

## 2019 Southwest Symposium Forensic Case Studies in Geotechnical Engineering

October 28, 2019

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

## **Conference Agenda**

7:30 – 8:30 AM	Registration and Continental Breakfast
8:30 AM	Welcome and Introductions
8:45 AM	Lessons from the Bingham Canyon Mine Landslide Guest Speaker: Brad Ross, Ph.D. – University of Arizona
9:30 AM	Common Geotechnical Recommendations that lead to Problems and Forensic Evaluations Guest Speaker: Curt Peterson, P.E. – Peterson Geotechnical Group
10:15 AM	15-min Break
10:30 AM	Analyzing Civil Lifeline Systems Guest Speaker: Robb Moss, Ph.D., P.E., F.ASCE – Cal Poly in San Luis Obispo, CA
11:15 AM	Network Lunch
12:15 PM	National Geo-Institute Update Jeffrey Rodgers
12:30 PM	<b>Case Study of Thomas Jefferson High School Soil Movement and</b> <b>Remediation</b> Guest Speaker: Thomas Printz, P.E. – Printz Engineering Services
1:15 PM	15-min Break
1:30 PM	The Challenges and Reward of Practicing Everywhere Guest Speaker: Bob McMichael, P.E. – Madsen, Kneppers, and Associates
2:15 PM	Break – Refreshments
2:45 PM	<b>Case Studies in the Design of Structures for Surface Fault Rupture</b> Guest Speaker – Jim Gingery, Ph.D., P.E. – Hayward Baker
3:30 PM	<b>TH2 Crookston Slope Stability Design-Build Project</b> Guest Speaker: Rick Deschamps – Ph.D., P.E., M.ASCE – Nicholson Construction Company
4:15 PM	Closing

## **Presenter Information – Abstracts and Biographies**

#### Analyzing Civil Lifeline Systems – Robb Moss, Ph.D., P.E., F.ASCE, Professor of Geotechnical, Earthquake, and Risk Engineering at Cal Poly in San Luis Obispo, CA

#### **Biography:**

Robb Moss, Ph.D., P.E., F. ASCE is a professor of Geotechnical, Earthquake, and Risk Engineering at Cal Poly in San Luis Obispo, CA. His research focuses on liquefaction engineering, surface fault rupture, cyclic failure of sensitive clays, seismic site response, seismic soil structure interaction, flow failures/debris flows, and the application of probability and risk concepts to these engineering hazards. He has several years of consulting experience as a geotechnical earthquake engineer in the US and abroad. He has been part of nine NSF-funded earthquake reconnaissance teams investigating ground failures in: Mexico, Japan, Turkey, Chile, India, Nepal, California, and Alaska. Currently Robb is a Fulbright Specialist to Chile focusing on the topic of Engineering Education. He is also part owner and founding member of a subsurface investigation company in Chile.

#### Abstract:

This talk covers methods for analyzing civil lifelines systems (pipelines, canals, highways, etc) from a reliability perspective. Examples of different lifelines failures over the years are examined to learn from past mistakes. Then for back-analysis or forward-design the following topics are covered: spatially correlation of load and resistance, interconnectedness/interdependence of lifelines, systems redundancy verses capacity, ageing and maintenance, multi-hazard susceptibility, and lifelines resilience. The goal of this talk is to raise awareness of systems specific engineering issues and provide a means for addressing them within a risk and reliability framework.

# Case Study of Thomas Jefferson High School Soil Movement and Remediation – Thomas Printz, P.E., Printz Engineering Services, LLC

#### **Biography:**

Mr. Thomas graduated from Colorado State University – Pueblo with a Bachelor of Science in Civil Engineering in 1998. He worked for Kiewit Western Company for four years out of college as a Project Engineer. In 2002, Thomas began a 16-year career at Williams Form Engineering Corporation and from 2011-2018 served as the Vice President of Engineering. Thomas is currently the President of Printz Engineering Services, LLC; which is a consulting firm that Thomas started in 2007, to serve the deep foundation and anchored earth retention design/build construction industry.

#### Abstract:

Thomas Jefferson High School is a historic structure located in San Antonio, Texas. The structure was originally founded on belled shaft deep foundations. During the life of the structure, water infiltration in the crawl spaces and basement sections of the building allowed the expansive soils to heave, which lifted or sheared the deep foundation shafts. The differential movements left sections of the building unusable without constant maintenance activities. A deep foundation solution was required to attach to the existing structure and recover the elevations across the building to a near level condition. Micropiles were proposed as value engineering solution, as the small diameter high capacity elements are more resistant to heave and can be installed in low head room, confined space drilling conditions. The micropile design, method of lifting or lowering of the structure, as well as permanent cast-in-place concrete cap design for the finished, recovered column elevations will all be discussed herein.

