2018 Southwest Symposium
“Slope Stability and Earth Retaining Structures”

October 16, 2018

Learn – Share – Network

Topics Include:

- Rockfall Stabilization
- Deep Excavations
- Soil Nails
- Connect 202 Update
- Landslides
- Geosynthetic Slope Stability
- Unsaturated Slope Stability
- Mining Tailings Slope Stability

Location:

Desert Willow Conference Center
4340 E Cotton Center Boulevard, Suite 100
Phoenix, AZ 85040
Conference Agenda

7:30 to 8:30 AM  Registration and Continental Breakfast

8:30 AM  Welcome and Introductions

8:45 AM  Utilizing Soil Nails for Slope Stabilization  
Guest Speaker: Nathan Thompson, PE - GeoStabilization International

9:30 AM  Sensible Structures: Reinforcing Earth with Sub-Premium and Recycled Fills  
Guest Speaker: Sean Wagner - Tensar

10:15 AM  15 min Break

10:30 AM Key Considerations for Tailings Dam Stability Analysis  
Guest Speaker: Jim Casey, PE and Andrew Witte, PE - KCB Consultants

11:15 AM  Network Lunch

12:15 PM Connect 202 Blasting Update- Bob Cummings

12:30 PM From Peck to Augmented Reality in Deep Excavations  
Guest Speaker: Dimitrios Konstantakos -

1:15 PM  Break

1:30 PM Landslides - Forensic Engineering  
Guest Speaker: Avram Ninyo, PE

2:15 PM  Break- Refreshments

2:45 PM Unsaturated Soil Mechanics in Geotechnical Practice  
Guest Speaker: Dr. Sandra Houston - Arizona State University

3:30 PM Ongoing Protection of SRP’s Assets Results in Extensive Rockfall Mitigation  
Guest Speakers: Ken Euge and Jordan Hamula - Geological Consultants Inc. DBA Construction

4:15 PM  Closing
presenters abstracts and biographies

Lessons Learned from Landslides - Avram Ninyo, PE, GE, Ninyo & Moore

Abstract:
Ninyo & Moore provides geotechnical engineering, environmental consulting, and materials testing and inspection services for various private and public works projects throughout the United States. Their geologists and engineers have investigated landslides, mudflows and unstable slopes that threatened or damaged infrastructure such as roads, railways, dams, power plants, residences, commercial buildings, retaining walls, levees and drainage structures. In the Southwest, landslide hazards are common in steep sloping hillsides and coastal terrain, and in areas comprised of weak underlying rock and soil. Landslides result from disturbances in the natural stability of a slope. Common landslide triggers include heavy rain, rapid snow melt, earthquakes, removal of vegetation by fires, poorly designed grading of slopes, and other events. The presentation will include an overview of the typical types of landslides, modes of failure, methods of investigation, and case histories where the causes of failure were evaluated and recommended repair measures were provided. Lessons learned from Ninyo & Moore’s landslide projects will be discussed.

Biography:
Mr. Avram Ninyo has served as Principal Engineer of Ninyo & Moore since 1986. His more than 45 years of geotechnical engineering experience includes providing services for municipal, federal, military, and private sector projects. Mr. Ninyo has directed the geotechnical aspects of a large variety of engineering projects, including treatment plants, pipelines, tunnels, reservoirs, highways, bridges, hospitals and medical facilities, park and recreational facilities, commercial and municipal developments, harbor and offshore structures, and other infrastructures. He is a California-registered geotechnical engineer, and a registered civil engineer in the States of California, Nevada, Arizona, Colorado, Idaho, Kansas, Utah, Texas, Oregon, and Washington. Mr. Ninyo possesses a Masters degree in Geotechnical Engineering from Syracuse University and a Bachelors degree in Civil Engineering from Roberts College. Ninyo & Moore has over 450 geotechnical and environmental professionals in San Diego, Irvine, Los Angeles, Fontana, Monterey Park, Oakland, Alameda, San Francisco, San Jose, Sacramento, Las Vegas, Phoenix, Prescott Valley, Tucson, Salt Lake City, Denver, Broomfield, and Houston.

From Peck to Augmented Reality in Deep Excavations - Dimitrios Konstantakos, PE, Deep Excavation, LLC, New York University Tandon School of Engineering

Abstract:
New technologies in visualization are transforming our ways of practicing deep excavation design and construction. This presentation will cover the history of deep excavation design and explore how technologies such as virtual and augmented reality are transforming the way we design and build.

