was performed by the Client's plumbing contractor during the week of February 25, 2008. According to Mr. Pape, no leaks were encountered beneath the floor slab. However, a leak was detected within the sanitary sewer line located approximately 5-ft outside of the exterior (west side) kitchen wall. We understand that this leak was repaired, however, the condition of the pipe at the leak location and those of the soils around the pipe are not known.

Observations of the domestic water line were performed by the Client by monitoring the water meter over a period of four days. According to the Client, the water meter needle did not move over the course of the monitoring period.

### **COMMENTS**

On the basis of our visual observations of the concrete cores and vapor barrier, the limited laboratory testing performed on select soil samples recovered from the core holes, and our previous experience with similar residential structures, the elevation MVER test result at this location cannot be attributed to one particular source. Based on the results of the laboratory tests, we know that the moisture conditions within the surficial native, dark gray clay soils on which the home is founded are consistent at both locations where soil samples were recovered beneath the floor slab. In addition, standing water was not observed in the core holes while they were open.

As discussed with the Client, we understand that the site grading has been improved on several occasions to help promote positive drainage of surface water away from the foundation. Variations in soil moisture content, associated with site grading conditions along the exterior of the home, may have occurred over the life of the home and resulted in a higher moisture vapor emission rate through the floor slab at the location of Core No. 1. At this time, it does not appear that the sanitary sewer line leak located within the front yard has affected the soils encountered in Core hole No. 1.

To better manage the vapor emissions, a breathable floor covering, such as ceramic tile, is recommended to prevent any continued vapor emissions from becoming trapped beneath the floor covering.

### **RECOMMENDATIONS**

On the basis of our findings, we recommend the following:

- Ceramic tile flooring is recommended in lieu of vinyl or linoleum floor covering in order to allow the slab to breath.
- We recommend that the ceramic tile be set in a Portland Cement thin-set mortar meeting the requirements of ANSI Specifications A118.4 and A118.11, such as Hydroment® Single-Flex™ F.S.™ or an approved equivalent.

- A cementitious grout mixed with a multi purpose latex admixture meeting the requirements of ANSI Specification A118.7, such as Hydroment® Ceramic Tile Grout with Hydroment® 425 multi purpose latex admixture or an approved equivalent, is recommended.
- The recommendations issued in our original report are still valid and should be implemented.

We appreciate the opportunity to be of service to you on this project. Should you have any questions about the information presented in this document, or if we may be of additional service, please call.

Very truly yours,

**RABA-KISTNER CONSULTANTS, INC.**



Jesse H. Aguilar, P.E.  
Project Engineer



Kenneth W. Donoughue, A.I.A.  
Senior Architect

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