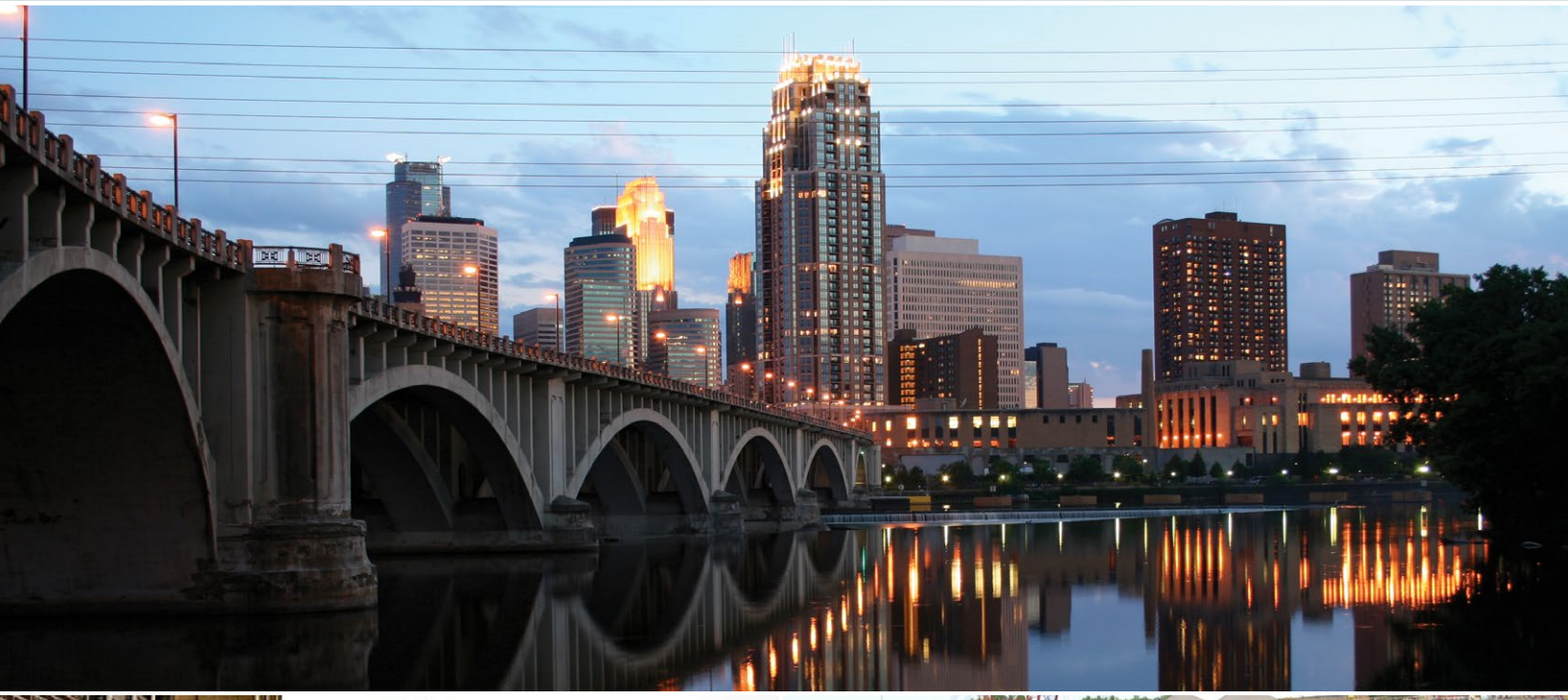
FINAL PROGRAM

GEO-CONGRESS 2020

Minneapolis, Minnesota | February 25-28

Vision, Insight, Outlook



Hyatt Regency Minneapolis | Minneapolis, MN USA

www.geocongress.org

Welcome to **Geo-Congress 2020**

Schedule at a Glance

(Subject to change) **Events in bold take place in the Exhibit Hall.*

Tuesday, February 25, 2020

8:00 a.m. – 5:00 p.m. Geotechnical Aspects of Pavement Design and Construction – *Lakeshore A*

8:00 a.m. – 5:00 p.m. Stability & Stabilization of Natural and Man-Made Slopes with Climate Change – *Lakeshore B*

8:00 a.m. – 12:00 p.m. Ground Modification Methods and Their Recent Developments – *Lakeshore C*

8:00 a.m. – 12:00 p.m. Implementation of Geotechnical Asset Management – *Greenway A*

1:00 – 5:00 p.m. Analysis of Seismic CPT Data to Derive Shear Wave Velocity Profiles – *Lakeshore C*

1:00 – 5:00 p.m. Design of Structural Compacted Fills for Better Performance – *Greenway A*

1:00 – 5:00 p.m. An Introduction to Earthquke Engineering Computer Simulation – *Greenway B*

1:00 – 6:00 p.m. **Exhibitor Setup**

2:00 – 2:30 p.m. G-I Student Orientation – *Northstar Ballroom*

2:30 – 3:30 p.m. G-I Student Professional Development Workshop – *Northstar Ballroom*

3:30 – 4:30 p.m. G-I Geo-Wall Captains Meeting – *Northstar Ballroom*

4:30 – 5:00 p.m. AGP Induction Ceremony – *Nicollet Ballroom*

5:00 – 6:30 p.m. Opening Remarks and H. Bolton Seed Award Lecture – *Nicollet Ballroom* **Sponsored by** ITASCA

6:30 – 8:00 p.m. **Welcome Reception**

8:00 – 10:00 p.m. Outreach and Engagement Happy Hour – *Prairie Kitchen and Bar, Hyatt Regency*
Sponsored by KCI

Wednesday, February 26, 2020

6:30 – 7:30 a.m. Yoga - StayFit Fitness on Demand Studio

8:00 – 9:00 a.m. Opening Plenary Session – *Nicollet Ballroom*
Sponsored by Jacobs

9:00 – 10:00 a.m. Geo-PIT: Powerful, Informative Talks on Geotechnical Topics – *Nicollet Ballroom*

9:30 a.m. – 4:00 p.m. Academic Showcase – *Great Lakes Ballroom*

10:00 – 10:30 a.m. **Morning Networking Break** – *Available in Exhibit Hall, Northstar Ballroom & Great Lakes Ballroom*
Sponsored by BGC

10:00 a.m. – 3:00 p.m. Student Competitions – *Great Lakes Ballroom*

10:30 – 11:30 a.m. G-I Business Meeting – *Greenway A*

10:30 a.m. – 12:00 p.m. ASCE Government Relations Session: Impacting Policy Through State Report Cards – *Lakeshore A*

10:30 – 12:30 p.m. Poster Sessions – *Northstar Ballroom*
See pages 24-25 for details

12:30 – 2:00 p.m. **"Vision" Lunch** – *Available in Exhibit Hall, Northstar Ballroom & Great Lakes Ballroom*

2:00 – 3:30 p.m. Technical Sessions

2:00 – 3:30 p.m. Special Session: Supporting Our Stadiums: The Geotechnics of the Stadiums of the Twin Cities – *Lakeshore A*

2:00 – 3:30 p.m. Special Session: Innovative Use of Computing for Data Visualization and Geotechnical Analysis – *Greenway A*

2:00 – 3:30 p.m. Special Session: Grouting "Grouting Verification from lab to Field"– *Greenway C*

2:00 – 3:30 p.m. Special Session: Geotechnical Considerations of Permanent and Temporary Flood Protection Infrastructure in the Province of Manitoba | Past, Present, and Future – *Greenway D*

2:00 – 3:30 p.m. Special Session: The Road Ahead: Using Technological Advances to Address Challenges in Pavements – *Greenway F*

3:30 – 4:00 p.m. **Afternoon Networking Break** – *Available in Exhibit Hall, Northstar Ballroom & Great Lakes Ballroom*

4:00 – 5:30 pm Technical Sessions

4:00 – 5:30p.m. Special Session: Point the Way: Photogrammetry and LiDAR for geo-imaging Panel and CPT vs. SPT Debate – *Greenway A*

4:00 – 5:30p.m. Special Session: Geotechnical Considerations for Alternative Project Delivery – *Greenway C*

4:00 – 5:30p.m. Special Session: Sinkhole Detection, Characterization, and Engineering – *Greenway E*

4:00 – 5:30p.m. Special Session: Recent Advances in Risk-Informed Geotechnical Design and Management – *Greenway F*

4:00 – 5:30p.m Special Session: Multiphysics and Multiphase Flow in Porous Media – *Greenway G*

4:00 – 5:30p.m Special Session: Fostering Innovation with Geotechnical Reliability: The Role Reliability Plays in Spurring Innovation – *Greenway H*

4:00 – 5:30p.m Special Session: Advances in Geomechanics and Geocomputing – *Greenway I*

5:30 – 6:00 pm Geo-PIT: Powerful, Informative Talks on Geotechnical Topics – *Nicollet Ballroom*

6:00 – 7:00 p.m. **Mercer Lecture** – *Nicollet Ballroom*

6:30 – 8:00 p.m. Organizational Member Executive Leadership Dinner and Workshop – *Millennium Done, Millennium Hotel - Use Skyway from 2nd Floor of Hyatt Regency*

7:00 – 8:30 p.m. MGS/U of M 68th Annual Geotechnical Conference Dinner and Lecture – *University of Minnesota McNamara Alumni Center (separate registration required)*

8:00 – 10:30 p.m. Purple Party | A Prince Tribute

8:15 – 9:15 p.m. G-I Student Program: Organizational Members and Student Travel Grant Winners Job Fair – *Northwoods*

9:15 – 10:15 p.m G-I Student Program: Organizational Member and Student Reception – *Northwoods*

Thursday, February 27, 2020

6:30 – 7:30 a.m. Yoga - StayFit Fitness on Demand Studio

8:00 – 10:00 a.m. Special Session: 68th University of Minnesota Geotechnical Conference Plenary Session 1 and Kersten Lecture – *Nicollet Ballroom*

