

September 4, 2015

Sarasota County  
Facilities Planning  
1001 Sarasota Center Drive  
Sarasota, Florida 34240

Attention: Mr. Darryl Blair

**RE: Supplemental Data and Report  
Venice Library  
300 S. Nokomis Avenue  
Venice, Florida  
Our File L 159825  
Report 02**

Dear Mr. Blair:

**DRIGGERS ENGINEERING SERVICES** has obtained additional groundwater level and RH Probe measurements at the subject site. We also set a Vapor Gauge floor moisture test kit and examined the drain in the Atrium on July 27. The floor moisture test kit was retrieved on July 30, with results presented herein. On July 30, a fourth RH probe was set, as requested, on the exterior slab near the door on the west side of the building.

### **DISCUSSION OF RESULTS**

Groundwater was initially measured at depths of 5.3 to 6.7 feet below the floor slab and 5.1 to 6.0 feet below the exterior grade in late June of 2015. Following heavy rainfall at the end of July, groundwater levels rose to about 3.5 to 4.4 feet below the exterior grade and 3.7 to 4.5 feet below the slab. Results are summarized on the attached Plate III, which also presents the relative ground surface elevations at the piezometer locations with reference to the floor slab elevation, which was arbitrarily set at elevation El. +10.0 feet. As can be seen, the ground surface at the west side of the building at piezometer locations PZ-4 through PZ-6 is at most a few inches below the floor slab elevation. This area on the west side also receives much of the roof runoff.

The relative humidity (RH) probes initially exhibited relative humidity readings of 94 to 99 percent in late June, with essentially the same results on July 27 and July 30.

The moisture test kit showed a moisture vapor transmission rate of 4.75 lbs./1,000sq.ft/day, which is relatively low. Concrete slabs with such vapor transmission rates are typically considered suitable for most flooring types. Thus it appears that the moisture problems are relatively isolated, rather than typical of the entire library.

During our July 27 visit, an examination of the drain vault box in the atrium revealed four (4) perforated PVC pipes and one solid PVC pipe. The solid pipe exits to the south of the box. We understand that your investigation showed that the perforated pipes are short and are likely drains from the irrigated landscaped areas in the atrium. The solid pipe is likely the drain which presumably exits the building to the paved area south of the library. The invert of the drain pipe is only 6-3/4 inches below the elevation of the atrium pavers. The concrete box drain was nearly full of soil with several wide cracks evident in the walls. The depth of the box and its method of construction are not known.

#### **PROBABLE CAUSE OF MOISTURE PROBLEMS AND SUGGESTED REMEDIES**

Based on the results of our investigation, it is our opinion that the moisture problems that have been experienced beneath the carpet tiles are the result of several factors:

1. Roof runoff directed toward the west side of the building. The grade in this area is very close to the floor slab elevation. The concentration of runoff to an area which does not slope away from the building is likely a major contributor to the moisture problems in the meeting room.

All roof downspouts and their discharge points should be checked and corrected as necessary to discharge all runoff well away from the building and to the pavements, if at all possible. The ground surface along the west side of the building should be graded to slope away from the building.

2. Irrigation and rainfall into the atrium area. The floor of the atrium is about at the level of the library floor slab. The construction details of the planter areas and the glass atrium enclosure are not known. The level of the planter areas and the drains plus the cracks in

the vault box allow water to be added close to the underside of the floor slab around the atrium. Excess irrigation or heavy rainfall could also result in water standing against and seeping below the glass wall frame.

If the atrium floor, planter areas and vault box can be made water tight, it may be possible to minimize the potential for the atrium being a source of moisture. This would require repair and waterproofing of the vault box; insuring that the vault drain is functional; waterproofing of the planter boxes and atrium floor; and sealing the glass atrium enclosure, particularly the base of the frame. Alternatively, the open atrium could be eliminated, the plants placed in hand watered above ground boxes and the atrium screen replaced with a skylight.

3. The groundwater table occurs within several feet of the under slab elevation. The groundwater table results in increased soil moisture content, by capillarity, of the fine sands under the concrete slab. As suspected in our preliminary report, groundwater was measured above the lower permeability organic stained layer following the heavier rainfall in July of 2015. As a result of the differences in relative humidity at the base of the concrete slab versus the air conditioned interior of the structure, moisture will tend to wick or migrate through the concrete. While a plastic sheet "vapor barrier" was encountered below the slab in the cores, often these plastic sheets are not sealed at the joints or are punctured by foot traffic or other processes during construction such that the plastic sheet is often not an effective barrier against vapor transmission. Plastic sheets also tend to deteriorate with time. More pronounced moisture penetration may also occur where there may be shrinkage cracking in the concrete, or at joints in the slab. This situation was pointed out in the Williams Building Diagnostics, LLC report on April 10 of this year.

As suggested in our preliminary report, if the rubber backed carpet tiles are trapping moisture being transmitted through the slab, you could consider replacing the rubber backed carpet with a carpet that can "breathe" and allow the moisture to be handled by the building HVAC system. This could be checked by replacing the carpet in a test area of the main library and checking pre-installed RH probes at accessible locations. This is suggested as a first measure in lieu of the considerably more costly and disruptive slab sealing and moisture barrier methods mentioned in our preliminary report.

