2017

CONFERENCE PROGRAM
ANNUAL KANSAS CITY
GEOTECHNICAL CONFERENCE

April 20, 2017

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FOREWORD

The Kansas City Geotechnical Group thanks you for attending the Annual Kansas City Geotechnical Conference. This year's program brings together technical experts to present geotechnical topics of interest to the profession. We hope that you take advantage of this opportunity to expand your knowledge on these topics.

The proceeds generated today are used to support the ASCE/AEG/UMKC Peck-Garstang-Williams Scholarship Endowment Program and the Department of Civil, Environmental, and Architectural Engineering at the University of Kansas (KU CEAE). Please take a few minutes to read the history of this program on the next page.

Thank you for your continued support and enjoy the conference.

Sincerely,

Richard M. (Dick) Vaeth

ASCE/AEG UMKC

PECK-GARSTANG-WILLIAMS SCHOLARSHIP ENDOWMENT PROGRAM

The ASCE/AEG/UMKC Peck-Garstang-Williams Scholarship Endowment Program was initiated in 2001 after a successful year of income resulting from both a specialty seminar and our annual conference keynoted by Dr. Ralph Peck, and Mimi Garstang and James Williams of the Missouri Geological Survey. The endowment has grown each year with the Kansas City Section ASCE acting as the host sponsor and accounting administrator.

The cumulative contributions to UMKC have now grown to over $150,000. The endowment's earnings generate a sustained annual outflow averaging 5% in recent years. These earnings are equally shared between the UMKC Civil Engineering Department (School of Computing and Engineering) and Geology Department (College of Arts and Sciences), unique as the only known shared scholarship program in the nation between two separate colleges at higher level institutions of education.

The first scholarship recipients were one student from each college during the 2005 – 2006 Academic Year. Since then we have provided for a total of 31 scholarships with approximately $3000/college awarded to either one or two students at each college annually.

The students receiving this year's Peck – Garstang – Williams Scholarships are:

- Joshua Bragg, B.S. Geology, UMKC (Senior)
- Eric Brown, B.S. Geology, UMKC (Graduate)
- Bethany Buckland, B.S. Civil Engineering, UMKC (Junior)
- Joseph Romo, B.S. Civil Engineering, UMKC (Senior)

The Kansas City Geotechnical Group in 2013 entered into a Memorandum of Understanding with the Department of Civil, Environmental, and Architectural Engineering at the University of Kansas (KU CEAE) to establish an Endowment-Sponsorship program for the KU CEAE Department. The Endowment-Sponsorship is intended for use by the graduate level geotechnical program at KU and will be administered mutually between the KU CEAE Department and the Kansas City Geotechnical Group. The amount given to KU this past year was $4,458; now totaling $10,208 donated to this program.

Both ASCE and AEG wish to recognize the professors and staff of UMKC, along with KU, who have dedicated their time and support to these scholarship and sponsorship programs since their respective inceptions. These annual contributions to each academic university provide a means of re-investing back into our engineering/ geology community locally.

Scholarship Review Committee

Craig A. Buhr, P.E.

Dr. John T. Kevern

Dr. Gary Krizanich

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STUDENT POSTER PRESENTERS

Jamal Ismael Kakrasul - KU
Performance Evaluation of Lime Klin Dust Stabilized Subgrade

Mahdi Al-Naddaf - KU
Investigation of Stability of Soil Arching under Surface Loading Using Trapdoor Model Tests

Md Zahidul Karim – KSU
Assessment of bridges with scour vulnerable foundations using electrical resistivity

Madan Neupane – KU
Paradigm of Interface Pressure Distribution of Mechanically Stabilized Layer by Tactile Pressure Sensor

Seyed Mustapha Rahmaninezhad – KU
Effect of Facing Stiffness on Performance of Geosynthetic-Reinforced Retaining Walls Subjected to Footing Loading

CONFERENCE AGENDA

7:00–8:00 a.m.
Registration, Exhibits,
Breakfast/Coffee

8:00–8:15 a.m.
Welcome and Introductory Remarks

8:15–9:00 a.m.
SESSION 1
The Observation Method of Bridge Scour

Jean-Louis Briaud, Ph.D., P.E.
Texas A&M University

9:00–9:45 a.m.
SESSION 2
Emergency Stabilization of Fountain Slide to Maintain CN Rail Service