10:00 – 10:30 a.m. **Morning Networking Break** – *Available in Exhibit Hall & Northstar Ballroom*

10:30 a.m. – 12:00 p.m. Technical Sessions

10:30 – 12:30 p.m. Special Session: 68th University of Minnesota Geotechnical Conference Plenary Session 2 – *Nicollet Ballroom*

10:30 – 12:00 p.m. Special Session: "Ah-Ha" Moments in Geo-Engineering: My Biggest Geotechnical Surprise – *Lakeshore A*

10:30 – 12:00 p.m. Special Session: Practical Considerations on Seepage Analysis for Embankments, Dams and Slopes – *Lakeshore B*

10:30 – 12:00 p.m. Special Session: Soil Improvement by Rigid Inclusions Panel Discussion – *Greenway A*

12:00 – 1:30 p.m. **"Insight" Lunch** – *Available in Exhibit Hall & Northstar Ballroom*

1:30 – 3:00 p.m. Special Session: 68th University of Minnesota Geotechnical Conference Part A – *Lakeshore A*

1:30 – 3:00 p.m. Special Session: 68th University of Minnesota Geotechnical Conference Part B – *Lakeshore B*

1:30 – 3:00 p.m. Special Session: GeoDebate- Limit Equilibrium vs. Finite Element Analysis – *Greenway A*

1:30 – 3:00 p.m. Special Session: U.S. Canada Joint Session on Innovative Approaches for Mine Waste Management – *Greenway C*

1:30 – 3:00 p.m. Special Session: Determining Pavement Design Criteria for Recycled Aggregate Base and large Stone Subbase – *Greenway D*
1:30 – 3:00 p.m. Special Session: Temporal Forecasting of Geo-Risk in Distributed Infrastructure – *Greenway E*
1:30 – 3:00 p.m. Technical Sessions
3:00 – 3:30 p.m. **Afternoon Networking Break** – *Available in Exhibit Hall & Northstar Ballroom*
3:30 – 5:00 p.m. Special Session: 68th University of Minnesota Geotechnical Conference Part A – *Lakeshore A*
3:30 – 5:00 p.m. Special Session: 68th University of Minnesota Geotechnical Conference Part B – *Lakeshore B*
3:30 – 5:00 p.m. Special Session: USACE Dams and Performance Monitoring – *Greenway A*
3:30 – 5:00 p.m. Special Session: Biogeotechnics Symposium – *Lakeshore C*
3:30 – 5:30 p.m. Poster Session – *Northstar Ballroom*
See pages 24-25 for details.
5:30 – 7:00 p.m. Awards Presentation and Karl Terzaghi Award Lecture – *Nicollet Ballroom* Sponsored by BARR
7:30 – 9:00 p.m. Terzaghi Dinner (Invitation Only) – *Millennium Done, Millennium Hotel - Use Skyway from 2nd Floor of Hyatt Regency*

Friday, February 28, 2020

6:30 – 7:30 a.m. Yoga - StayFit Fitness on Demand Studio
8:00 – 9:30 a.m. Special Session: Mosul Dam | Emergency Construction in a Contingency Environment – *Greenway A*
8:00 – 9:30 a.m. Special Session: Emerging Biogeotechnologies – *Greenway B*
8:00 – 9:30 a.m. Special Session: Design of Geosynthetic Reinforced MSE Walls, Part 1 – *Greenway C*
8:00 – 9:30 a.m. Special Session: Risk Management and modeling in Tailings Ponds – *Greenway D*
8:00 – 9:30 a.m. Special Session: "Panel Session:" Women in Tunneling – *Greenway E*
8:00 – 9:30 a.m. Special Session: Local Governments and Geotechnical topics: City of Minneapolis and Minnesota DOT – *Greenway F*
9:30 – 10:00 a.m. **Morning Networking Break** – *Available in Exhibit Hall & Northstar Ballroom* Sponsored by BGC
10:00 – 11:30 a.m. Special Session: "I couldn't agree more!" The latest Geotechnical Developments Where We Agree Improvement is needed – *Lakeshore A*
10:00 – 11:30 a.m. Special Session: Mosul Dam- Emergency Construction in a Contingency Environment – *Greenway A*
10:00 – 11:30 a.m. Special Session: Biogeotechnics for Reinforcement, Penetration and Foundations – *Greenway B*
10:00 – 11:30 a.m. Special Session: Design of Geosynthetic Reinforced MSE Walls, Pt 2 – *Greenway C*
10:00 – 11:30 a.m. Special Session: Static Liquefaction of Mine Tailings – *Greenway D*
10:00 – 11:30 a.m. Special Session: Overview of Recent Twin Cities Based Underground Projects – *Greenway F*
10:00 – 11:30 a.m. Technical Sessions
11:30 a.m. – 1:00 p.m. **"Outlook" Lunch** – *Available in Exhibit Hall & Northstar Ballroom*
1:00 – 1:30 p.m. Geo-PIT: Powerful, Informative Talks on Geotechnical Topics – *Nicollet Ballroom*
1:30 – 6:00 p.m. **Exhibit Hall Hours: Exhibitor Move Out**
1:30 – 2:30 p.m. Ralph B. Peck Award Lecture – *Nicollet Ballroom* Sponsored by ConeTec
2:30 – 3:00 p.m. Closing Ceremony – *Nicollet Ballroom*

ADSC The International Association of Foundation Drilling
ACEC American Council of Engineering Companies of Minnesota
AMSE Association for Mechanically Stabilized Earth
AEG Environmental Engineering Geologists
Deep Foundations Institute DFI
GBA Geoprofessional Business Association
U.S. Department of Transportation Federal Highway Administration
SEG Society of Exploration Geophysicists
NRRA National Road Research Alliance
PDCA WWW.PILEDRIVERS.ORG
US Army Corps of Engineers
TRB

Contents

CONFERENCE APP

Be sure to download the mobile app to create a personalized schedule, see all the session details and speakers, last minute changes, and contact other attendees.

To download the app, visit: www.attendify.com/attendify_app/download and search for **Geo-Congress 2020**.

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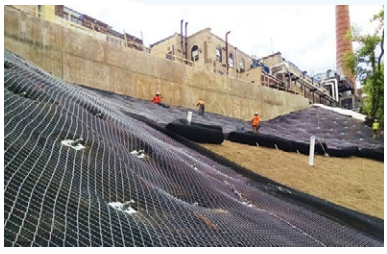

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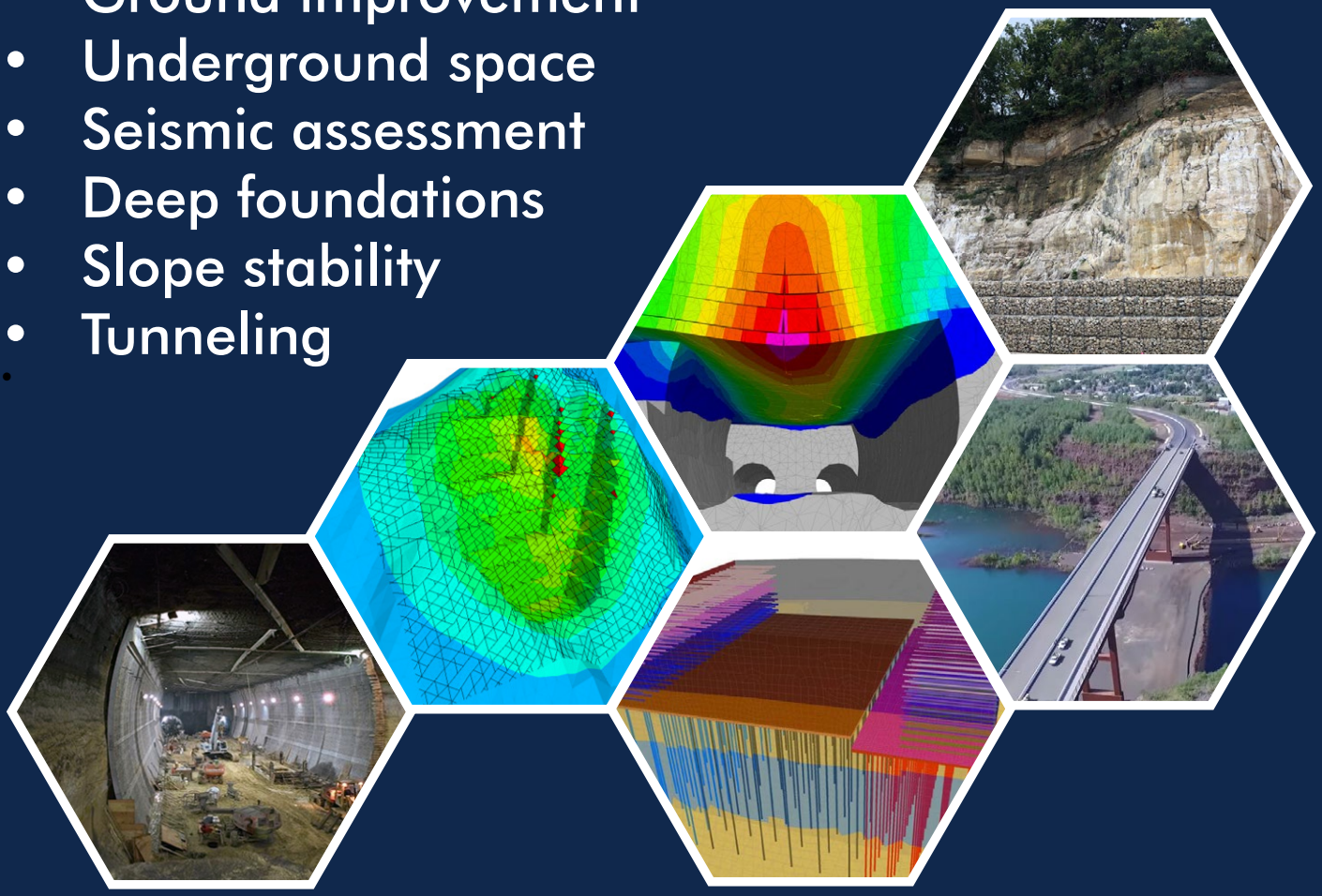

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TUESDAY, FEBRUARY 25, 2020

AGP Induction Ceremony
4:30 – 5:00 p.m.

