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- Rockledge
- Sarasota
- Tampa
- Tifton
- West Palm Beach

April 2, 2019

Joseph Duennes
Sumter County Building Services
7375 Powell Road
Wildwood, Florida 34785

Reference: **Site Inspection**
Dollar Tree Store
5977 E. County Road 462
Wildwood, FL 34785
UES Project No. 0840.1900047.0000

Mr. Duennes:

Universal Engineering Sciences, Inc. (UES) representatives performed a site inspection of the Dollar Tree at the above referenced location to address concerns of a possible sinkhole. It was reported that a "pinging" noise was heard emanating from one of the interior steel columns. Employees claimed to have heard the "pinging" noise since the store opened in December, 2018. The site inspection included a Ground Penetrating Radar (GPR) survey of the building floor along with a visual inspection of the structural components of the building in the area of subject column.

The visual inspection revealed that the subject column is a 6x6 steel HSS column. The roof framing of the building consisted of steel joists and joist girders. No distortion was observed in any of the steel joists in the area of the subject column which would indicate settlement. The drop ceiling of the building consisted of an acoustical ceiling system that is supported by rigid wires attached to the steel joists. A rigid wire anchored to a joist stabilizer plate welded to the subject column was observed to be loose which would allow it to vibrate with change in the internal air pressure of the building or when the air handlers turn on. UES was able to manually replicate the "pinging" noise during the inspection. Therefore, UES concluded that the "pinging" noise heard is non-structural in nature.

Ground Penetrating Radar (GPR) is a geophysical exploration tool used to provide a graphic cross-sectional view of subsurface conditions. This cross-sectional view is created from the reflections of repetitive, short-duration electromagnetic (EM) waves which are generated by an antenna in contact with the ground surface as the antenna is pulled in linear traverses across the ground surface. The reflections occur at the subsurface contacts between materials with differing electromagnetic properties. The electrical property contrast that causes the reflections is the dielectric permittivity, which is directly related to the electrical conductivity of the material. The GPR method is commonly used to identify such targets as underground utilities, underground storage tanks, buried debris, or geological features. This recorded information can be used to assist in identifying locations for geotechnical borings. The greater the electrical contrast between the surrounding earth materials and the target of interest, the greater the amplitude of the reflected return signal. Unless the buried object/target of interest is highly conductive, only part of the signal energy is reflected back to the antenna located on the ground surface with the remaining portion of the signal continuing to propagate downward to be reflected by deeper features. If there is little or no electrical contrast between the target of interest and the surrounding earth materials, it would be very difficult, if not impossible to identify the object using GPR.

The depth of penetration of the GPR is very site specific and is controlled by two primary factors: subsurface soil conditions and antenna frequency. The GPR signal is attenuated (absorbed) as it passes through earth materials. As the energy of the GPR signal is diminished due to attenuation, the energy of the reflected waves is reduced, eventually to a level where the reflections can no longer be

detected. In general, the more conductive the earth materials, the greater the GPR signal attenuation. In Florida, typical soil conditions which severely limit the GPR signal penetration are near-surface clays, organic materials, and the presence of saline water in the soil pore water space.

A GPR survey is conducted along survey lines (transects), which are measured paths along which the GPR antenna is moved. The survey map allows for correlation between the GPR data and the position of the GPR antenna in the field. Features most commonly associated with potential sinkhole activity are:

- A down-warping of GPR reflector sets that are associated with suspected lithological contacts towards a common center. Such features typically have a bowl or funnel shaped configuration and are often associated with deflection of the horizontal bedding of the overlying sediment horizons caused by the migration of sediments into voids in the underlying limestone.

- A localized significant increase in the depth of penetration and/or amplitude of the GPR signal response. The increase in GPR signal penetration depth or amplitude is often associated with a localized increase in sand content at depth. Thicker surficial sands may be associated with subsidence, erosion, or loss of clayey soil horizons.

- An apparent discontinuity in GPR reflector sets or missing reflector sets, that are associated with suspected or previously imaged lithological contacts. The apparent discontinuities and/or disruption of the GPR reflector sets may be associated with the downward migration of sediments.

A RAMAC X2M integrated radar with a 250-megahertz (MHz) antenna with a time window of 234 nanoseconds (ns) was used to perform the GPR survey. The GPR was coupled with a Trimble AgGPS 114 differential global positioning system (GPS) receiver to obtain latitude and longitude coordinates along each GPR trace. The survey was conducted around the area of the concern and around the perimeter of the building and a total of eleven (11) transects were completed in continuous mode. The field data was post-processed in the office utilizing computer analysis to filter and enhance results and the GPR data has been retained electronically in the event further evaluation is required.

Across the property, the virtual GPR profiles provided two sets of reflectors in the subsurface at approximately 30 ns and 45 ns. This two-way travel time correlates with an interpreted depth of approximately 6 and 9 ft bls. Both reflectors were laterally continuous. Within the imaged GPR profiles no features of interest was noted. Therefore, UES concluded that there was no evidence of a sinkhole.

The scope of our services was performed in general accordance with the principles and practices of the local community. We appreciate the opportunity to have assisted you. Please contact us if you have any questions or if we may further assist you.

Sincerely,

UNIVERSAL ENGINEERING SCIENCES, INC.

This item has been digitally signed and sealed by Robert F. Brown on the date adjacent to the seal.

ROBERT FRANKLIN BROWN LICENSE No. 56928 STATE OF FLORIDA PROFESSIONAL ENGINEER

Digitally signed by Robert F Brown
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Date: 2019.04.02 09:48:02 -04'00'

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Robert F. Brown, PE
Structural Department Manager
Florida Professional Engineer No. 56928

Mark K. Hardy, PE
Tampa Regional Manager
Florida Professional Engineer No. 57233