Rick Deschamps, Ph.D., P.E. *Nicholson Construction Company*

9:45–10:10 a.m.
Break, Exhibits, Networking

10:10–10:55 a.m.
SESSION 3
The Overprediction of Liquefaction Hazard in Certain Areas of Low to Moderate Seismicity

Kevin W. Franke, Ph.D.
Brigham Young University

10:55–11:40 a.m.
SESSION 4
Recent Developments in the Axial, Lateral, and Torsional Response of Drilled Shaft Foundations

Armin W. Stuedlein, Ph.D., P.E.
Oregon State University

11:40–12:00 p.m.
SESSION 5
Update on Deep Foundations Institute's Technical Activities

Mary Ellen (Bruce) Large, P.E., D.GE
Deep Foundations Institute

12:00–1:00 p.m.
LUNCH
Break, Exhibits, Networking

1:00–1:45 p.m.
SESSION 6
Geophysical Methods for Screening and Investigating Utility Waste Landfill Sites in Karst Terrain

Gary J. Pendergrass, P.E., R.G.
GeoEngineers, Inc.

1:45–2:30 p.m.
SESSION 7
Impacts of Superfast Construction on Slope Stability

Steve Wendland, P.E., R.G., D.GE
Kleinfelder

2:30–3:00 p.m.
Break, Exhibits, Networking

3:00–3:15 p.m.
Announcement of Student Poster Winners

3:15–3:45 p.m.
SESSION 8
Case Studies Related to Expert Testimony

Phil King, P.E., D.GE, F.ASCE
SynchroPile, Inc.

3:45–4:15 p.m.
SESSION 9
Geosynthetic Reinforced Soil – Integrated Bridge Systems (GRS-IBS)

John bowders Jr., Ph.D., P.E..
University of Missouri

4:15–4:45p.m.
SESSION 10
Ray County, Alternative to a Soil Nail Wall

Diego Plazas, E.I.T.
Berkel & Company Contractors

4:45–5:00 P.m.
Closing Remarks

SESSION 1

JEAN-LOUIS BRIAUD, PH.D., P.E.

Texas A&M University

Professor Jean-Louis Briaud is a Distinguished Professor and Holder of the Spencer J. Buchanan Chair in the Zachry Department of Civil Engineering at Texas A&M University and a Professional Engineer. He received his Bachelor degree in France in 1972 and his Ph.D. degree from the University of Ottawa in Canada in 1979. His expertise is in foundation engineering and more generally geotechnical engineering. He has served as President of the Geo-Institute of ASCE, President of the International Society for Soil Mechanics and Geotechnical Engineering, and is the current President of the Federation of International Geoengineering Societies. Among other awards, he has received the ASCE Ralph Peck Award from the USA, the CGS Geoffrey Meyerhof Foundation Engineering Award from Canada, the Honorable Aitalyev Medal from Kazakhstan, and is a member of the National Academy of Natural Sciences in Russia. Over the last 30 years, Dr. Briaud has conducted about 10 million dollars of research most of which was on foundations and retaining walls. He has supervised 50 PhD students and 90 Master students. He is the author of a new book entitled Geotechnical Engineering and one entitled The Pressuremeter; he has published about 300 articles and reports in geotechnical engineering. He enjoys tennis, soccer, and rugby, and plays jazz piano at the amateur level

The Observation Method of Bridge Scour

One bridge collapses every ten days in the USA and 60 % of the time it is due to scour. Bridges are inspected every two years; those with foundations that are unstable for calculated and/or observed scour conditions are termed scour critical bridges. There are approximately 17,000 scour critical bridges in the United States. This lecture starts with a history of the development of bridge scour in the US followed by the current state of practice to predict the depth of the scour hole around bridge supports during large flood events. It includes the existing erosion tests to quantify the erodibility of earth materials and how to use the results of these tests. Then it proposes a new bridge scour assessment method called the Observation Method for Scour (OMS). The proposed method does not require site specific erosion testing and accounts for time dependent scour in erosion resistant materials. The OMS is based on finding out what is the biggest flood that a bridge has experienced together with the observed depth of scour. Then it makes use of charts that extrapolate or interpolate observed scour depths at the bridge to predict future scour depths. Ten case histories are presented.

SESSION 2

RICK DESCHAMPS, PH.D., P.E.