Opening Remarks and H. Bolton Seed Award Lecture
5:00 – 6:30 p.m. | *Nicollet Ballroom*

Sponsored by ITASCA

Open Issues about Soil Liquefaction from a Perspective Including Physical Model Tests

Awarded annually by the Geo-Institute, the recipient of the H. Bolton Seed Medal is honored for outstanding contributions to teaching, research, or practice in geotechnical engineering.

Presented by this year's recipient, **Bruce Kutter, Ph.D, M.ASCE**

Outreach and Engagement Happy Hour
8:00 - 10:00 p.m. | *Prairie Kitchen and Bar, Hyatt Regency*

Sponsored by KCI

Join your colleagues to promote and celebrate diversity and inclusion in the geo-profession.

WEDNESDAY, FEBRUARY 26, 2020

Opening Plenary Session
8:00 - 9:00 a.m.

Sponsored by Jacobs

Opening Remarks
8:00 – 8:30 a.m. | *Nicollet Ballroom*

Welcoming Remarks from **G-I President Patrick Fox, Ph.D., P.E., D.GE, F.ASCE** and **Conference Chair Derrick D. Dasenbrock, P.E., D.GE, F.ASCE**

Engineering a Miracle
8:30 – 9:00 a.m. | *Nicollet Ballroom*

Guest Speaker: Dave Christian,
American Former Professional Ice Hockey Forward, Olympic Gold Medalist

Christian comes from a family of hockey players. His father Bill and uncle Roger were members of the 1960 U.S. Olympic Hockey Team that won the Gold Medal. His family is also famous for the Christian Brothers Hockey Company, makers of hockey sticks, founded in 1964 in Warroad, MN by Bill and Roger, along with Hal Bakke. Christian is best known for being a member of the 1980 U.S. Olympic hockey team that won the gold medal in an event known as the Miracle On Ice during the 1980 Winter Olympics.

Within a week of the Miracle On Ice, Christian joined the Winnipeg Jets, who drafted him in the 1979 NHL Entry Draft. Just 7 seconds into his first NHL shift, Christian electrified the sold out Winnipeg crowd with his first professional goal. After a roller-coaster career in Winnipeg, he went on to play in the NHL with the Washington Capitals, Chicago Blackhawks, Boston Bruins and St. Louis Blues. In 1009 NHL games, he scored 340 goals and 433 assists. Christian attended the University of North Dakota in Grand Forks, North Dakota. He was inducted into the United States Hockey Hall of Fame in 2001.

GeoPIT: Powerful, Informative Talks on Geotechnical Topics
9:00 – 10:00 a.m. | *Nicollet Ballroom*

Victoria Bennett, Ph.D., A.M.ASCE, Rensselaer Polytechnic Institute – Is the Road to Learning Engineering Judgement a Virtual One?
James Press, EIT, A.M.ASCE, Aterra Solutions – How I Almost Became an English Major
Ellen Rathje, Ph.D, P.E., F.ASCE, University of Texas at Austin – Make Your Data Count
Thomas Westover, P.E., M.ASCE, Cornforth Consultants – Experience: Why Knowing More Means Knowing Less and What to Do About It

ASCE Government Relations Session: Impacting Policy Through State Report Cards
10:30 a.m. - 12:00 p.m. | *Lakeshore A*

Polling indicates Americans overwhelming identify infrastructure investment as a policy area they would like policymakers to prioritize. In state Capitols, ASCE members help champion gas tax increases to fund transportation infrastructure, secure funding for water infrastructure projects, and improve dam safety laws. This is all done through the power of ASCE's State Infrastructure Report Cards. ASCE has released 27 state infrastructure report cards since 2017. State report cards provide an opportunity to reach legislators, as well as a broader audience of infrastructure stakeholders, with information about our infrastructure in a familiar A-F format. Hear from members of the Minnesota State Infrastructure Report Card Committee to learn how they created their report card and why it's a critical advocacy tool.

Jason Staebell, PE, Chair 2018 Report Card for Minnesota's Infrastructure

Seth Spychala, PE, Co-Chair, ASCE State Government Relations & Grassroots Committee

Katherine Zadrozny, PE, Dams Chapter Author, 2018 Report Card for Minnesota's Infrastructure

GeoPIT: Powerful, Informative Talks on Geotechnical Topics
5:30 – 6:00 p.m. | *Nicollet Ballroom*

Vanessa Bateman, P.E., M.ASCE, U.S. Army Corps of Engineers – Between a Rock and a Hard Place: The Role of Judgement and Unexpected Roadblocks
Mario Ruel, CN – The Old and New St. Clair USA-Canada Tunnels: A Fantastic Tale of Achievements

Mercer Lecture
6:00 – 7:00 p.m. | *Nicollet Ballroom*

Geosynthetics for Construction on Soft Foundation Soils

The series was established in 1992 to provide individuals who have made significant technical contributions to the advancement of geosynthetics the opportunity to present their work at international conferences around the world.

Presented by this year's recipient, **R. Kerry Rowe, Ph.D., DEng., DSc(hc), FRS, NAE, FREng, FRSC, FCAE, FEIC, FASCE, FIE(Aust), FCSCE, P.Eng, CP.Eng.**

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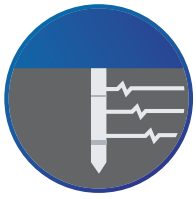
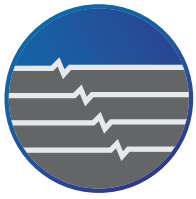


Seismic Cone Penetration Testing (SCPTu)

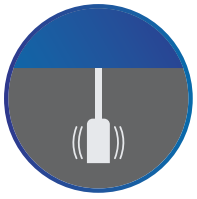


Geophysical Testing

Over Water

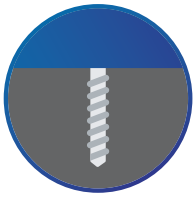
Environmental

Energy



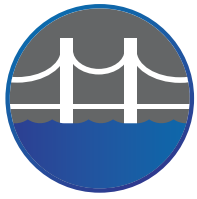
In-Situ Testing (eVST, PMT, DMT)

Monitoring and Instrumentation



Drilling and Sampling

Mining



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THURSDAY, FEBRUARY 27, 2020

Special Session: 68th University of Minnesota Geotechnical Conference Plenary Session 1 and Kersten Lecture

8:00 – 10:00 a.m. | *Nicollet Ballroom*

Kersten Lecture:

Energy Geotechnology: A New Era for Geotechnical Engineering Practice

The University of Minnesota 68th Annual Geotechnical Engineering Conference presents the Kersten Lecture.

Presented by this year's lecturer, **Lyesse Laloui, Ph.D.**

The Art of Numerical Modeling in Geomechanics

Peter A. Cundall, Adjunct Professor, Civil, Environmental, and Geo- Engineering University of Minnesota, Twin Cities

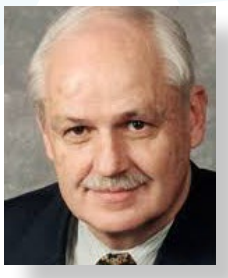
Special Session: 68th University of Minnesota Geotechnical Conference Plenary Session 2

10:30 a.m.– 12:30 p.m. | *Nicollet Ballroom*

Awards Presentation and Karl Terzaghi Award Lecture

5:30 – 7:00 p.m. | *Nicollet Ballroom*

Sponsored by BARR



Karl Terzaghi Lecture:

Observing and Controlling Ground Behavior during Tunneling

For more than 50 years, Geo-Institute's Karl Terzaghi Lecture has been given by an individual honored by the Geo-Institute for their exemplary contributions to the field of geotechnical engineering.

Presented by this year's recipient, **Ed Cording Ph.D., M.ASCE, NAE**

Terzaghi Dinner (Invitation Only)

7:30 – 9:30 p.m. | *Millennium Dome (Millennium Hotel)*

FRIDAY, FEBRUARY 28, 2020

GeoPIT: Powerful, Informative Talks on Geotechnical Topics

1:00 – 1:30 p.m. | *Nicollet Ballroom*

Chukwuebuka Nweke, Ph.D., P.G., M.ASCE, UCLA – Not the Big One, but some Good ones: Strong Motion Data and Geotechnical Engineering Impacts from the Ridgecrest Earthquake Sequence

Joseph Wartman, Ph.D, M.ASCE, University of Washington – Shaping Federal Policy to Reduce Geohazard Losses: the National Landslide Preparedness Act

Ralph B. Peck Award Lecture

1:30 – 2:30 p.m.

Sponsored by ConeTec

Problematic Soils: Characterization Challenges, Innovative Solutions and Novel Monitoring Methods

The Ralph B. Peck Medal Lecture is presented annually by a geotechnical engineer recognized by the Geo-Institute for outstanding contributions to the profession through the analysis and publication of case histories.

Presented by this year's recipient, **Anand Puppala, Ph.D., P.E., D.GE., F.ASCE, F-ICE**

Closing Ceremony

2:30 – 3:00 p.m. p.m. | *Nicollet Ballroom*

Wednesday, February 26

2:00 – 3:30 p.m. **Technical Sessions 1**

Track B | Lakeshore A

Supporting Our Stadiums: The Geotechnics of the Stadiums of the Twin Cities

Moderators: Nathan Iverson, P.E., M.ASCE, and Brian Sanchez, P.E., M.ASCE

Special Session 14
Overview of Twin Cities Underground Projects

The geology of the Twin Cities has been historically advantageous to provide for underground excavations and tunnels to support infrastructure. Much of the in-place infrastructure is being updated or replaced around the area which has resulted in a number of rehabilitation and new construction projects to support the growth of the metropolitan area. The purpose of this proposed special session is to highlight a variety of recent projects from various perspectives within the local industry and discuss challenges or lessons learned from these projects. The special session will consist of a series of short 10-15 minute presentations with discussion/questions representing various views (owner, academic, contractor, designer) on underground construction in the Twin Cities.