# The Challenges and Rewards of Practicing Everywhere – Robert W. McMichael, PE, GE. D.GE, Madsen, Kneppers, and Associates

#### **Biography:**

Mr. McMichael has 35 years of geotechnical, civil and environmental consulting experience throughout the United States, and internationally. He specializes in forensic civil and geotechnical consulting, with extensive experience in the evaluation of complex technical insurance claims and in the support of construction defect and other litigation. He has testified in trial, arbitration and deposition on approximately 100 occasions. He is licensed as a Civil Engineer in 29 states, and as a Geotechnical Engineer in the State of California. He is one of fewer than 500 globally to have become a board-certified Geotechnical Engineer (Diplomate, Geotechnical Engineering).

His experience includes hundreds of design phase (pre-construction) studies, construction-phase support projects, and post-construction (forensic) studies. His project experience includes streets and highways, retaining walls, support of excavation systems, deep foundations, underpinning systems, construction vibrations, groundwater problems, post-tensioned foundations, bridges, dams and flood control structures, pipelines, pump stations, water and wastewater treatment facilities, hotels, hospitals, schools, communications and airport facilities, and various industrial, governmental, commercial and residential developments.

#### Abstract:

The presentation will use instructive case histories illustrating a wide-variety of problems and will include tips for successful practice. The presenter will share his perspectives on what it takes to successfully practice nationally as a geotechnical consultant/expert. Among the topic the presenter will discuss:

- How to obtain the assignment, contacts, and credentials;
- The logistics of being there and conducting business on the road;
- How to add value to your clients' projects, from sinkholes in Florida to thawing permafrost in Alaska and lava flows in Hawaii;
- Dealing with local standards of care, codes and construction practices; and
- Using your knowledge and open mind to assess a wide range of geotechnical problems.

# Lessons from the Bingham Canyon Mine Landslide – Brad Ross, Ph.D., Director of the Geotechnical Center of Excellence at the University of Arizona

#### **Biography**:

Dr. Brad Ross is the founder and Director of the Geotechnical Center of Excellence at the University of Arizona, which is dedicated to creating multi-disciplinary research and academics related to the geotechnical issues in the mining industry. He is also a Professor of Practice in the Mining and Geological Engineering Department.

Brad is a Professional Mining Engineer with over 35 years of industry experience. For his last industry position, he was brought into the Bingham Canyon Mine in 2013 to help the mine prepare for and recover from the gigantic Manefay slope failure, the largest in mining history. He has written a book about that experience called "Rise to the Occasion – Lessons From the Bingham Canyon Manefay Slide".

#### Abstract:

The Manefay highwall failure at Rio Tinto Kennecott's Bingham Canyon Mine in 2013 was significantly larger and had a very different failure mechanism than any highwall failure the mine had experienced in its 107-year history. This failure forced the mine personnel to look at potential highwall failures differently that it had in the past. This talk describes the what happened, how the mine prepared for and recovered from the failure as well as how the mine personnel were able to prevent a second failure that could have been even more devastating than the Manefay itself.

# Common Geotechnical Recommendations that lead to Problems and Forensic Evaluations – Curt Peterson, P.E., Peterson Geotechnical Group

#### **Biography**:

Curt Peterson is the founding engineer of Peterson Geotechnical Group, a forensic geotechnical consulting firm located in Gilbert, Arizona. He holds a BSCE and MSE degrees in civil engineering from BYU. He has over 20 years of engineering experience, involving power plants, freeways, commercial, retail and high-rise structures, airports, custom homes, and residential subdivisions. During his career, Mr. Peterson has served as an expert witness on nearly 1,000 projects involving numerous issues such as expansive, collapsible, and corrosive soils, poorly compacted fill soils, improper engineering recommendations, cracked/settled swimming pools, retaining wall failures, concrete cracking and deterioration, and asphalt failure. Mr. Peterson has personally evaluated the performance of over twenty thousand residential homes that were involved in construction defect lawsuits.

Mr. Peterson frequently works for developers, general contractors, and building owners that are experiencing issues with structures. He uses various tools to evaluate the causes of the problems in order to develop a repair. Mr. Peterson has designed and provided oversight for various specialty repairs such as helical piers, pressure and injection grouting, foam injection, structural and membrane cut-off walls, drainage issues, corrosion on concrete, failed pavement, settled trenches, collapsed underground pipes, and erosion protection. Mr. Peterson frequently provides expert witness testimony in depositions, arbitrations, bench trials, jury trials, and administrative law hearings.