Nicholson Construction Company

Rick Deschamps is V.P. of Engineering at Nicholson Construction Company working in the corporate office near Pittsburgh, PA. He received BSCE and MSCE degrees from the University of South Florida and a Ph.D. from Purdue University. Rick's civil engineering experience has spanned consulting, academics and construction. He is a registered professional engineer in several states and has over 40 technical publications. Rick has broad geotechnical experience including soil behavior, soil-structure interaction, and ground improvement. His current efforts relate to leading Nicholson's engineering group with emphasis in development of competitive design-build systems and value engineering alternatives for geo-construction projects throughout the U.S.A.

Emergency Stabilization of Fountain Slide to Maintain CN Rail Service

Fountain Slide, located approximately 16 km Northwest of Lillooet BC, is a relic landslide that has been active since the 1970's. The progressive movements have posed a significant challenge to BC 99, the main North-South highway in the region, and a Canadian National Railway Company (CN) line. Some of these measures implemented by CN included a track realignment, shotcrete tie back wall and a soldier pile and lagging wall with three levels of anchors. For many years the measures had proved to be successful, until in mid 2014 it was observed that the retrogressive slide activated two blocks uphill of the tracks. Slide movements were typically 6 mm per day, leading to extreme distortion of the earth retention system and frequent realignment of the tracks. In the summer of 2016 a design build system of micropiles and anchors was implemented to stabilize the slide. The approach was used because of limited access for large equipment and the need for a ductile stabilization system because of the ongoing movements during construction (as much as 20 mm/day) Three dimensional numerical modeling demonstrated that common state-of-practice design approaches for micropile walls can be unconservative. The longevity of the stabilization is uncertain because of the magnitude and nature of the relic slide above the tracks. The presentation will discuss the design considerations and final approach implemented, construction activities, and deformation monitoring during and post construction.

SESSION 3

KEVIN W. FRANKE, PH.D., P.E.

Brigham Young University

Kevin W. Franke, Ph.D., P.E. is an Assistant Professor in the Department of Civil and Environmental Engineering at Brigham Young University. Kevin's principal research focus relates to geotechnical/earthquake engineering. Kevin and his students are currently developing performance-based (i.e., probabilistic) methods for dealing with soil liquefaction and its associated hazards. Additionally, Kevin is an investigator in the Center for Unmanned Aircraft Systems (C-UAS), which is currently the only NSF-sponsored research center for UAVs. Kevin's research focus in the Center deals with new and improved applications of small unmanned aerial vehicles (sUAVs) in monitoring infrastructure and performing post-disaster reconnaissance.

Prior to his current position at BYU, Kevin worked for 6 years as a professional civil engineering consultant for Kleinfelder, Inc. and URS Corporation. Kevin contributed to multiple significant projects throughout the western and central US including Kennecott Utah Copper tailings impoundment, facilities at Los Alamos National Labs, California High Speed Rail, North Torrey Pines Bridge seismic retrofit, I-15 Corridor Reconstruction in Utah County, Sacramento Area Flood Control Authority Levee Evaluations/Improvements, Levee improvements in New Orleans, Roscoe Wind Farm, Legacy Parkway, and multiple schools and hospitals throughout CA, OR, and WA. Kevin received his BSCE from Utah State University in 2004, is MSCE from University of Washington in 2005, and his Ph.D. from Brigham Young University in 2011.

The Overprediction of Liquefaction Hazard inCertain Areas of Low to Moderate Seismicity

Since the 1990s, geotechnical engineers have commonly used probabilistic ground motion estimates in the prediction of liquefaction triggering hazard and its subsequent effects. These engineers generally identify a return period of interest, and then couple the probabilistic ground motion from that return period with the corresponding modal or mean earthquake magnitude from the ground motion deaggregation to create an equivalent single earthquake scenario that is analyzed in a deterministic manner in a liquefaction hazard assessment. This approach has been referred to as the pseudo-probabilistic approach or the partially probabilistic approach by other researchers. While this approach generally produces acceptable liquefaction hazard estimates in areas of high seismicity, it has been shown to produce unreasonably large liquefaction hazard estimates in areas of low to moderate seismicity where seismic sources that are capable of producing large magnitude earthquakes and that are located far away dominate the probabilistic seismic hazard. As a result, the pseudo-probabilistic approach routinely contributes to the overprediction of liquefaction hazard in many areas of low to moderate seismicity. This presentation will demonstrate through an example how the pseudo-probabilistic approach produces an unrealistic earthquake scenario in these areas of low to moderate seismicity. A probabilistic liquefaction hazard analysis approach that removes the tendency to overpredict liquefaction hazard in these areas will be summarized and explained. A new simplified probabilistic liquefaction hazard analysis approach that is easier for engineering practitioners to apply on routine projects will be presented and discussed. This simplified probabilistic approach allows engineers to take advantage of the benefits of a fully probabilistic liquefaction hazard analysis, but without requiring them to perform the numerous probabilistic calculations or numerical integrations that are typically associated with such advanced and sophisticated approaches.