Speakers:

Nathan Iverson, P.E., M.ASCE, *Chief Geotechnical Engineer, Veit & Company, Inc.*

Brian Sanchez, P.E., M.ASCE, *Project Manager, Atlas Foundation Company*

Track C | Greenway A

The Future of Computing is Data-Rich, Often in the Cloud, and it is Here: Have You Seen It?

Moderator: Scott Anderson, Ph.D., P.E., M.ASCE

Special Session 18

Beyond limit equilibrium and even finite elements and differences, the power of computing for digital data collection, management, viewing, analysis of complex processes, and reducing risk in geotechnical practice and project delivery is where it has never been before. Computer programmers regularly engage with geotechnical engineers, and the "data" departments in companies or agencies will soon be what the word processing and drafting departments were a generation ago – a necessary step to get any important message across. This session will showcase innovations in cloud-based platforms, 3-D visualizations, augmented reality, and the use of gaming engines for complex analyses, better understanding, better communication, and greater risk reduction.

Topics:

- **Use of the Microsoft HoloLens for understanding complex data above and below ground.**
- **Use of gaming engine software for rockfall analysis in three dimensions to build simple design charts for every day use.**
- **Data management platforms in preparation for AI, learning and big data**
- **Future predictions from the panel and panel discussion.**

Speakers:

Big Data and Cloud-Based Tools WILL Transform Geotechnical Research, Ellen Rathje, Ph.D., P.E., *UT Austin*

Real Life Benefits of Cloud Computing for Geotechnical Data Management, Roger Chandler, *Director, Geotechnical Information Management, Bentley*

Collaborative, Contextual and Accessible – The Future of Subsurface Decision-making, Adam Pidlisecky, *Chief Research Officer, Seequent*

Visualization of Data for Risk Reduction in Project Delivery, Silas Nichols, P.E., *Principal Geotechnical Engineer, Federal Highway Administration*

Using Unity for Geoscience/Rockfall Modelling, Zac Sala, *BGC Engineering*

Panel Discussion:

Future predictions from the panel and panel discussion will be facilitated by Scott Anderson, Ph.D., P.E., BGC Engineering.

Track D | Greenway B

Railway Geotechnics (Part 1)

Moderator: Prof Indraratna, FASCE, and Claudia Zapata, Ph.D.

The Centre for Geomechanics & Railway Engineering (CGRE) and ARC Industrial Transformation Training Centre for Advanced Technologies in Rail Track Infrastructure (ITTC-Rail), University of Wollongong, Australia are honored to lead the Rail Geotechnics Special Sessions. Part 1 of this technical session will include:

Advancement of Rail Ballast Testing Methodologies and Design Implications, Buddhima Indraratna, Ph.D., F.ASCE, *University of Wollongong Australia,* Trung Ngo, Ph.D, M.ASCE, *University of Wollongong Australia,* Cholachat Rujikiatkamjorn, Ph.D, M.ASCE, *University of Wollongong Australia,* Fernanda Ferreira, Ph.D., *University of Porto*

Design of Southwest LRT Cut and Cover Tunnels in Minneapolis, Verya Nasri, Ph.D., P.E., *AECOM, NY,* Hasan Abedi, Ph.D., P.E, M.ASCE, Michelle Julius, P.E., Jim Alexander

The Application of Elastic Inclusions to Improve the Performance of Ballasted Track, Chamindi Jayasuriya, BSc, *Centre for Geomechanics and Railway Engineering (CGRE) and ARC Training Centre for Advanced Technologies in Rail Track Infrastructure (ITTC-Rail), University of Wollongong,* Buddhima Indraratna, F.ASCE, Cholachat Rujikiatkamjorn, Ph.D., M.ASCE, *Centre for Geomechanics and Railway Engineering (CGRE) and ARC Training Centre for Advanced Technologies in Rail Track Infrastructure (ITTC-Rail), University of Wollongong,* Sinniah Navaratnarajah, Ph.D., M.S.

Large-Scale Direct Shear Shear Test on Railroad Ballast, Mohammad Mahdavi Kharanaghi, *Texas A&M University,* Jean-Louis Briaud, Ph.D., P.E., D.GE, Dist.M.ASCE, *Texas A&M University*

Part 2 of this session follows the Networking Break

Track E | Greenway C

GROUTING "Grouting Verification from Lab to Field"

Moderators: Chadi El Mohtar, Ph.D., P.E., M.ASCE, James Myers, P.E., M.ASCE, Adam Paisley, P.E., M.ASCE, Milton Gomez, A.M.ASCE

Special Session 5

Erosion Behavior of Earth Levee Models Treated with Biopolymer Hydrogel Assessed with Hydraulic Flume Apparatus, Sojeong Lee, M.S., *University of New South Wales (UNSW),* Yeong-Man Kwon, *Korea Advanced Institute of Science and Technology,* Gye-Chun Cho, Ph.D., *Korea Advanced Institute of Science and Technology,* Ilhan Chang, Ph.D., A.M.ASCE, *University of New South Wales (UNSW)*

Engineering Assessment of Jet Grouting Pressures and Effects in the Elliott Bay, Sam Yao, P.E., Ph.D., *Simpson Gumpertz & Heger, CA,* William Rudolph, P.E., G.E., Julie Galbraith, P.E., *Simpson Gumpertz & Heger, CA*

Cement Suspension Flow through Heterogeneous Porous Media, Hamza Jaffal, Ph.D., *The University of Texas at Austin, TX,* Katie Ward, B.E., *The University of Texas at Austin, TX* , Chadi S El Mohtar, Ph.D., P.E., M.ASCE, *The University of Texas at Austin, TX.*

Verification of Foundation Improvement Using Low Mobility Grouting; Tarek Haider, P.E., *Geo-Explorers, Inc., PA,* Christopher Morgan, PMP, *Borton-Lawson Engineering, PA,* Roman Poudyal, P.E., *Geo-Explorers, Inc., PA.*

An Experimental Study of Chemical Grouting Materials for Optimum Mechanical Performance, Yusuf Alper Cinar, Msc, *The General Directorate of State Hydraulic Works,* Norbert Maerz, *Missouri University of Science and Technology, MO.*

Discussion on Grouting Topics

Facilitator: Chadi El Mohtar

Track F | Greenway D

Geotechnical Considerations of Permanent and Temporary Flood Protection Infrastructure in the Province of Manitoba – Past, Present and Future

Moderator: James Blatz, Ph.D., P.Eng., FEC

Special Session 8

In 1950 the City of Winnipeg experienced the largest flood on the Red River in over a century. Virtually unprotected from rising flood waters, over 10,500 homes were inundated where water covered almost one-tenth of the city. Over 100,000 people were forced to evacuate their homes in one of the largest mass exoduses in Canadian history. In 1962 the Province of Manitoba embarked on the second largest earth-moving project ever undertaken, second only to the Panama Canal, to construct a flood diversion channel around the City known as the Red River Floodway. Since 1968, the floodway has prevented tens of billions of dollars in flood damage within the City of Winnipeg and in 1997, was tested with 'the Flood of the Century' that pushed the channel and its associated structures to their limits. The 1997 flood also required the emergency construction of a 40 km long earth dike to prevent the Red River from making an "end run" into the City of Winnipeg via the La Salle River. Faced with an increased frequency and severity of spring floods, the Province decided to nearly double the capacity of the floodway to pass a 1- in-700 year flood event and in 2006, expansion of the floodway commenced.

Speakers:

James Blatz, Ph.D., P.Eng., FEC, *Professor of Civil Engineering (and President &CEO TREK Geotechnical Inc. in Winnipeg)*

Rob Kenyon, Ph .D.,P .Eng, FEIC, *Specialist Advisor (Geotechnical), KGS Group, Vice President Technical, Canadian Geotechnical Society*

Ken Skaftfeld, M.Sc., P.Eng., *Senior Geotechnical Engineer, TREK Geotechnical Inc.*

Track H | Greenway F

The Road Ahead: Using Technological Advances to Address Challenges in Pavements

Moderators: Raul Velasquez, Ph.D., P.E., M.ASCE, Eyoab Zegeye, and Hassan Tabatabaee, Ph.D.

Special Session 21

This special session focuses on an overall review of the use of advanced technologies (e.g., automation, nanotechnology, etc.) to address current and future challenges during the design, construction, and maintenance/rehabilitation of pavements. Thoughts and ideas on efficient implementation of advanced technologies are shared and discussed in this session.

The objective of the session is to provide historical background on the major aspects in the developments of pavement design and construction, as well as an overview of the current challenges and significant opportunities created by new technology and innovations. Researchers and industry practitioners will present to the audience essential information on the state-of-practice of pavement design and construction and explore the impact that new and emerging technologies are having or may have on these processes.

