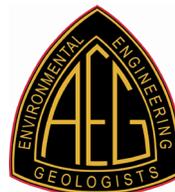


2017

CONFERENCE PROGRAM  
ANNUAL KANSAS CITY  
GEOTECHNICAL CONFERENCE

*April 20, 2017*  
BLACK & VEATCH RUISCH AUDITORIUM

Jointly Sponsored by:



## FOREWORD

**T**he 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

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## ASCE/AEG UMKC

### PECK-GARSTANG-WILLIAMS SCHOLARSHIP ENDOWMENT PROGRAM

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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**

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# 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

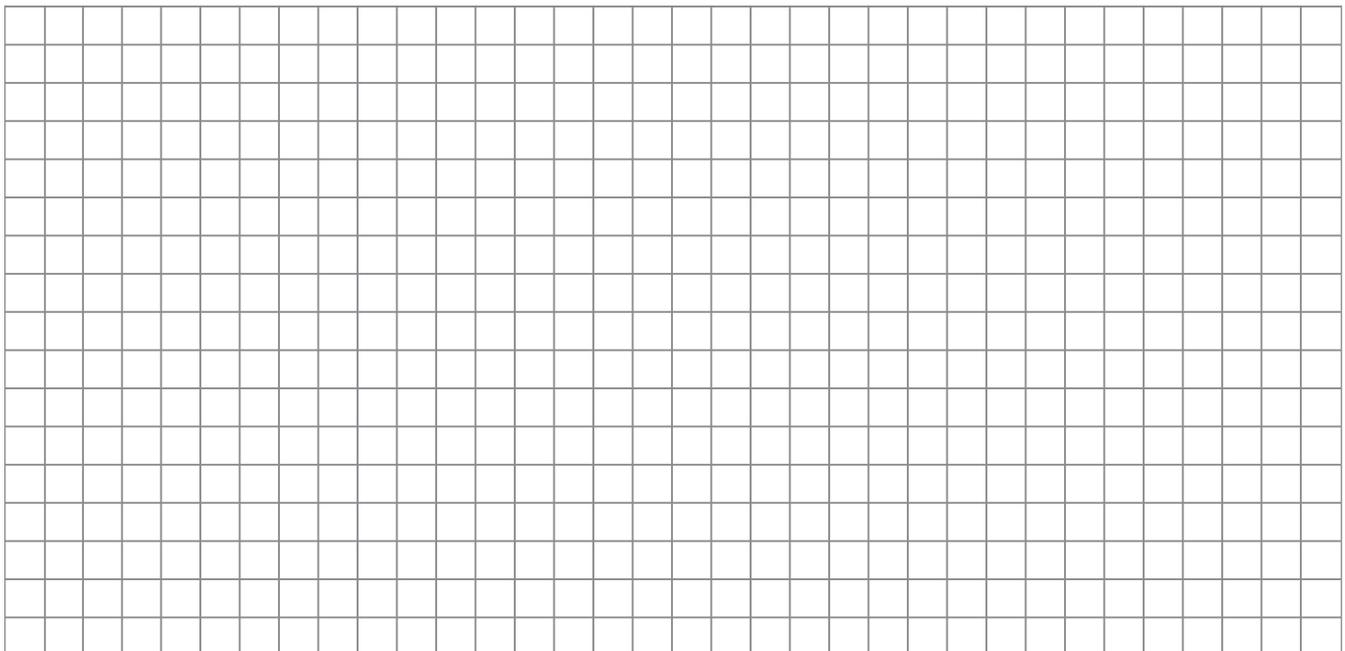
**SESSION 1****JEAN-LOUIS BRIAUD, PH.D., P.E.**

*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.