#### Abstract:

Mr. Peterson will discuss some common geotechnical problems he has encountered during his career, including moisture sensitive soils, drainage, inadequate geotechnical studies, and inadequate foundation design. He will discuss case histories involving extensive soil movement and damage to residential and commercial structures. Mr. Peterson will also discuss issues involving corrosive soils and the damage to structures.

#### Case Studies in the Design of Structures for Surface Fault Rupture – Jim Gingery, Ph.D., P.E., Hayward Baker

#### **Biography**:

Dr. James Gingery has practiced geotechnical and earthquake engineering for twenty-two years. Dr. Gingery's expertise includes soft ground engineering, seismic hazard characterization and mitigation, soil-structure interaction, and numerical modeling. He is a Chief Engineer at Hayward Baker / Keller where his responsibilities include ground improvement and geo-structural design, quality control and assurance, and research/development. He holds an MS from U.C. Berkeley and a PhD from the U.C. San Diego. He's a licensed Civil Engineering in California and Washington, and a Registered Geotechnical Engineer in California. Dr. Gingery has published more than two dozen technical papers in journals and conference proceedings. In 2015 he was awarded the Shamsher Prakash Prize for Excellence in the Practice of Geotechnical Engineering.

#### Abstract:

Two case studies of design to mitigate surface fault rupture are presented. The first involves a light rail bridge crossing an active fault zone where large diameter drilled shaft foundations were designed to accommodate up to 6.5 feet of surface fault rupture displacement. The second concerns a pumps station with 36-foot deep wet wells where deep soil mixing ground improvement was used to protect the structure from surface fault rupture. In each case, paleoseismic field investigations were performed to characterize the site, then deterministic and probabilistic fault rupture displacement estimates were made and used to develop design scenarios. Three-dimensional soil-structure interaction numerical modeling of the fault rupture scenarios was performed as part of the design. The analyses showed the fault rupture displacements could be accommodated through various mechanism and that satisfactory structure performance could be achieved. While the case study focuses on surface rupture of an active fault, the strategies employed can be applied to other modes of ground deformation such as ground subsidence and liquefaction.

#### TH2 Crookston Slope Stability Design-Build Project - Rick Deschamps, Ph.D., P.E., M.ASCE

#### **Biography:**

Rick Deschamps, Ph.D., P.E., M.ASCE is the Vice President of Engineering for Nicholson Construction Company, the US subsidiary of Paris-based Soletanche-Bachy, one of the world's premier geotechnical general contractors. Rick is responsible for overall engineering and quality control efforts with emphasis on design build, alternative design, and value engineering efforts. His experience includes design, quality control and implementation of projects involving deep foundations, retaining structures, ground improvement, ground modification, slope stabilization, and earth-fill and concrete gravity dams.

Rick has been working and a part of the geotechnical industry since 1988. Rick holds a Ph.D. in Geotechnical Engineering from Purdue University and a Bachelor's and Master's Degree in Civil Engineering from University of South Florida. Mr. Deschamps is a registered professional engineer in the states of Kentucky, Indiana, Pennsylvania, West Virginia, Ohio and Florida.

#### Abstract:

Landslides are common along the Red River within the Red River Valley in Western Minnesota. Deep glacial lake deposits along the meandering river lead to rotational failures that have major impacts to infrastructure and personal property. One specific slide threatened to engulf an important highway in Crookston, MN. The Minnesota Department of Transportation selected a group of Design-Build contractors to compete for a plan to repair/stabilize the slope. This presentation provides an overview of a novel solution that was implemented which consisted of widely spaced shear walls across the site. Unlike most conventional applications, the walls were spaced at distances of more the 90 feet apart through approximately 65 feet of soft lake clays. Detailed monitored was complete over the warranty period of three years. The scope of the presentation will include coverage of the procurement process, design, construction, quality control and system performance.

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Arizona Chapter

## 2019 Southwest Symposium "Forensic Case Studies in Geotechnical Engineering" October 28, 2019

**Desert Willow Conference Center:** 4340 E. Cotton Center Blvd., Suite 100, Phoenix, AZ 85040

#### Professional Development Hours Awarded To:

Name:

 Lessons from the Bingham Canyon Mine Landslide (1 PDH) Guest Speaker: Brad Ross, Ph.D. – Director of the Geotechnical Center of Excellence at the University of Arizona
 <b>Common Geotechnical Recommendations that lead to Problems and Forensic Evaluations</b> (1 PDH) Guest Speaker: Curt Peterson, P.E Peterson Geotechnical Group
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