Topics include:

- **Historical Perspective: From Roman Roads to Current State of Practice, Current and Future Challenges for Road Infrastructure**
- **Current Technologies and Challenges**
- **Future Technologies**
- **Thoughts for Rapid Implementation of Technologies**

Presenters:

Raul Velasquez, Ph.D., P.E., M.ASCE., *Geomechanics Research Engineer, Minnesota Department of Transportation*

Eyoab Zegeye, Ph.D., *Research Scientist, Office of Materials and Road Research, Minnesota Road Research Section, MnDOT*

Hassan Tabatabaee, Ph.D., *Global Technical Manager for Asphalt Solutions, Cargill BioIndustrial*

Track I | Greenway G

Computational Geotechnics

Moderators: Usama El Shamy, P.E., M.ASCE, Qiushi Chen, Ph.D., EIT, A.M.ASCE

Influence of the Stiffness and Saturated Conditions of Sand on the Numerical Simulation of Free Fall Penetrometers, Luis E. Zambrano-Cruzatty, M.S., SM.ASCE, *Virginia Polytechnic Institute and State University* , Alba Yerro, Ph.D., *Virginia Polytechnic Institute and State University,* and Nina Stark, Ph.D., M.ASCE, *Virginia Polytechnic Institute and State University*

Modeling Deep Excavations in OpenSees, A. Felipe Uribe-Henao, SM.ASCE, *University of Central Florida, FL,* Luis G. Arboleda-Monsalve, Ph.D., M.ASCE, *University of Central Florida, Orlando, FL,* David G. Zapata-Medina, Ph.D., *Universidad Nacional de Colombia,* Fernando Sarabia, *GEI Consultants*

Modeling Irregular Boundaries Using Isoparametric Elements in Material Point Method, Ezra Y. S. Tjung, P.E., S.M.ASCE, *University of California, Berkeley,* Shyamini Kularathna, Ph.D., *University of California, Berkeley,* Krishna Kumar, Ph.D, Aff.M.ASCE , *The University of Texas at Austin,* Kenichi Soga, Ph.D., M.ASCE, *University of California, Berkeley*

Smoothed Particle Hydrodynamics Simulations of Dynamic and Quasi-Static Axisymmetric Collapse of Granular Columns, Elnaz Kermani, Ph.D., *Civil and Environmental Consultants Inc. (CEC), PA,* Saman Barzegari, *Pennsylvania State University, PA,* Tong Qiu, Ph.D., P.E., M.ASCE, *The Pennsylvania State University, PA*

Numerical Analysis of Heat Transfer in Layered Saturated Soil, Chu Wang, S.M.ASCE, *Pennsylvania State University, PA,* Patrick Fox, Ph.D., P.E., F. ASCE, *The Pennsylvania State University*

A DEM Study of the Evolution of Fabric of Coarse-Grained Materials during Oedometric and Isotropic Compression, Mandeep Singh Basson, S.M.ASCE, *University of California, Davis, CA,* Alejandro Martinez, EIT, A.M.ASCE, *University of California, Davis, CA*

Track J | Greenway H

Deep Foundations

Moderators: Muhammad Suleiman, Ph.D., Hai Lin, Ph.D., P.E., M.ASCE, Rozbeh Moghaddam, Ph.D., P.E., M.ASCE

Static Load Test on Open-Ended Pipe Pile Using Double-Wall Instrumentation, Fei Han, Ph.D., M.ASCE, *Purdue University, IN,* Eshan Ganju, S.M.ASCE, *Purdue University, IN,* Rodrigo Salgado, Ph.D., D.G., F. ASCE, *Purdue University, IN,* Monica Prezzi, Ph.D., M.ASCE, *Purdue University, IN*

Results and Lessons Learned from Converting Strain to Internal Force in Instrumented Static Loading Tests Using the Incremental Rigidity Method, Van Komurka, P.E., D.GE, F.ASCE, *GRL Engineers, Inc., OH,* Seth Robertson, Ph.D., P.E., *GRL Engineers, Inc., OH*

Drilled Shaft Foundation Solution at a Challenging, Variable, Karst Site in Tampa, Justin Seltzer, P.E., M.ASCE, *Langan Engineering, FL,* Matthew Meyer, P.E. , D.GE, M.ASCE, *Langan Engineering and Environmental Services, FL,* Carlos Ortiz, P.E., M.ASCE, *Langan Engineering and Environmental Services, FL,* James Dean, P.E., M.ASCE, *Langan Engineering and Environmental Services, FL*

Use of Alternate Foundations to Overcome Design and Construction Challenges in Mississippi Backwater, Simon Murley, P.E., M.ASCE, *POWER Engineers, Inc,* Jason Herron, P.E., C.W.I., *Hubbell Chance Civil & Utility Helical Products,* Christopher Strom, P.E., *Xcel Energy*

Performance Monitoring of a Driven Pile: Early Construction, Static Load Test, and Long-Term Performance Data, Aaron Budge, Ph.D., P.E., M.ASCE., *Minnesota State University, Mankato, MN,* Derrick Dasenbrock, P.E., F.ASCE, D.GE., *Minnesota Department of Transportation, MN*

Track K | Greenway I

Earth Retaining Structures

Moderators: Glen Anderson, Ph.D., A.M.ASCE, Miguel Pando, Ph.D., P.E., M.ASCE, George Segre, P.E., M.ASCE

Case Study of the Observational Method: Northwestern University Simpson-Querrey Biomedical Research Center Earth Retention System, Justin Lewis, P.E., M.ASCE, *Hayward Baker Inc., IL,* Joel Dellaria, S.E., P.E., M.ASCE, *Hayward Baker Inc., IL,* Richard Finno, Ph.D., P.E., D.GE, M.ASCE, *Northwestern University, IL*

Preliminary Numerical Modeling of a Mechanically Stabilized Earth Wall Under Flooding and Rapid Drawdown Conditions, Ali Soleimanbeigi, Ph.D., P.E., *University of Wisconsin-Madison, WI,* William Likos, Ph.D., *University of Wisconsin-Madison, WI,* Greg Siemens, Ph.D., *Royal Military College of Canada, ON,* Tuncer Edil, Ph.D., P.E., FASCE, *University of Wisconsin-Madison, WI*

Limit Equilibrium Analysis of Geosynthetic-Reinforced Retaining Walls Subjected to Footing Loads, S. Mustapha Rahmaninezhad, Ph.D., A.M.ASCE, *Terracon Consulting Inc., TX,* Jie Han, Ph.D., P.E., F.ASCE, Glenn L. Parker, Mahdi Al-Naddaf, Ph.D., A.M.ASCE, *University of Kerbala*

Design, Construction and Monitoring of a Hybrid Cofferdam; Hande Gerkus-Harris, Ph.D., P.E., M.ASCE, *Freese and Nichols, Inc., TX,* Tony Bosecker, P.E., *Freese and Nichols, Inc., TX,* Jiun-Yih Chen, Ph.D., P.E., M.ASCE, *Freese and Nichols, Inc., TX,* Mathew Moses, P.E., Victor Vasquez, P.E., *Freese and Nichols, Inc., TX*

A Reliability-Based Design Approach of a Retaining Wall under Seismic Loading; Wenjun Dong, Ph.D., P.E., M.ASCE, *Bittner-Shen Consulting Engineers, Inc., OR*

Quantifying Induced Stresses from Noise Wall Horizontal and Moment Wind Load Effects, Michael Zimmerman, BSc, MS, E.I.T., S.M.ASCE, *Hayward Baker,* Dante Fratta, Ph.D., P.E., A.M.ASCE, *University of Wisconsin-Madison*

The Effect of Natural Frequency on the Seismic Behavior of an 8 m High MSE Wall, Berk Turkel, S.M.ASCE, *Department of Civil Engineering, Bogazici University, Bebek, Istanbul, Turkey,* Irem Zeynep Yildirim, Ph.D., P.E., M.ASCE, *Department of Civil Engineering, Bogazici University, Bebek, Istanbul, Turkey,* Erol Guler, Ph.D., M.ASCE, *Department of Civil Engineering, Bogazici University, Bebek, Istanbul, Turkey*

Track L | Greenway J

Earthquake Engineering And Soil Dynamics

Moderators: Scott Brandenberg, Ph.D., P.E., M.ASCE, Ashly Cabas Mijares, Ph.D., A.M.ASCE, Menzer Pehlivan, Ph.D., P.E., M.ASCE, Russel Green, Ph.D., P.E., M.ASCE

Numerical Analysis of Soil Liquefaction Using Centrifuge Tests of a Level Site Subjected to Biaxial Shaking; Omar El Shafee, Ph.D., M.ASCE, *RPI, NY,* Mourad Zeghal, Ph.D., M.ASCE, *RPI, NY,* Tarek Abdoun, Ph.D., M.ASCE, *RPI, NY*

An Energy-based Process Evaluation for Low-plasticity Fine-grained Soils during Cyclic Loading, Xiqun Ke, M.S., *South China University of Technology,* Junsheng Chen, *South China University of Technology,* Weidong Pan, *South China University of Technology,* Yi Shan, Ph.D., A.M.ASCE, *South China University of Technology*

Effects of Rocking Coefficient on Seismic Energy Dissipation, Permanent Settlement, and Self-Centering of Rocking Shallow Foundations; Sujitha Soundararajan, M.E., S.M.ASCE, *North Dakota State University,ND,* Sivapalan Gajan, Ph.D., *SUNY Polytechnic Institute, NY*

A Consistent Correlation between Vs, SPT, & CPT Metrics for Use in Liquefaction Evaluation Procedures, Kristin J. Ulmer, S.M.ASCE, *Virginia Tech, VA,* Russell A. Green, Ph.D., P.E., M.ASCE, *Virginia Tech, VA,* Adrian Rodriguez-Marek, Ph.D., M.ASCE, *Virginia Tech, VA*

Turning Disaster into Knowledge: Geotechnical aspects of the 2018 Mw 7.1 Anchorage Alaska Earthquake, Ashly,Cabas, Ph.D., M.ASCE , *North Carolina State University, NC,* Kevin Franke, Ph.D., M.ASCE, *Brigham Young University, UT,* Rich Koehler, Ph.D., *University of Nevada, Reno, NV,* Christine Beyzaei, Ph.D., P.E., M.ASCE , *SAGE Engineers, CA,* Ian Pierce, *University of Nevada, Reno, NV,* Armin Stuedlein, Ph.D., M.ASCE., *Oregon State University, OR,* Zhaohui Zang, Ph.D., M.ASCE, *University of Alaska Anchorage, AK,* Samuel Christie, P.E., G.E., *COWI Marine North America, WA*