# PRESENTATIONS

## SESSION 2

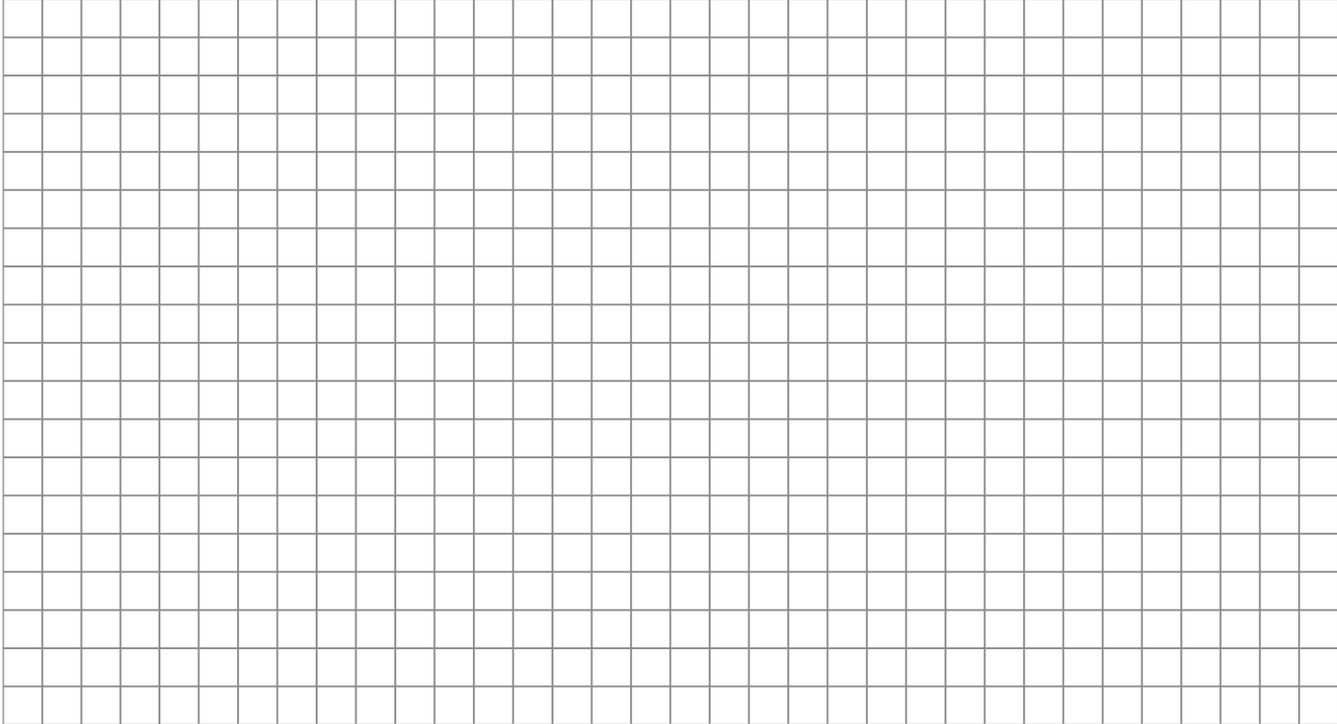
### RICK DESCHAMPS, PH.D., P.E.

*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.**

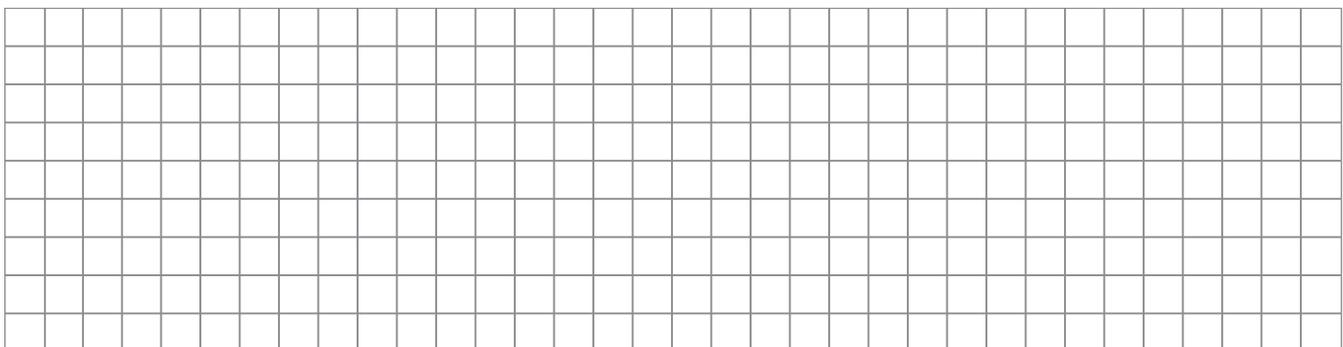
*Brigham Young University*

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 in Certain 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.