SESSION 4

ARMIN W. STUEDLEIN, PH.D., P.E.

Oregon State University

Dr. Stuedlein is an Associate Professor in the School of Civil and Construction Engineering at Oregon State University. Armin received his doctorate at the University of Washington in 2008. He joined the faculty at OSU in 2009 after five years of geotechnical consulting at Seattle-based firms, where he specialized in port and harbor engineering with an emphasis on foundation and earthquake engineering. His research has been published in over 70 technical publications, and focuses on ground improvement for static and seismic applications, reinforced soils, soil-foundation-structure interaction, and the characterization and incorporation of inherent soil variability and model transformation errors into probabilistic geotechnical analyses. His research is funded by departments of transportation, the National Science Foundation, and the National Academy of Science. He is an active member of the Soil Improvement and the Risk Assessment and Management Committees at the ASCE Geo-Institute, the Editorial Boards for Georisk and the ASCE Journal of Geotechnical and Geoenvironmental Engineering (JGGE). Among other honors, Professor Stuedlein received the 2013 Deep Foundations Institute Young Professor Award for work on the reliability of augered cast-in-place piles, and the 2015 Associate Editor of the Year Award for the JGGE.

Recent Developments in the Axial, Lateral, and Torsional Response of Drilled Shaft Foundations

Drilled shafts are used to provide support for buildings, bridges, and mast arm-type traffic sign and signal poles owing to the various advantages these foundation elements provide with regard to construction and substructure load transfer. In the Pacific Northwest, increasing seismic loads has led to the need to consider alternate means of construction and providing necessary structural resistance without impacting geotechnical capacity. The first part of this presentation will discuss the results of recent full-scale axial and lateral loading tests of high-strength (80 ksi) reinforced drilled shafts and cased drilled shafts with and without internal steel, and the use of novel integrity test approaches in the interpretation of load transfer. The second part of this presentation will present the results of full-scale torsional loading tests of drilled shafts, including the first full-scale observations of torsional load transfer. A design methodology is proposed and compared to this and previously reported loading data.

SESSION 5

MARY ELLEN (BRUCE) LARGE, P.E., D.GE

Deep Foundations Institute

Ms. Bruce Large is the Director of Technical Activities for Deep Foundations Institute (DFI), responsible for assisting technical aspects of committee work, research, publications, seminars, journal, magazine and strategic planning. She holds a B.S. degree in Civil Engineering from the University of Maryland and a M.S. degree in Geotechnical Engineering from Cornell University. She has over 25 years of experience in the geotechnical, environmental and deep foundations engineering industry. She worked for major consulting engineering firms before founding geotechnica, s.a., Inc. in 1998, a certified woman-owned geotechnical engineering consultancy. She has authored/co-authored technical papers on micropiles, deep mixing, and ground anchors, and she was involved in preparing a federally funded state-of-practice report and NHI teaching course on micropiles. She was the FHWA's Principal Investigator for the design manual on deep mixing for embankment and foundation support. She is a Professional Engineer in Pennsylvania, New York and Michigan, a member of ASCE, Engineers without Borders, Chi Epsilon, ADSC, DFI, TRB and a Diplomate of Geotechnical Engineering. She serves as the Technical Lead for the International Society for Micropiles (ISM), established in 2006, a vehicle for networking micropile specialists globally, disseminating technical micropile information and organizing international micropile workshops.

Update on Deep Foundations Institute's Technical Activities

Deep Foundations Institute's 18 technical committees and 3 working groups are actively involved in projects aimed at advancing the state of the practice and understanding of deep foundations. This presentation will highlight some of the newest technical projects and events being conducted, including:

- DFI-Geo-Institute Collaboration
- DFI Risk and Safety Initiatives
- Stabilize, Support and Improve Event – Washington, DC August 2017
- DFI Seepage Control Working Group-USACE Workshop
- NAVFAC Specification Updates
- EFFC-DFI Support Fluids Task Force
- DFI's Newest Technical Committee Publications

SESSION 6

GARY J. PENDERGRASS, P.E., R.G.