DEM Simulations of the Seismic Response of Flexible Retaining Walls; Saman Farzi Sizcow, and Usama El Shamy, Ph.D., P.E., M.ASCE, *Southern Methodist University, TX*

The Effects of Soil Gradation on System Level Dynamic Response, A.P., Sturm, *University of California, CA,* J.T., DeJong, Ph.D., M.ASCE, *University of California, CA*

Wednesday, February 26 *(continued)*

4:00 – 5:30 p.m. **Technical Sessions 2**

Track B | Lakeshore A

COPRI

Moderator: Domenic D'Argenzio, P.E., M.ASCE, Christine Beyzaei, Erin Sibley, Ph.D., P.E., A.M.ASCE, Atilla Bayram, Ph.D., P.E., M.ASCE

Subaqueous Sediment Characterization near Oyster Colonies by Means of Side-Scan Sonar Imaging and Portable Free-Fall Penetrometer, Samuel Consolvo, E.I.T., S.M.ASCE, *Virginia Tech, VA;* Nina Stark, Ph.D., M.ASCE, *Virginia Tech, VA;* Celso Castro-Bolinaga, Ph.D., A.M.ASCE, *North Carolina State University, NC;* Grace Massey, Ph.D., *Virginia Institute of Marine Science, VA,* Steven Hall, Ph.D., P.E., M.ASCE, *North Carolina State University, NC;* Matthew Campbell, *North Carolina State University, NC;* Melody Thomas, *North Carolina State University, NC.*

Erosion and Recession of Beach-Bluff System of Low Fine Content Due to Wave and Surge Actions, Mahsa Ghazian Arabi, M.ASCE, *Stony Brook University, NY;* Ali Farhadzadeh, Ph.D., P.E.., M.ASCE, *Stony Brook University, NY;* Mohammad Khosravi, Ph.D., M.ASCE, *Montana State University, MT*

Characterization of Bed Stresses Near Quay Walls Due to Ship Thruster and Propeller Wash, Raphael Crowley, Ph.D., P.E., M.ASCE, *University of North Florida, FL;* David Bloomquist, Ph.D., P.E., F.ASCE, *University of Florida, FL;* Stefan Van de Sande, *Royal Boskalis Westminster N.V.;* Jamie Lescinski, *Royal Boskalis Westminster N.V.*

Development of a Unique Instrumentation System to Monitor Underwater Noise due to Pile Driving, Raphael Crowley, Ph.D., P.E., M.ASCE, *University of North Florida, FL;* Jonathan Berube, P.E., *University of North Florida, FL;* Christian Matemu, *University of Florida, FL, University of Florida, FL;* Clark Morgan, *University of North Florida, FL;* Brian Kopp, Ph.D., *University of North Florida, FL;* Margaret Kernan, *University of North Florida, FL;* William Dally, Ph.D., P.E., M.ASCE, *University of North Florida, FL;* James Gelsleichter, Ph.D., *University of North Florida, FL*

Optimized slip surfaces for Undrained Loading of Embankments on Lake Agassiz Clays, James Schneider, *USACE, MN;* Jason Foss, *USACE, MN;* Luke Schmidt, *USACE, MN;* Chris Behling, *USACE, MN.*

A Numerical Study on the Behaviour of Offshore Suction Bucket Foundations under Lateral Cyclic Loading, Yilmaz Alp, M.Sc., *Middle East Technical University,* Taşan H. Ercan, Ph.D., *Middle East Technical University*

Track C | Greenway A

Point the Way: Photogrammetry and LiDAR for geo-imaging Panel and CPT vs. SPT Debate

Moderator: Ben Leshchinsky, Ph.D., P.E., M.ASCE, Jim Hambleton, Ph.D., A.M.ASCE

Special Session 1

Point the Way: Photogrammetry and LiDAR for Geo-Imaging Panel (45-min)

Kevin Franke, *Brigham Young University*
Navid Jafari, *Louisiana State University*
Michael Olsen, *Oregon State University*
Thomas Oommen, *Michigan State University*
Joe Wartman, *University of Washington*

CPT vs. SPT Debate (45-min)

Two Invited CPT proponents and two SPT advocates will debate the merits of each exploration system. This will be a light-hearted, but hopefully thought-provoking, look at how long it takes to implement new technologies in the geo-profession.

Participants will include Gerald Verbeek and Derrick Dasenbrock (but we aren't going to tell you which side of the debate they are on).

The Oxford-style debate will be moderated by Jim Hambleton, Northwestern University.

Track D | Greenway B

Railway Geotechnics (Part 2)

Moderator: Erol Tutumluer, Ph.D., M.ASCE, and Trung Ngo, Ph.D., C.Eng, M.ASCE

Part 2 of this this technical session will provide a platform to present and discuss recent and innovative research on railway track systems with the main goal of bringing together the scientific community in this evolving field.

Use of Recycled Rubber Elements in Track Stabilisation, Yujie Qi, Ph.D., A.M.ASCE, *University of Wollongong,* Buddhima Indraratna, Ph.D., FASCE, *University of Wollogong,* Miriam Tawk, S.M.ASCE, *University of Wollongong*

Unsaturated Characteristics of Fouled Ballast to Support in Situ Identification of Fouling, Robert Sherwood, *Kansas State University, KS,* Stacey Tucker-Kulesza, Ph.D., P.E., *Kansas State University, KS,* Michelle Bernhardt-Barry, Ph.D., P.E., *University of Arkansas, AR.*

Numerical Modelling of Track Behavior Capturing Particle Breakage Under Dynamic Loading, Trung Ngo, Ph.D., C.Eng, M.ASCE, *University of Wollongong Australia,* Buddhima Indraratna, Ph.D., F.ASCE, *University of Wollongong Australia*

Panel Discussion
(30 minutes)

Panel Members:
Buddhima Indraratna, *Professor, U*
Erol Tutumluer, Ph.D., M.ASCE, Ph.D., M.ASCE, *Professor, University of Illinois*
Cholachat Rujikiatkamjorn, Ph.D., *UOW*
Claudia Zapata, Ph.D., *Arizona State University*

Track E | Greenway C

Geotechnical Considerations for Alternative Project Delivery

Moderators: Lizan Gilbert, M.ASCE, and Tom Pennington, P.E., M.ASCE

Special Session 7

Moderators:
Lizan Gilbert, P.E., M.ASCE, *Atkinson Construction*
Tom Pennington, P.E., M.ASCE, *McMillen Jacobs Associates*

Panelists:
Peter Davich, P.E., M.ASCE, *MnDOT (Owner)*
Chris Gaskins, *SCDOT (Owner)*
Renee Fippin, P.E., G.E., *McMillen Jacobs Associates (Designer)*
Shannon Sweitzer, P.E., DBIA, *S&ME (Designer)*
Phil Sheridan, *Clark Construction (Contractor)*
*(TBD) *(Contractor)*

Track G | Greenway E

Sinkhole Detection, Characterization, and Engineering

Moderators: Boo Hyun Nam, Ph.D., A.M.ASCE; Chadi El Mohtar, Ph.D., P.E., M.ASCE

Special Session 13

Speakers:
Kheim Trans, Ph.D., *Associate Professor, Dept. of Civil & Coastal Eng., University of Florida, (expertise in sinkhole detection using seismic test)*
Boo Hyun Nam, Ph.D., A.M.ASCE., *Associate Professor, Dept. of Civil Eng., University of Central Florida. (expertise in sinkhole susceptibility assessment using subsurface exploration methods)*
Mike Miluski, P.E., M.ASCE, *Compaction Grouting Services, Inc. (expertise in sinkhole remediation)*
Michael Byle, D.GE, F.ASCE, *Tetra Tech, Inc. (expertise in sinkhole investigation and engineering)*

Track H | Greenway F

Recent Advances in Risk-Informed Geotechnical Design and Management

Moderators: Lei Wang, Ph.D., P.E., M.ASCE, and Zhe Luo

Special Session 3

Full and quasi-Stochastic Slope Stability Analyses using Random Limit Equilibrium Method (RLEM), Ardavan Izadi, MSc, *University of Guilan,* Reza Jamshidi Chenari, Ph.D., *University of Guilan,* Brigid Cami, BSc, *Rocscience Inc., ON,* Sina Javankhoshdel, Ph.D., Aff.M.ASCE, *Rocscience Inc., ON*

Reliability Based Design Charts for Spatially Variable MSW Landfill Slopes, Ammavajjala Raghuram, S.M.ASCE, *Indian Institute of Technology Hyderabad,* K V N S Ravitheja, A.M.ASCE, *National Institute of Technology, Hyderabad* B Munwar Basha, Ph.D., M.ASCE, *Indian Institute of Technology Hyderabad,* Arif Ali Baig Moghal, Ph.D., M.ASCE, *Indian Institute of Technology, Warangal,* Arif Ali Baig Moghal, Ph.D., M.ASCE, *Indian Institute of Technology*

A Moving Mud Spring Threatening Critical Infrastructure, Imperial County, California, R. Travis Deane, MSCE, P.E., *Shannon & Wilson, Inc., CA,* David Lynch, Ph.D., *Thule Scientific*

The Importance of Spatial Variability in Slope Reliability Analysis, D. V. Griffiths, Ph.D., P.E., *Professor of Civil Engineering, Colorado School of Mines*

Topic TBD, Silas C. Nichols, P.E., *Principal Bridge Engineer – Geotechnical, Federal Highway Administration,*

Project Risk Management, James Parkes, P.E., *Technical Tunneling Director, Schnabel Engineering*

Track I | Greenway G

Multiphysics and Multiphase Flow in Porous Media

Moderators: Omid Ghasemi-Fare, Ph.D., A.M.ASCE, and Marcelo Sanchez, Ph.D., Aff.M.ASCE