# PRESENTATIONS

## SESSION 4

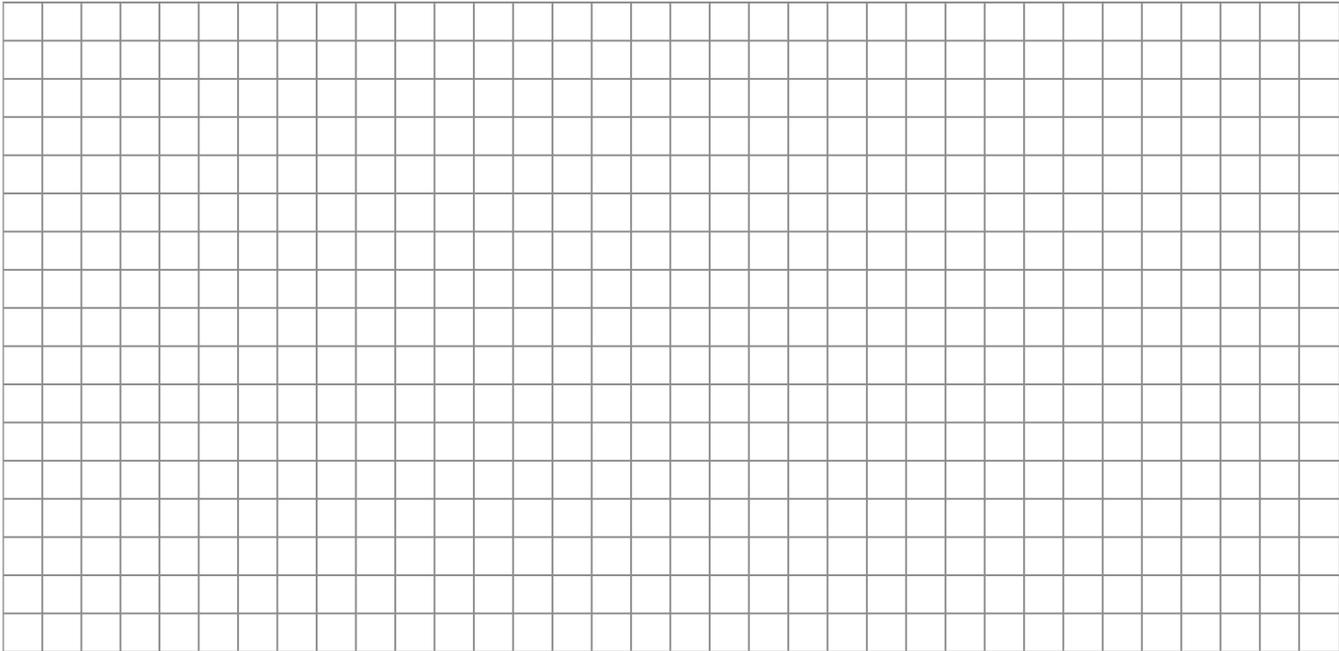
### ARMIN W. STUEDLEIN, PH.D., P.E.

*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.