GeoEngineers, Inc.

Gary Pendergrass is a Registered Professional Engineer and Registered Geologist with over thirty-five years of experience in management of major engineering and environmental projects. Mr. Pendergrass currently serves as Principal and Environmental Group Leader with GeoEngineers, Inc. in Springfield, MO. In this role, Mr. Pendergrass manages environmental, geological, and geotechnical projects in the Midwestern and Southern United States. Recent project work has involved carbon sequestration, utility waste landfill development, groundwater characterization, sinkhole stabilization, and Superfund remediation.

Prior to joining GeoEngineers in December 2010, Mr. Pendergrass served as Manager of Environmental Compliance with City Utilities of Springfield, MO, and previously served the utility as Assistant to the Manager of Engineering and Planning. Gary rejoined the utility after retirement from Syntex Corporation, where he served as President of Agribusiness Technologies, Inc. During his association with Syntex, Mr. Pendergrass completed major hazardous waste cleanup projects at the Syntex Agribusiness, Inc. Springfield (MO) and Verona (MO) plant sites and, more recently, headed up the Eastern Missouri Dioxin Project, a nationally recognized hazardous waste cleanup project involving 29 dioxin-contaminated sites, including Times Beach. The Eastern Missouri Dioxin Project is the largest hazardous waste cleanup project ever completed in EPA Region VII, and one of the largest in the nation. The "mixed work" settlement agreement negotiated by Mr. Pendergrass for the Eastern Missouri Dioxin Project was termed a "model for the nation" by EPA. During his association with City Utilities, Mr. Pendergrass completed a number of projects involving power plant construction, dam inspection and rehabilitation, landfill design and construction, coal sourcing and supply, soil and groundwater remediation, and water resource development. As a private consultant, Mr. Pendergrass has also provided litigation support and expert testimony on issues involving soil and groundwater contamination, foundation failure, groundwater depletion, and sinkhole collapse.

Mr. Pendergrass holds a Bachelor of Science Degree in Engineering Geology and Stratigraphy from Missouri State University, and both Bachelor of Science and Master of Science Degrees in Geological Engineering from Missouri University of Science & Technology. He has served on the Boards of Directors of Syntex Agribusiness, Inc. and Agribusiness Technologies, Inc., in addition to public service on the Missouri Air Conservation Commission and Missouri Board for Geologist Registration, and professional service on National Society of Professional Engineers and Missouri Society of Professional Engineers Boards. Gary has been featured in MSM Alumnus (a quarterly publication of Missouri University of Science & Technology), and his work on the Eastern Missouri Dioxin Project has received national recognition from Renew America and the National Awards Council for Environmental Sustainability, as well as the Keep America Beautiful National Awards Campaign.

Geophysical Methods for Screening and Investigating Utility Waste Landfill Sites in Karst Terrain

With the existing utility waste landfill (UWL) approaching capacity, City Utilities of Springfield, Missouri needed to locate and develop additional landfill space at its John Twitty Energy Center (JTEC). GeoEngineers, Inc. conducted a detailed screening of the entire 800-acre site to characterize karst features and identify suitable prospective landfill sites. Geophysical surveys utilizing parallel Electrical Resistivity Tomography (ERT) traverses (100-foot spacing) and Multi-channel Analysis of Surface Waves (MASW) soundings (400-foot grid) were conducted and complemented by site reconnaissance, confirmatory drilling, downhole video, and downhole Light Detection and Ranging (LiDAR). The screening program successfully delineated depth to bedrock, engineering properties of earth materials, the nature and extent of the karst system beneath the site, and the mode of shallow groundwater movement. Two sites were identified which provided the best opportunities for cost-effective landfill development. A preferred site was selected, and a more detailed geophysical investigation conducted which utilized parallel ERT traverses on a 20-foot spacing and MASW soundings on a 200-foot grid. The closer ERT spacing allowed processing of 3D imagery which was utilized to 1) develop a conceptual landfill model, 2) design a focused drilling program, 3) identify areas requiring pre-emptive stabilization and develop a stabilization plan, and 4) site groundwater monitoring wells which would effectively monitor groundwater in karst beneath the landfill. All geophysical and drilling data were input to a comprehensive 3D GIS model for use in public presentations and meetings.