Biography:
Mr. Konstantakos is the CEO and founder of Deep Excavation LLC, and also serves as the chair of the Technical Coordination Council of ASCE/G-I, the committee that oversees all technical committees for the Geo-Institute. Mr. Konstantakos is the previous chair of the Earth Retaining Structures Committee of ASCE/G-I. He is managing the company operations and holds a Master’s of Science degree from Massachusetts Institute of Technology and a Bachelor of Science from University of Massachusetts in Lowell. Mr. Konstantakos has considerable international involvement and experience. His areas of specialization are deep excavations, soil-structure interaction, slope stability, helical piles, and software development with relative publications.

Mr. Konstantakos has applied his passion for deep excavation design and has been the master developer of the international software program DeepEX dedicated to the subject. The DeepEX software is currently used by more than 1200 engineers and contractors worldwide and embodies a wide range of standards and specifications. He
holds professional licenses in New York and in Europe. Mr. Konstantakos in the recipient of the 2018 ASCE/G-I Martin S. Kapp Foundation Engineering award.

Mr. Konstantakos has worked on many important international projects for slope stability, pile foundations, and braced excavations, including the World Trade Center recovery efforts in 2001. Beyond promoting the DeepEX software, Mr. Konstantakos has enriched the www.deepexcavation.com website (which he developed from 2000) essentially creating an online library for deep excavations and helping fellow engineers and contractors address related issues.

He is a vocal advocate of issues that face the geotechnical engineering community and tries to raise awareness of the important role that geotechnical engineers play.

**Ongoing Protection of SRP’s Assets Results in Extensive Rockfall Mitigation - Jordan Hamula, DBA Construction and Ken Euge, PG, Geological Consultants, Inc.**

**Abstract:**
The area directly adjacent to Horse Mesa Dam (between Canyon and Saguaro lakes) was originally used to stockpile materials blasted out in the 1930’s for the original dam construction. Decades later, time, erosion and general movement of the debris fields have been causing rockslides near the dam that pose a potential threat to life and dam access.

The Stabilization of Rock-Face at the Water Line project was awarded to DBA Construction after multiple other rockslide stabilization projects had been completed nearby. The project was constructed in three separate components: 1) Stabilization of the Rock-Face at the Water Line was identified as an unstable area along the access road measuring 226 LF under a 230’ high cliff wall. Salt River Project referred to the location as the “Keystone” wall because it displayed 45 degree fractures in the rock that, if erosion continued or if rain water penetrated the cracks, it could have created a massive landslide that would block the access road and even affect the flow of the river below. 2) Component number two was referred to as the Roadway Drainage Improvements; and 3) Eagle’s Nest Wall and Drain project.

The project involved construction of a concrete retaining wall with slurry backfill to equalize the pressure and hold back the rock face. This required the placement of 42 (#11) grouted anchors that were drilled 30’ in the rock face pinning the fractures back after the wall construction. The one-lane dirt road (10-12’ wide) needed to stay open for part of the day to accommodate dam crew shift change. Heavy equipment was working directly under the rock face except during the shift change (11:00 am to 11:30 am).

Adding to the complexity of the project was the radius of the rock-face and the access road around it (creating blind curves). Building the retaining wall around it also required elevation changes as the roadway had an 8’ grade change. Initially, it was thought that the retaining wall could be built directly onto bedrock (giving it a stable base), but once the project got underway, crews discovered that in some areas 4 – 5’ deep they encountered loose cobbles. This created a situation where the subgrade required additional build up that included slurry fill.

The project was completed in three months and around a planned outage which was a requirement for the schedule. Safety was of the utmost importance and as a result, no lost-time accidents were experienced during the project’s construction.