# PRESENTATIONS

## 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.







# PRESENTATIONS

## SESSION 10

### DIEGO PLAZAS, E.I.T.

*Berkel & Company Contractors*

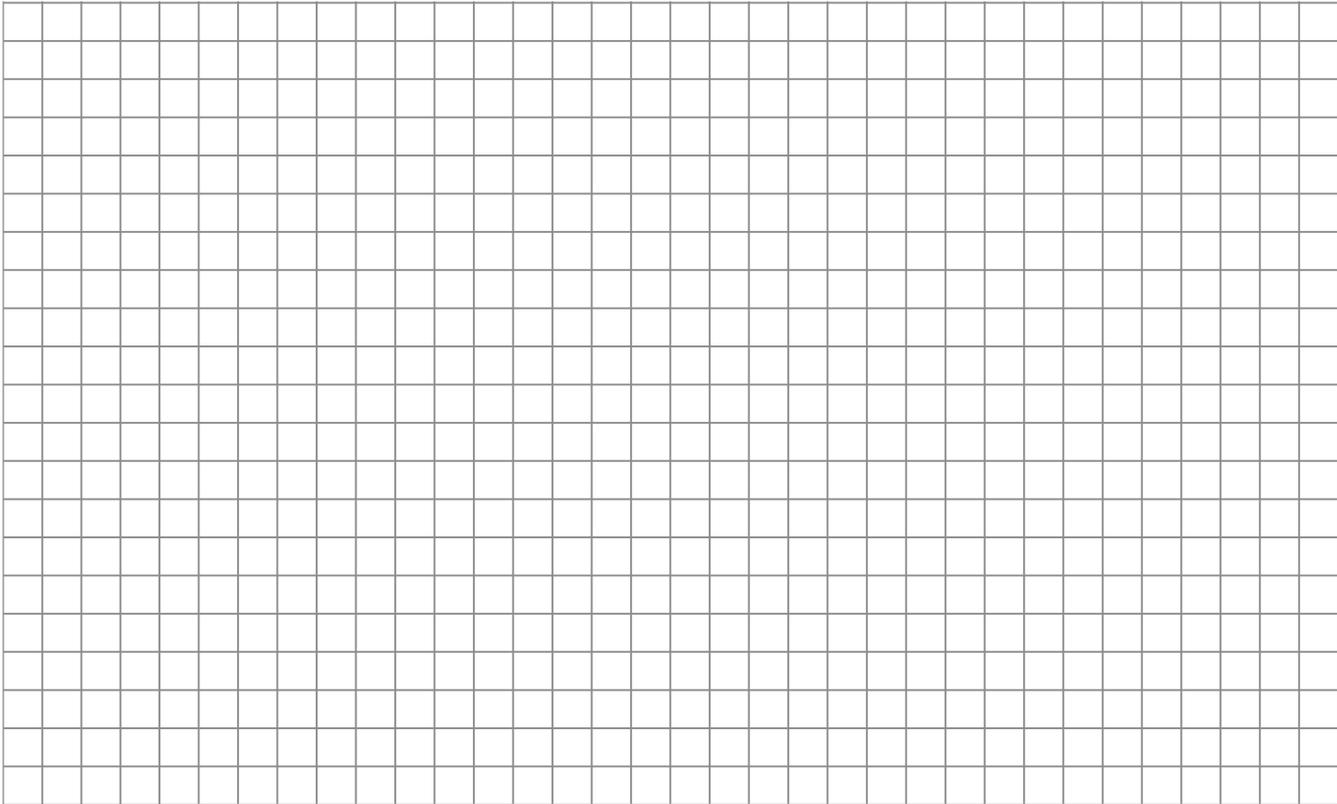
Diego Plazas is A project manager for Berkel and Company. He obtained his degree as a civil engineer from La Salle University in Bogota Colombia, 2001. He worked on several slope stabilization projects in Colombia before moving to the US to complete an MBA at Drury University in 2005. He has been working 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.