SESSION 7

STEVE WENDLAND, P.E., R.G., D.GE.

Kleinfelder

Steve Wendland is Kleinfelder's Director of Geo-Engineering with 29 years of experience in geotechnical engineering. In this role, he is responsible for technical leadership of Kleinfelder's geotechnical and geological engineering staff throughout the United States and internationally. He directs technical development and training, use of quality standards, and loss prevention practices for Kleinfelder's 200+ geoprofessionals. Previously, he worked at Black & Veatch and TSI Engineering.

Impacts of Superfast Construction on Slope Stability

A client's desire to complete construction in the shortest possible time can lead to use of super-fast construction methods that directly impact the stability of slopes. Projects are sometimes built before engineering is completed, or engineering plans are ignored, which results in a much higher rate of slope failures.

When the value of natural gas was very high, super-fast construction was often used for well pads, access roads, pipelines, and storage facilities in order to increase profits for the owner. The increased profits exceeded the engineering fees for the project. Based on this situation, many gas production enterprises adopted a "build it then design it" approach which resulted in many failures. The clients understood that these failures would occur, but were willing to accept the repair costs. It can be difficult for consulting engineers to deal with the client's exceptionally high risk tolerance on these projects.

Kleinfelder has provided geotechnical engineering services to some gas and oil production clients that accepted these high failure rates when gas prices were high. For some clients, a large majority of the production facilities experienced slope failures, and that was acceptable to the client. The cause of the slope failures included use of frozen fill, overly steep cut or fill slopes, uncompacted fill, poorly planned spoil piles, surface water, and groundwater seepage. The well pad itself was usually failure free because of the extreme financial and environmental consequences if it were to experience a failure. However, access roads, storage pads, and spoil piles in the mountainous terrain frequently experienced slope failures. "Standard designs" were frequently implemented, but often were not appropriate for a particular site. Kleinfelder worked with these clients to communicate and document the risk, understand the clients' risk tolerance, control the construction as much as possible, and protect our firm from any resulting liability.

As oil and gas prices dropped, the financial advantage of the rapid construction faded. Also, some clients began focusing more on financial accountability and were less willing to accept the costs of the slope failures. As these economic transitions occurred, Kleinfelder worked with our oil and gas clients to understand their changing risk tolerance, complete forensic evaluations of past failures, and help the clients establish new controls to reduce the risk of future failures. Failure rates dropped significantly, with some clients now pushing for a low slope failure rate that is in line with typical commercial development.

The presentation will review the difficulties of super-fast construction, relationships with clients that are willing to accept exceptionally high failure rates, and controlling the liability exposure on these projects. Case studies of slope failures caused by this "build it then design it" approach will be presented. Also, the presentation will focus on how the construction and engineering practices changed as the value of accelerated construction decreased, client interaction through that transition, and how Kleinfelder continued to control our liability.

SESSION 8

PHIL KING, P.E., D.GE, F.ASCE

SynchroPile, Inc.

Philip G King, P.E., D. GE, F.ASCE is President of SynchroPile, Inc., in San Antonio, Texas. Mr. King is a practicing engineer with over 35 years of experience in the fields of Geotechnical, Geo Environmental and Construction Materials Engineering. He is co-inventor of numerous patents related to the SynchroPile / SynchroPier technology, and the AquaLogic stormwater filtration technology. In 2007, ASCE National bestowed Fellow status to Mr. King, and in 2009 he was granted the status of Diplomate, Geotechnical Engineering by The Academy of Geo-Professionals. Mr. King has managed a wide variety of engineering projects throughout North, South and Central America; North and West Africa; the Middle East; the Canadian and Alaskan Arctic; the Alaskan North Slope; and the Gulf of Mexico. Over his career, he has been active in local, state and national engineering societies, and is past President of the GeoInstitute of ASCE National (G-I).

Case Studies Related to Expert Testimony

The presentation will have an overview of our Ethical duties as Engineers providing expert services and testimony in litigation cases. The presentation will include several litigation examples.

SESSION 9

JOHN BOWDERS JR., PH.D., P.E.