**Biographies:**

Mr. Hamula has worked in the heavy construction industry since 2004. He is currently a principal and senior project manager for DBA Construction, Inc. Throughout his career, Jordan has served as a project coordinator/engineer, estimator and project manager for projects ranging in size from $50,000 to $5 million. He has extensive experience working on projects utilizing an alternative delivery method including design-build, construction manager at risk,
and job order contracting requiring fast turn-around for both preconstruction and construction phase services. His most notable projects include the:

- Design-Build Stabilization of the Rock Face at the Waterline, Horse Mesa Dam, Salt River Project, Canyon Lake, AZ
- Scottsdale Water Campus Solar Array Infrastructure and Facility Beautification Project, City of Scottsdale, AZ
- Design-Build Horse Mesa Dam Rock Debris Talus Stabilization Project, Salt River Project, near Canyon Lake, AZ
- Design-Build 230kV Transmission Line, Palm Valley Substation to Sun Valley Substation via Trilby Wash Substation, Arizona Public Service, Maricopa County, AZ
- Design-Build New Whiteriver EHV Power Substation, Sharyland Utilities, Floydada, TX
- And CMAR Black Canyon Dam and Spillway Modifications, Arizona Game & Fish Department, Heber, AZ

Mr. Ken Euge is a registered geologist in Arizona (No. 10338) with more than 47 years of professional geological experience following his graduation from California State University Los Angeles in 1969 with a Degree in Geology with emphasis in engineering geology. His profession career began with a small geotechnical engineering firm Robert Stone & Associates where he was exposed seismic refraction surveys, proctors, sand cone testing, and grading contractors. With the housing crash in California in 1971 he had to look for a new employer during the Xmas holidays (bad timing). After hearing “nothing going on right now...” for the ninth time, he got a suggestion to go see Jay Smith at Fugro. “Go see who at where!” He did go see Jay at FUGRO where he was hired on a part-time basis. Two days later he found himself in the San Joaquin Valley in a back-hoe trench looking for faults at a proposed nuclear power plant site. One year later he was in Arizona geologizing six alternate nuclear power plant sites including the eventually selected PVNGS site. During the following 12 years at FUGRO, now the Earth Technology Corporation (ETC), he was provided opportunities to expand his work experiences in engineering geology, geotechnical engineering, seismology, hydrogeology, and geophysics on a variety of projects. Due to changes in the corporate philosophy of “shareholders first and everything else second”, Ken left ETC in June 1985, and opened the doors of Geological Consultants (GCI) in July 1985. At GCI he is directly involved with engineering geology, geophysics, and hydrogeology on projects throughout Colorado Plateau and Basin & Range provinces in Arizona and in adjacent States. He has and continues to have opportunities to work with PVNGS as well as Arizona DOT and DWR, various County flood control districts, Salt River Project, Arizona Public Service Company, municipalities, and private sector companies including engineers, architects, land developers, construction contractors, and individuals.

**Utilizing Soil Nails for Slope Stabilization - Nathan Thompson, PE, GeoStabilization International**

**Abstract:**

Soil nails are often a viable solution for slide repair or slope stabilization. A brief design and construction overview for “typical” soil nail construction will first be presented, before highlighting two innovations in soil nail design and construction developed to provide more rapid installation under active soil conditions – hollow-bar soil nails (HBSN) and launched soil nails. Design for both approaches can be completed under the same general framework, but important differences and technology-specific considerations will be emphasized. The presentation will include an overview of construction methods and key drivers of efficiency with hollow-bar and launched soil nails. Case studies will be presented for each technology.

**Biography:**

Nathan Thompson is a Project Development Engineer for GeoStabilization’s Mountain Region. After earning a BS degree in civil engineering from the University of Kentucky, Nathan obtained a MS degree in geotechnical engineering from the University of Texas at Austin. He has nine years of experience providing geotechnical and civil engineering services focused on the investigation, design, and construction oversight for infrastructure and mining projects. Nathan’s recent infrastructure experience focused on geotechnical challenges related to slope stabilization, rockfall hazard reduction, rock anchor design, and deep foundations in the Mountain Region. In the
Unsaturated Soil Mechanics in Geotechnical Practice — Sandra Houston, Ph.D., PE, D.GE, Arizona State University

Abstract:
It is recognized that our infrastructure to a very large extent is founded on unsaturated soils. In fact, construction in unsaturated soils is typically preferred when practical, due to reduced costs and effort. A major push to advance unsaturated soils theory into geotechnical practice has been underway since the early 1990’s. Starting with the 1993 book, Unsaturated Soils, by Fredlund and Rahardjo, more than a dozen texts have now emerged on the subject, with the vast majority of subsequent books having “geotechnical practice” as a part of the title. Still, unsaturated soils theory is rarely used explicitly in geotechnical practice, and its use is often disguised, or only partially implemented. In this presentation, Prof. Houston will provide an introduction to unsaturated soil mechanics. She will briefly explore the reasons for slow adoption of unsaturated soil mechanics and why it is time for its general use in routine geotechnical engineering practice. Simple approaches for using unsaturated soil shear strength in slope stability and retaining wall design will be presented. Straightforward and innovative field applications of unsaturated soil principles to slope stability and earth retaining system design and analysis will be included in the presentation.