Special Session 16

Experimental Investigation of Coupled Thermo-Hydraulic Properties of Glacial Tills. Tugce Baser, A.M.ASCE, *University of Illinois at Urbana-Champaign;* Kiseok Kim, M.S., S.M.ASCE, *University of Illinois at Urbana-Champaign;* Roman Makhnenko, Ph.D., A.M.ASCE, *University of Illinois at Urbana-Champaign;* Andrew Stumpf, Ph.D., *University of Illinois at Urbana-Champaign,* Elisabeth Tarpey, *University of Illinois at Urbana-Champaign*

Numerical Analysis of Variation of Saturation and Moisture Transport at the Vicinity of a Heat Source, Mohammadreza Mir Tamizdoust, S.M.ASCE, *University of Louisville, KY;* Ali Moradi, Ph.D., A.M.ASCE, *Humboldt State University, CA;* Omid Ghasemi-Fare, Ph.D., A.M.ASCE, *University of Louisville, KY*

An Effective Stress Model for Unsaturated Soils at Elevated Temperatures. Sannith Kumar Thota, S.M.ASCE, *Mississippi State University, MS;* Toan Duc Cao, A.M.ASCE, *Mississippi State University, MS;* Farshid Vahedifard, M.ASCE, *Mississippi State University, MS;* Ehsan Ghazanfari, M.ASCE, *University of Vermont, VT*

Microscopic Assessment of the Thermally Induced Volume Changes of Saturated Clays using Discrete Element Method, Karam Jaradat, S.M.ASCE, *Stony Brook University, NY,* Sherif Abdelaziz, Ph.D., A.M.ASCE, *Stony Brook University, NY*

Cross Validation of Computational Model Predictions against the Analytical Solutions for the Response of a Heat Exchanger Pile Subjected to Thermal Loading, Dunja Peric, Ph.D., A.M.ASCE, *Kansas State University, KS,* Sharmin Sarna, *Kansas State University, KS,* Aaron Cossel, *Kansas State University, KS*

Track J | Greenway H

Fostering Innovation with Geotechnical Reliability: The Role Reliability Plays in Spurring Innovation

Moderators: Robert Gilbert, Ph.D., P.E., D.GE, M.ASCE, and Gregory Baecher, M.ASCE

Special Session 37

The role geotechnical reliability plays in spurring innovation. Topics will include:

- **New technology can provide an equivalent reliability compared to the existing technologies**
- **Role of codes, standards and guidelines based on reliability**
- **Creative and efficient ways to manage risk**
- **Maximizing the value of site investigation and performance monitoring**
- **Quantifying the value of site characterization**
- **Active risk management and instrumentation**
- **Geotechnical reliability and resilience to disasters**
- **Dam safety**
- **Coastal protection**
- **Systems thinking about safety**
- **Risk policy**
- **LRFD and reliability-informed design**
- **Risk-informed design codes**
- **Critical infrastructure systems**
- **Large projects**

Organizers:
Robert Gilbert, *University of Texas at Austin*
Gregory Baecher, *University of Maryland, College Park*

Invited presenters will include experts in the field of risk and reliability.

Track K | Greenway I

Special Session on Advances in Geomechanics and Geocomputing

Moderator: Computational Geotechnics Committee

Special Session 11

Comparing Realistic Particle Simulation Using Discrete Element Method and Physics Engine, Hantao He, S.M.ASCE, *Iowa State University;* Junxing Zheng, Ph.D., A.M.ASCE, *Iowa State University;* Zhaochao Li, *Iowa State University*

A New Approach to Simulate Suffusion Processes with MPM, John Murphy, P.E., *University of California Berkeley,* Alba Yerro, Ph.D. M.ASCE , *Virginia Polytechnic University,* Kenichi Soga, Ph.D., M.ASCE, *University of California Berkeley*

Discrete Element Modelling of Large Scale Stacked-Ring Simple Shear Test of Steel Spheres, Nina Zabihi, Ph.D., S.M.ASCE, *University of Michigan, MI;* Adda Athanasopoulos-Zekkos, Ph.D., A.M.ASCE, *University of Michigan, MI*

Stability analysis of Jointed Rock Slope Using Finite Element Method (FEM) with the Random-Joints Generation Model, Yuan Feng, *University of Nebraska-Lincoln, NE;* Shikuo Chen, *Southwest Jiaotong University;* Jongwan Eun, Ph.D., P.E., M.ASCE, *University of Nebraska-Lincoln, NE*

Application of Computational Design Optimization in Geotechnical Engineering, Colin C. Smith, Ph.D., *University of Sheffield,* Matthew Gilbert, Ph.D., *University of Sheffield M.ASCE,* J. González-Castejón, M.Sc, *LimitState Ltd.,* Slimane Ouakka, M.Sc, *University of Sheffield*

Explaining the Effect of Biopolymer-Based Pore Fluid on Soil Behavior Using Coarse Grained Molecular Dynamics Simulations, Shoumik Saha, *Stony Brook University, NY;* Dilip Gersappe, Ph.D., *Stony Brook University;* Sherif Abdelaziz, Ph.D., A.M.ASCE, *Stony Brook University*

Track L | Greenway J

Canadian Geotechnical Society Special Session

Moderator: CGS, Jim Hambleton, Ph.D., M.ASCE

Literature Review of Causes and Mitigation Techniques for Bumps at Ends of Bridges, Hao Liu, *Univ. of Kansas, KS;* Jie Han, Ph.D., P.E., F.ASCE, *Univ. of Kansas, KS;* Saif Jawad, *Univ. of Kansas, KS;* Robert L. Parsons, Ph.D., P.E., F.ASCE, *Univ. of Kansas, KS*

Shear Behavior of Waste Rock and Filtered Tailings Mixtures, Raquel Borja, *Colorado State University, CO;* Christopher Bareither, Ph.D., P.E., M.ASCE, *Colorado State University, CO*

Engineering Challenges and Options in Remediation and Prevention of Permafrost Coastal Erosion, Min Liew, S.M.ASCE, Pennsylvania State University, PA; *Ming Xiao, Ph.D., P.E., M.ASCE, Pennsylvania State University, PA*

Application of Fly Ash to Improve the Mechanical Properties of Paste Tailings, Amin Ghorbanpour, P.E., *Golder Associates Inc.,* Xinbao Yu, Ph.D., P.E., M.ASCE, *University of Texas at Arlington*

Common Geotechnical Design Challenges for Solar Power Plant Development in the US and Canada, Bruno Mendes, *DNV GL, CA;* Eric Ntambakwa, P.E., M.ASCE, *DNV GL, CA;* Hao (Chris) Yu, Ph.D., *DNV GL, CA;* Matthew Rogers, P.E., M.ASCE, *DNV GL, CA,* Mark Young, *BlackRock Real Assets*

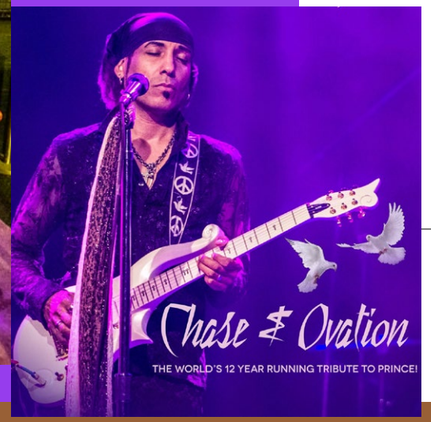
Suction Measurement in Freezing Process using High-Suction Tensiometer, Jianhua Yin, *Missouri University of Science and Technology, MO;* Xiong Zhang, Ph.D., P.E., M.ASCE, *Missouri University of Science and Technology, MO*

Infrastructure Adaptations to Changing Permafrost Conditions – Three Case Studies along the Trans Alaska Pipeline System, Wendy Mathieson ,P.E., *Shannon & Wilson, Inc., WA,* Frank Wuttig, P.E., *Alyeska Pipeline Service Company, AK,* Peppi Croft, P.E., *Shannon & Wilson, Inc., WA*

PURPLE PARTY | A Prince Tribute

Wednesday, February 26, 8:00 – 10:30 p.m.
Buses will begin departing the Hyatt Regency hotel at 7:30 p.m.
Please queue in the lobby at 7:00 p.m.

Join the Geo-Institute at the historic First Avenue club for a Purple Party! The world's top Prince tribute band, Chase and Ovation, will provide the music – we need you to provide the atmosphere! Refreshments will be provided. You must be 21 to enter the club. Valid photo ID required. This event is free to all conference attendees. There will be a suggested $10 contribution to Geo-Institute student programs at the door.



Thursday, February 27

10:30 – 12:00 Noon **Technical Sessions 3**

Track A | Nicollet Ballroom

68th University of Minnesota Geotechnical Conference Plenary Session 2
Moderator: Brent Theroux

Lessons (Re)learned from Geotechnical Failures
Richard J. Finno, Ph.D., P.E., D.GE, M.ASCE, *Life Member ASCE, Professor Emeritus, Civil and Environmental Engineering, Northwestern University, Evanston, IL*

Twenty-Year Performance of a Mixed LLRW/RCRA Waste Disposal Facility, Rudolph Bonaparte, Ph.D., P.E.,NAE, D.GE, F.ASCE, *Senior Principal Engineer, Geosyntec Consultants, Atlanta, GA*

Track B | Lakeshore A

"Ah Ha" Moments in Geo-Engineering: My Biggest Geotechnical Surprise
Moderator: Allen Marr, Ph.D., P.E., NAE, D.GE, F.ASCE

Special Session 33
This special session is a panel discussion providing insights and lessons learned on projects, related to geotechnical discoveries or other "Ah ha" moments during a practicing geotechnical engineer's career. Invited panel speakers will provide at least one anecdote about their "Biggest Geotechnical Surprise" to start the panel discussion. Audience participation is expected and encouraged during the second half of the session.
A variety of panelists are being assembled for this moderated interactive session.