University of Missouri

John J. Bowders is the William A. Davidson Professor of Civil Engineering at the University of Missouri. He completed his BS and MS Civil Engineering degrees at Drexel University, and his PhD at the University of Texas at Austin in 1985. During the past 30 years, Dr. Bowders has served on the civil engineering faculties of West Virginia University, The University of Texas at Austin, and the University of Missouri. During his tenure at West Virginia University, Dr. Bowders served for 18 months as on-site advisor to the U.S. Army Research Office's Terrestrial Sciences program. He is a registered professional engineer in West Virginia and Missouri. His research interests include: the effects of chemicals and wastes on the properties and behavior of soil, subsurface containment systems, in situ remediation systems, and design of experiments for laboratory and field tests involving water and chemical movement in soil.

Dr. Bowders is a recent past member of ASCE Geo-Institute's Technical Coordination Council and is responsible for technical committees on geosynthetics, shallow foundations and deep foundations. He is a member of the Geo-Institute's committee on Environmental Geotechnics. Dr. Bowders served as the chair of the committee on Physiochemical Phenomena in Soils for the Transportation Research Board (TRB) and is a past member of TRB's committee on Subsurface Drainage. He is a past member of the Editorial Board for ASCE's Journal of Geotechnical and Geoenvironmental Engineering and served as co-editor of the "Environmental Geotechnics" Department of Geotechnical News.

Dr. Bowders' research has included systems for control, containment, and treatment of acidic drainage resulting from mining operations. He has researched and developed new areas for geosynthetic application including: clogging of geotextile filters placed in combustion ash, in situ containment barriers installed through remote mining technology, and enhanced soil remediation using prefabricated vertical drains. Dr. Bowders has collaborated in research involving: geomembranes, geosynthetic clay liners, asphaltic barriers for containment systems, geotextiles, expanded clays-shales, soil vapor extraction with radio frequency heating, calibration of load resistance factor design for geotechnical infrastructure and measurement of electrical properties.

Geosynthetic Reinforced Soil – Integrated Bridge Systems (GRS-IBS)

An instrumentation and monitoring system was implemented for a geosynthetic reinforced soil (GRS) integrated bridge system (IBS) constructed in Boone County, Missouri in 2014. The project location is subjected to relatively frequent flash flooding, which was a significant consideration in the design of the bridge and the design of the monitoring system. The monitoring system includes 26 surveying points on the bridge exterior to monitor external movement; settlement plates and inclinometers to monitor vertical and horizontal exterior movement, respectively; earth pressure cells to monitor total stresses within the abutment backfill; and vibrating wire piezometers to monitor pore pressures and drainage within the abutment backfill. The GRS-IBS was monitored for a period of 19 months after construction. The monitoring period included several high-water events, but none overtopped the bridge. The results indicate satisfactory performance, including negligible external and internal movements and rapid backfill drainage in response to groundwater level increases.

SESSION 10

DIEGO PLAZAS, E.I.T.

Berkel & Company Contractors

Diego Plazas is A project manager for Berkel and Company. He obtained his degree as a civil engineer from La Salle University in Bogota Colombia, 2001. He worked on several slope stabilization projects in Colombia before moving to the US to complete an MBA at Drury University in 2005. He has been working in design and building projects all over the United States ever since. His professional experience is strong in foundation grouting, permeation grouting, compaction grouting, cellular concrete, soil nail walls, soldier beam and lagging, micropiles, rock and soil anchors, and underpinning.

Ray County, Alternative to a Soil Nail Wall

Soil nail walls are constructed using a "top-down" construction sequence, where the ground is excavated in lifts of limited height. Soil nails and an initial shotcrete facing are installed at each excavation lift to provide support. Nails are often installed in a vertical spacing of 4 to 5 ft. which translates in one nail every 20 square feet of wall. The MODOT issued a contract for design and construction of soil nail. The challenge was the limited access for the drill rig.

Berkel and company proposed a soldier beam and lagging wall with permanent shotcrete face to reduce the amount of drilling. This is the most commonly used type of anchored wall system. It uses vertical wall elements spanned by lagging, typically made of timber, which may also be made of reinforced shotcrete. The advantage of this system over the soil nail wall was the reduction of drilling amount which was the most difficult task on this project.

The first part of the presentation will consist of reviewing the design guidelines issued by MODOT and the constructability challenge. The second part will describe the soldier and beam lagging and how this helped the project. Finally, we will describe advantages and disadvantages of each system used for this specific project.

ADDITIONAL NOTES

PRESENTATIONS

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