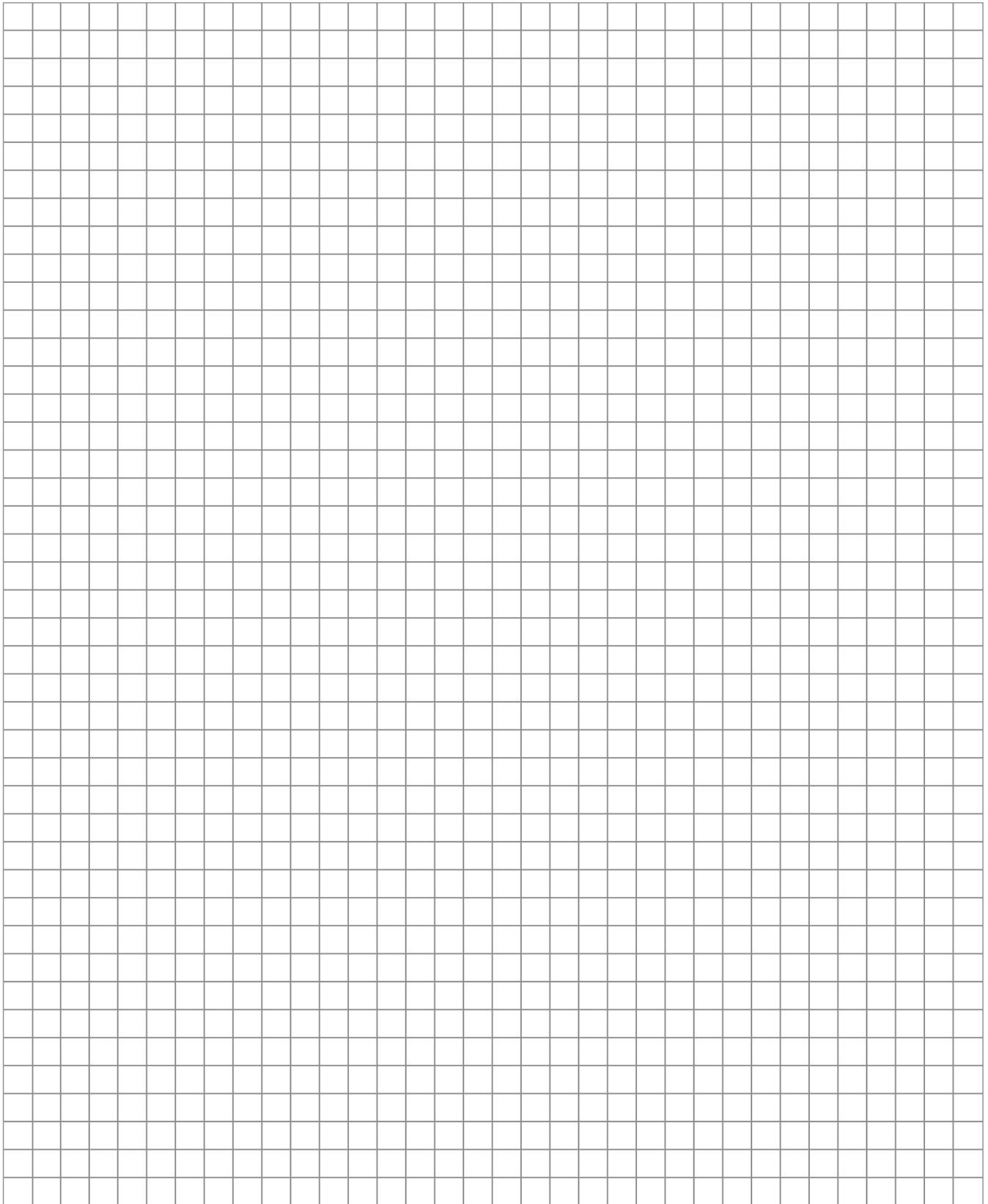
Berkel and company proposed a soldier beam and lagging wall with permanent shotcrete face to reduce the amount of drilling. This is the most commonly used type of anchored wall system. It uses vertical wall elements spanned by lagging, typically made of timber, which may also be made of reinforced shotcrete. 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.

