The Geo-Institute Engineering Geology and Site Characterization Technical Committee will live-stream the *session* "Engineering Characterization and Solutions in Florida's Sensitive Karst Environment" on Friday, December 11, at 11 AM EST. The talks include:

Talk #1: Case History: Karst Challenges on the Wekiva Parkway (Section 6) Design-build project (presented by Michael Byerly, P.E. – Florida DOT and Michael Woodward, P.E., M.ASCE – WSP USA)

The Wekiva Parkway (Section 6) is a design-build project located in Lake and Seminole Counties, Florida. This project encompassed approximately 6 miles of new limited-access toll road largely along the existing State Road 46 corridor. Section 6 is a continuation of the SR 429/SR 417 beltway around the Orlando metropolitan area. The project included three new parallel cast-in-place segmental box bridges over the Wekiva River (each 2,068 feet long), as well as several wildlife-crossing bridges (with lengths ranging from 100 to 3,870 feet) to allow animals to pass safely beneath the expressway.

This area of Florida has karst geological conditions that can provide challenges to contractors, structural engineers, and geotechnical engineers. Dealing with such unforeseen, challenging conditions requires additional subsurface exploration and often redesign. Because of the extreme variability in the subsurface conditions, it can be difficult to predict pile lengths in order to complete successful installations. Such uncertainties result in time delays, impacting costs and construction schedules.

This presentation will discuss the challenges faced by the design-build team on the Wekiva Parkway (Section 6) project when karst conditions were encountered during the design-phase geotechnical exploration and during construction. These challenges included two pile-supported bridges that required partial or complete redesign (one prior to construction, and one during construction) to overcome the karst conditions. In addition, two sinkholes developed during construction within roadway areas. Extensive compaction grouting programs were required to mitigate these sinkholes.

Talk #2: Remediation Estimation Using Microgravity and SPTs for Landfill Expansion (Presented by Timothy Copeland, PhD., P.E., M.ASCE and Matt Wissler, P.E. – Geosyntec Consultants)

To evaluate subsurface conditions within a lateral landfill expansion area, Geosyntec recommended and implemented a phased investigation approach to evaluate subsurface conditions at a 54-acre expansion area of a Southwest Florida Landfill. An initial pilot study area of 12-acres was used to evaluate and identify potential subsurface geophysical technologies most capable of detecting karst conditions. The resulting geophysical technologies identified were microgravity survey and SPT borings. Using the microgravity survey

as the first step in screening potential karst anomalies, a SPT boring program was implemented through initial and step-out phases, to quantify the potential karst anomalies. These SPTS were used to calculate the potential size of the anomalies. The calculation method used to evaluate the size was of the anomalies was considered using historical data from a previous sinkhole feature experienced at the site. The budget estimate of remediation repairs was then evaluated using the SPT N-values and considered appropriate densities of soil. While several remediation methods were considered, jet grouting was identified as the appropriate choice and was used to calculate a budget estimate to remediate each anomaly.

Talk #3: Site-specific sinkhole vulnerability assessment techniques in Florida Karst (presented by Ryan Shamet, PhD., P.E., M.ASCE – University of North Florida)

Florida's diverse geology comes with various challenges and karst geohazards. Cone Penetration Testing (CPT) is becoming more widely utilized in Florida to assess the potential of sinkhole formation or subsidence in karst topography, as well as to assess subsurface conditions post-collapse. However, there is no "one-size-fits-all" investigation assessment method for the various karst regions in Florida. In this presentation, we will review the current investigation techniques of the cone penetration tests (CPT) for the identification and assessment of the internally eroded soils associated to sinkhole formation. Assessment techniques presented include: 1) CPT-based raveling chart for the identification and evaluation of internally eroded soil in a karst landscape (also referred to as raveled soils) and, 2) a quantifiable vulnerability index, the sinkhole resistance ratio (SRR), used to compare the variation of subsurface conditions within a project site and correlate the potential of future sinkhole collapse. These deliverables were developed through an extensive data collection program of CPTs performed in karst landscapes for sinkhole investigation and repair purposes in central Florida over a 20-year period, and the methodology for the chart and index employed multiple mathematical and statistical methods. The assessment techniques presented provide engineers with an empirically proven evaluation tool when investigating and designing in a known karst landscape, ultimately enabling a safer and more economical geotechnical design or mitigation strategy.

Talk #4: TBD