

Virginia Tech
Center for Geotechnical Practice and Research
Annual Lecture Program

Thursday, April 2, 2015

Alumni Assembly Hall
Inn at Virginia Tech and Skelton Conference Center
Blacksburg, Virginia



8:00-8:45 **Rick Deschamps, P.E. PhD** *Nicholson Construction Company*
“Post Tension Anchors for Stabilizing Large Concrete Gravity Dams”

Large post-tensioned anchors are commonly used to improve the stability of concrete gravity dams. The need for improvement is frequently related to: increases in loads from interpreted changes in earthquake magnitude or in maximum floods levels. The presentation will discuss topics related to design, installation, and quality control, of "permanent" anchors and will illustrate these processes with the use of recent U.S. projects.

9:00-9:45 **R. J. Valentine, P.E.** *Valentine Engineering Associates, Inc.*
“An Assessment of the Factors that Contribute to the Poor Performance of Geosynthetic-Reinforced Soil Structures”

Seventy-six geosynthetic-reinforced soil structures that performed poorly have been investigated. Some of these structures experienced distress that cannot be characterized as “failure,” but nonetheless required repair measures to make them fully serviceable. Other structures failed catastrophically. It was determined that in almost all cases the poor performance was not the result of a single cause. Rather, the performance was a consequence of a combination of adverse factors. These adverse factors have been evaluated and each can be assigned to one of nine general categories. Examples of adverse factors in each category are provided and the frequency of the occurrence of the factors in each investigation is assessed. The results of this assessment have implications for the standards for both design and construction.

10:00-10:45 **Ray Martin, P.E. PhD** *Ray E. Martin, LLC*
“Veracruz Hydro Project”

The Veracruz project is located near the border of Veracruz and Puebla States in east central Mexico. The project consists of a 30MW powerhouse, a 2.7km long penstock with about 800m of head, a 2.4km long power tunnel and a 30m high concrete dam and reservoir. Geologically, the mountainous terrain contains massive sinkholes and disappearing streams in an area of Cretaceous Age limestone. The project was nearly completed, with only the power tunnel remaining. Then the first signs of trouble appeared – caves in the path of the tunnel. After completing the tunnel, an attempt to fill the reservoir failed due to leakage. The solution ultimately involved lining much of the 12.24ha-m reservoir, as well as repairing the tunnel. However, a giant sinkhole just above the dam remains. The presentation will describe the initial design of the facilities, the geology, and the design of remedial reservoir construction.

Keynote Speaker

11:00-12:00 **James K. Mitchell, Univ. Dist. Prof. Emeritus, Virginia Tech, Blacksburg, VA**
“Lessons From the Lives of Two Dams” The Fourth Victor de Mello Lectureⁱ

Many embankment dams completed during the first six decades of the 20th century have been found deficient relative their ability to resist currently anticipated levels of seismic shaking and probable maximum flood. In this Fourth Victor de Mello Lecture, two recent case histories are described. One is a hydraulic fill structure completed in 1920 that is founded on alluvial material, some zones of which are susceptible to liquefaction. The other is a zoned earthfill dam completed in 1956 that is founded over a channel filled with loose, uncompacted, hydraulically placed tailings from gold mining operations. Each dam has been upgraded in phases over periods of several decades using different strategies and ground improvement technologies to improve stability and reduce failure risks. Several take away lessons from these experiences concerning current risk mitigation strategies, the importance of correct soil and site characterization, and implementation and effectiveness of different ground stabilization and improvement methods are presented.

ⁱ First presented September 10, 2014 in Goiania, Brazil. Manuscript published in *Soils and Rocks*, Sao Paulo, May-August, 2014.

12:00 **The lecturers, CGPR members, and Virginia Tech faculty and graduate students are invited to join us for lunch in Latham Ballroom A.**