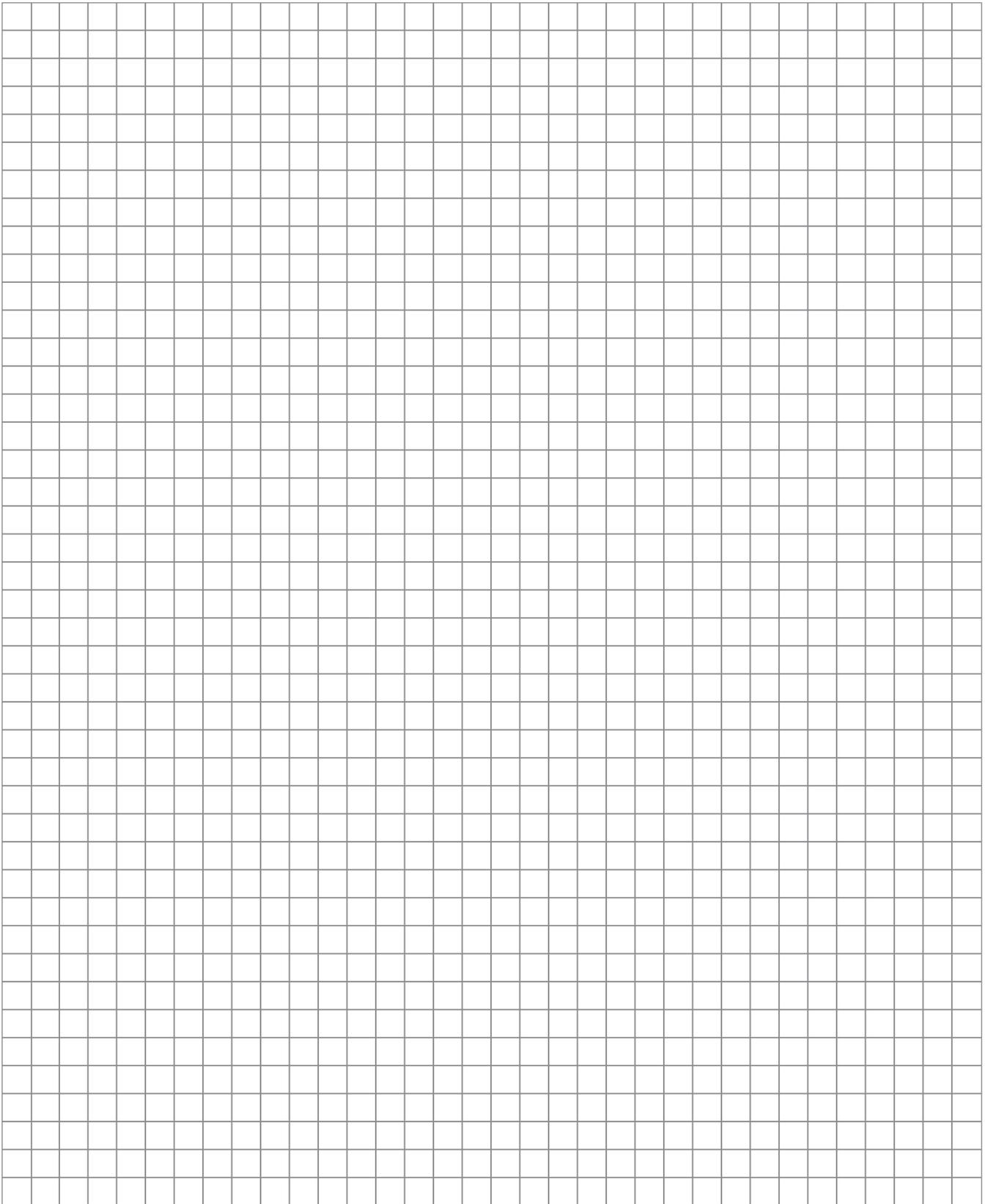
The first part of the presentation will consist of reviewing the design guidelines issued by MODOT and the constructability challenge. The second part will describe the soldier and beam lagging and how this helped the project. Finally, we will describe advantages and disadvantages of each system used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

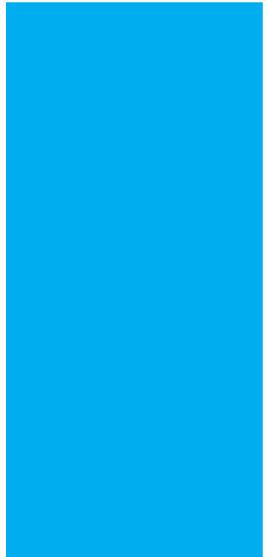




# PRESENTATIONS







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