Based upon review of reports by others, it seems that some modifications to the separate HVAC system of the Meeting Room may well be necessary. Again, HVAC and other mechanical system considerations are beyond our area of expertise.

### ADDITIONAL COMMENTS

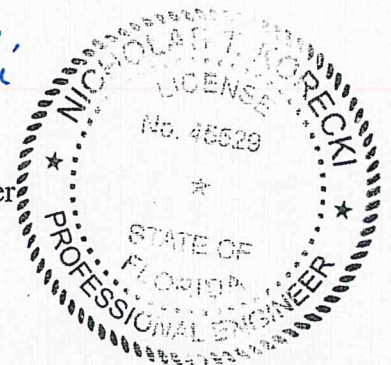
During our evaluation, we understand that an alternative being discussed is demolition of the existing building and constructing a new library. The existing building has apparently performed satisfactorily from a soil bearing standpoint for many years with no reported evidence of settlement related issues. If this alternative is considered further, the soils evidenced within the depth of our shallow borings are considered generally suitable for support of a new structure. An exception is the highly organic soil zone encountered at boring location HA-1. Further exploration in this vicinity is recommended should a new structure footprint extend this far. And certainly deeper exploration through Standard Penetration Test (SPT) borings is recommended to investigate deeper soil conditions and develop detailed recommendations for site preparation and foundation design.

**DRIGGERS ENGINEERING SERVICES** appreciates the opportunity to be of service to you. We also welcome the opportunity to further discuss the various alternatives.

Respectfully Submitted,  
**DRIGGERS ENGINEERING SERVICES, INC.**

*Nicholas T. Korecki*

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Senior Geotechnical Engineer  
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**PLATE II - RH PROBE READINGS**

**VENICE LIBRARY  
VENICE, FLORIDA**

**DESI FILE L159825**

**ASTM F2170 TEST RESULTS**

Smart Sensor Number	#1 U268805	#2 U318727	#3 U318851	#4 U318912	
Location	See Plate I Of Report 01				
Depth	2.4"	2.4"	2.4"	**	
Date/Time installed	6/22/15 8:18 a.m.	6/22/15 8:45 a.m.	6/22/15 9:00 a.m.	7/30/15 10:20 a.m.	
Date/Time %RH/°F	6/25/15 1:59 p.m. 99% / 78°	6/25/15 12:44 p.m. 94% / 78°	6/25/15 1:43 p.m. 99%/75°		
Date/Time %RH/°F	7/27/15 9:30 a.m. 99%/78°	7/27/15 9:30 a.m. 93%/77°	7/27/15 9:30 a.m. 99%/75°		
Date/Time %RH/°F	7/30/15 10 a.m. 99%/78°	7/30/15 10 a.m. 92%/77°	7/30/15 10 a.m. 99%/78°		

**Tested By:** Scott Farthing

**Company Name:** Driggers Engineering Services, Inc.

**NOTE:** HVAC system not operating in Meeting Room where Sensor #3 is placed.  
Sensor #4 placed on exterior slab as requested.

**PLATE III - SUMMARY OF GROUNDWATER DATA**

**SUMMARY OF GROUNDWATER DATA  
VENICE LIBRARY**

LOCATION	SLAB OR GROUND RELATIVE ELEVATION*	GROUNDWATER DEPTH/ELEV. 6/22/15	GROUNDWATER DEPTH/ELEV. 7/27/15	GROUNDWATER DEPTH/ELEV. 7/30/15	GROUNDWATER DEPTH/ELEV. 8/5/15	GROUNDWATER DEPTH/ELEV.
PZ-1	+9.6	-5.1 / +4.5	-4.0 / +5.6	-4.0 / +5.2	-4.6 / +5.0	
PZ-3	+9.1	-6.0 / +3.1	-4.1 / +5.0	-4.3 / +4.8	-4.4 / +4.7	
PZ-4	+9.7	-5.8 / +3.9	-4.0 / +5.7	-3.5 / +6.2	-4.2 / +5.5	
PZ-5	+10.0	-5.9 / +4.1	-4.0 / +6.0	-4.0 / +6.0	-4.1 / +5.9	
PZ-6	+9.7	-5.7 / +4.0	-4.3 / +5.4	-5.4 / +5.5	-4.2 / +5.5	
PZ-8	+10.0*	-6.7 / +3.3	-4.5 / +5.5	-4.6 / +5.4	-4.6 / +5.4	
PZ-9	+10.0*	-6.3 / +3.7	-4.5 / +5.5	-4.5 / +5.5	-4.5 / +5.5	
PZ-10	+10.0*	-5.3 / +4.7	-4.1 / +5.9	-3.7 / +6.3	-4.0 / +6.0	

\*Floor slab relative elevation arbitrarily set at elevation E. +10.0 ft.

No piezometers were set at locations HA-2 and HA-7.