Biography:
Sandra Houston, PhD, PE, D.GE, is Professor in the School of Sustainable Engineering and the Built Environment, Ira A. Fulton Schools of Engineering, Arizona State University. Professor Houston’s contributions to the field of geotechnical engineering focus on unsaturated soils, including advancement of methodologies for dealing with unsaturated soils and arid region problem soils, including in particular collapsible and expansive soils and unsaturated flow. Sandra has served in numerous leadership positions in the American Society of Civil Engineers (ASCE), Geo-Institute (GI), and the International Society of Soil Mechanics and Geotechnical Engineering (ISSMGE). She is a recipient of the 2017 ASCE Terzaghi Award and the 2004 William H. Wisely American Civil Engineer Award, past president of the Geo-Institute, and past chair of the ASCE Board-level Committee on Diversity and Inclusion. She served as the formational Chair of the GI Committee on Unsaturated Soils, and is a long-serving USA representative on the ISSMGE Committee on Unsaturated Soils. Sandra is the author and co-author of numerous journal and conference publications on unsaturated soils, and she has been selected as an invited speaker on the subject of problematic soils at many national and international conferences, and was recently awarded the first Distinguished Lecturer for the Pan-American Unsaturated Soils Conference Series by the Unsaturated Soils Committee of ISSMGE.

Sensible Structures: Reinforcing Earth with Sub-Premium and Recycledfills – Sean Wagner, Tensar

Abstract:
MSE walls and reinforced soil slopes are common fill structures used in grade separation applications. Specifications often require virgin fills, however these materials are often expensive and unnecessary. This presentation will cover a more economical approach that may be appropriate for some projects by using recycled or marginal material as fill.

Biography:
Sean Wagner is an Atlanta native who recently moved to Southern California to put his earth reinforcement knowledge into practice in the Pacific South. He received his B.S. in Civil & Environmental Engineering in 2014 from Georgia Tech and is sitting for the Geotechnical P.E. exam in Spring 2019. Sean has designed over 500,000 square feet of reinforced earth structures, ranging from lush pedestrian greenways to towering traffic interchanges. He enjoys recreational team sports, sci-fi, and entertaining friends and family.
Key Considerations for Tailings Dam Stability Analysis - Jim Casey, PE, and Andrew Witte, PE, KCB Consultants

Abstract:
Tailings dams are engineered structures designed and operated to retain the by-products of the mining and milling process. Unlike water dams, most tailings dams are raised continuously throughout mining operations to meet ever-increasing storage demands. The staged construction of a tailings dam presents a unique challenge to dam designers. Considerations must be made for a changing water balance, materials available for dam construction, the behavior of the foundation and fill materials as they are progressively loaded and the operability and cost of the tailings storage facility. The complexity of the system requires engineers to have a thorough understanding of the potential failure modes to guide dam design and monitor its performance.

This presentation will provide an overview of the principal failures modes for tailings dams. Focus will be placed on analysis of slope failure modes, with emphasis on the characterization of soil strength and application of the Observational Method. Case histories of recent tailings dam failures will be presented to highlight the importance of correct identification and analysis of critical failures modes.

Biography:
Andrew Witte is a senior geotechnical engineer with experience on a variety of mining, infrastructure, municipal and industrial related projects. His main focus is on the design, construction, operation and closure of earth and rockfill embankment dams. Specifically, he is the lead engineer for two 500+ high cyclone sand dams at the operating Copper Mountain Mine in British Columbia. He also holds various design and review roles for numerous other operating and closed tailings dams, all with their own unique challenges.

Jim Casey is a geological engineer with experience in geotechnical engineering, the design of tailings facilities, dam and waste dump design, dam safety reviews and inspections. He has been involved in tailings dam designs for the Resolution Copper project for the past five years and has supported geotechnical and dam safety reviews for several closed tailings dams in Arizona. Jim moved to Phoenix in 2018 to lead the growth of KCBCL’s first permanent US office.
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