Investigation and Repair of Karst Sinkholes

By
Michael J. Byle, D.GE, F. ASCE
National Discipline Lead for Civil/Geotechnical Engineering
Tetra Tech EC, Inc.

Friday, November 18, 2011 at 4:30pm
Room 2355 GGBL

Abstract: Carbonate formations underlie a majority of the United States and a significant fraction of these formations display evidence of dissolution in the form of karst features such as pinnacles, caves, and sinkholes. The technology of sinkhole formation is pretty well understood, however defining the conditions at specific location that caused a sinkhole to form is not always simple, since karst features are seldom regular or predictable except on the macro scale. While dissolution of limestone and dolomite is generally a slow process, taking millennia to form significant openings, subsurface soil erosion into solution features in the underlying rock can occur much more quickly and is the focus of a sinkhole repair strategy. The key to effective soil stabilization in karst involves effectively inhibiting the mechanisms of soil piping and transport by limiting erosional pathways, groundwater gradients, soil erodability and surface water sources. Surface repairs of sinkholes are often temporary, since surface erosion may continue and can either undermine the repair or open a new sinkhole adjacent to the surface repair. Effective repairs require knowledge of the subsurface and the openings through which the soil is being transported. Locating these relatively small openings at depth is challenging and can be costly. The design of an effective and permanent repair requires a good characterization of the frequency, orientation, and condition of openings in rock, particularly at the soil/rock interface. This presentation will outline factors to be considered in planning an exploration in karst and discussion of some commonly used exploration techniques including their applicability and limitations with respect to karst investigations and strategies for sinkhole prevention and repair. Actual sinkhole investigation and repair cases will be presented to demonstrate the principals and approaches described.

***** Everyone is invited – snacks will be available **********