Track C | Lakeshore B

Practical Considerations on Seepage Analysis for Embankments, Dams, and Slopes
Moderator: Ming Xiao, Ph.D., P.E., M.ASCE

Special Session 22
Practical Seepage Analysis (EDS)
This panel session will present the current practical considerations and solutions on seepage analysis for embankments, dams, and slopes. The session will cover topics on seepage in saturated and unsaturated soils, laboratory and field testing of seepage and instrumentation, seepage modeling and applications, and case studies. It will include five panelist presentations. The purpose of this session is to provide a practical and comprehensive guide on seepage analysis for embankments, dams, and slopes. A white paper of the same topic will be published by the G-I Technical Committee of Embankments, Dams, and Slopes.
Session speakers:
Timothy D. Stark, *University of Illinois at Urbana-Champaign*
Navid Jafari, *Louisiana State University*
Caleb Douglas, *Tennessee Valley Authority*
Daniel R. VandenBerge, *Tennessee Tech University*
Ghada S. Ellithy, *U.S. Army Corps of Engineers*

Track D | Greenway A

Soil Improvement by Rigid Inclusions Panel Discussion
Moderator: Jose Clemente, Ph.D., P.E., D.GE, F.ASCE

Special Session 6
Soil Improvement by Rigid Inclusions
Soil improvement systems have now reached a state of maturity in which they can reliably be used in numerous applications including liquefaction mitigation, increase in bearing capacity and reduction of settlement of shallow foundations and road embankments, etc. The use of rigid inclusions has gained wide acceptance, but there are common misconceptions or concerns that engineers who are familiar with piles have regarding rigid inclusions. These include possibly skirting the code requirements for piles, putting non-uniform stresses on footings/slabs, taking 100% of the load, taking high loads similar to what traditional piles can support, going down to bedrock and reinforcing them to take flexural stresses. Seismic resistance and use in liquefaction-prone sites is also a topic of interest related to rigid inclusions. We propose to have an interactive discussion with a group of soil improvement practitioners to address these topics. The proposed panel will consist of the following practitioners:
Moderator:
José L. M. Clemente, Ph.D., *Bechtel Corporation*
Panelists:
Tanner Blackburn, Ph.D., *Keller Foundations*
Roberto Lopez, *Malcolm Drilling*
Morgan NeSmith, *Berkel & Company*
Timothy Siegel, *Dan Brown & Associates*
Sonia Swift, *Menard Group USA*

Track E | Greenway B

Enginering Geology And Site Classification
Moderators: Aaron Budge, P.E., M.ASCE, Joseph Coe, Ph.D., A.M.ASCE, Tom Oommen, Ph.D., PE., Xiong (Bill) Yu, Ph.D., P.E., F.ASCE

Bench-Scale Investigation of Remote Detection of Clay Pockets in Granular Soils, Nick Hudyma, P.E., M.ASCE, *Boise State University, ID,* Brian Kopp, Ph.D., *University of North Florida, FL,* Joshua Oglesby, S.M.ASCE, *University of North Florida, FL,* Sukris Vong, *University of North Florida, FL*

Estimation of Fines Content Using the Modified CPT Material Index, Shehab Agaiby, Ph.D., *Cairo University,* Paul Mayne, Ph.D., P.E., M.ASCE, *Georgia Institute of Technology, GA*

Estimation of Pressuremeter Modulus from Geophysics in the Sonoran Desert, Ashley Shirer, Ph.D., P.E., M.ASCE, *DiGioia Gray & Associates, AZ,* Peter Kandaris, P.E., M.ASCE, *DiGioia Gray & Associates, AZ,* Michael Rucker, P.E., *Wood, AZ*

Probabilistic Field Assessment of Sinkhole Occurrence Using the Raveling Index, Ryan Shamet, M.S., S.M.ASCE, *University of Central Florida, FL,* Boo Hyun Nam, Ph.D., *University of Central Florida, FL*

Application of Dynamic Image Analysis to Sand Particle Classification Using Deep Learning, Linzhu (Lynn) Li, M.Sc., S.M.ASCE, *New York University Tandon School of Engineering, NY,* Nikolaos Machairas, *New York University Tandon School of Engineering, NY,* Magued Iskander, Ph.D., P.E., F.ASCE, *New York University Tandon School of Engineering, NY*

Application of Microtremor Horizontal to Vertical Spectra Ratio (MHVSR) and Multichannel Analysis of Surface Wave (MASW) for Shallow Bedrock Mapping for Transportation Projects, Salman Rahimi, M.Sc., EIT., *University of Arkansas at Fayetteville, AR,* Clinton Wood, Ph.D., P.E, *University of Arkansas at Fayetteville, AR,* Ashraf Kamal Himel, M.Sc., EIT., S.M.ASCE, *University of Arkansas at Fayetteville, AR*

Geo-Engineering, University of Minnesota, Twin Cities

Track F | Greenway C

Embankments, Dams, And Slopes
Moderators: Tim Stark, Ph.D., P.E., D.GE, F.ASCE, Binod Tiwari, Ph.D., P.E., M.ASCE, Farshid Vahedifard, Ph.D., P.E., M.ASCE, Ben Leshchinsky, Ph.D., P.E.,M. ASCE, Navid Jafari, Ph.D., A.M.ASCE

Nonlinear Deformation Analyses of Embankments on a Spatially Variable Liquefiable Deposit Modeled Using Conditional Random Fields, Nicholas Paull, A.M.ASCE, *University of California, CA,* Ross Boulanger, Ph.D., P.E., F.ASCE, *University of California, CA,* Jason DeJong, Ph.D., P.E., M.ASCE, *University of California, CA*

Assessment of Three Wireless Sensor Network-Inertia Measurement Unit Devices for Landslide Monitoring, Prapti Giri, Ph.D. A.M.ASCE, *Terracon,* Kam Ng, Ph.D., P.E., M.ASCE, *University of Wyoming,* William Phillips, *Intelligent Wireless Sensor Network, Inc.*

Influence of Post-Wild Fire Vegetation Cover Loss on Slope Stability – A Case Study of 2018 Montecito Debris Flow in California, Binod Tiwari, Ph.D., P.E., M.ASCE, *California State University, CA,* Beena Ajmera, Ph.D., P.E., M.ASCE, *North Dakota State University, ND,* Anthony Gonzalez, *California State University, CA, and* Hashem Sonbol, *North Dakota State University, ND*

Numerical Analysis of a Slope Failure of a Landfill with a Leachate Recirculation System, Yazen Khasawneh, Ph.D., P.E., MASCE, *Terracon, MD,* Yao Zhang, Ph.D., P.E., *AECOM, CA*

Geotechnical Consequences and Failures in Puerto Rico Due to Hurricane Maria, Francisco Silva-Tulla, Sc.D., P.E., M.ASCE, *GeoEngineering and Environment, MA,* Miguel A. Pando, Ph.D., P.E., M.ASCE, *Drexel University, PA,* Daniel Pradel, Ph.D., P.E., M.ASCE., *The Ohio State University, OH,* Youngjin Park, Ph.D.,*EPIC, NC, and* Robert Kayen, Ph.D., P.E., M.ASCE, *University of California Berkeley, CA*

A Computational Platform for The Assessment of Seismically-Induced Slope Displacements, Jorge Macedo Ph.D., P.E. M.ASCE, *Georgia Institute of Technology, GA,* Gabriel Candia, Ph.D., *National Research Center for Integrated Natural Disaster Management, Chile, and* Norm Abrahamson Ph.D., NAE, M.ASCE, *University of California Berkeley*

Track H | Greenway E

Risk Assessment And Management
Moderators: Limin Zhang, F.ASCE, Robert Gilbert, Ph.D., P.E., D.GE, M.ASCE, Gregory Baecher, M.ASCE, Lei Wang, Ph.D., P.E., M.ASCE, Zhe Luo, P.E., M.ASCE

Minnesota Department of Transportation Slope Failure Risk Assessment, Nick Bradley, M.S., WSB & Associates, MN, *Andrew Shinnefield, PG, CEG,* Minnesota Dept. of Transportation (MnDOT), MN, *Jen Holmstadt, PMP,* WSB & Associates, Inc., MN

Geotechnical Insights from Reliability-Based Design to Improve Partial Factor Design Methods, Bak Low, Ph.D., F.ASCE., *Nanyang Technological University, Singapore*

Effect of Compound Flooding on Performance of Earthen Levees, Farshid Vahedifard, Ph.D., P.E., M.ASCE, *MSU , MS,* Firas Jasim, *MSU, MS*

Smart Sampling Strategy for Geotechnical Site Characterization, Zheng Guan, S.M.ASCE, *City University of Hong Kong,* Tengyuan Zhao, S.M.ASCE, *City University of Hong Kong,* Yu Wang, Ph.D., F.ASCE., *City University of Hong Kong*

Evaluation of Performance of Engineered Slopes under Extreme Rainstorms, Te Xiao,Ph.D., *Hong Kong University of Science and Technology,* Limin Zhang, Ph.D., F.ASCE, *Hong Kong University of Science and Technology*

A History of Claims and Recommended Risk Management Practices for Site Characterization in Geotechnical Engineering, Lisa Yabusaki, *California Department of Water Resources,* Pat Lucia, Ph.D., P.E., *University of California, Davis, CA,* Jason T. DeJong, Ph.D., M.ASCE, *University of California, Davis, CA, and* David L. Coduto, *Terra Insurance Company, CA*

Track J | Greenway G

Geosynthetics
Moderators: Jorge Zornberg, Ph.D., P.E., F.ASCE, Mark Wayne, P.E., M.ASCE

Enhanced Moisture Management of Pavement Systems through Capillary Suction, René Laprade, P. Eng., *TenCate Geosynthetics Americas, GA,* John Lostumbo, P.E., M.ASCE, *TenCate Geosynthetics Americas, GA*

Theoretical versus Experimental Evaluation of Mechanically Stabilized Layers with Geogrid Over Weak Subgrade on Static Loading, Madan Neupane, Ph.D., *Gannett Fleming, Inc.,* Jie Han, Ph.D., P.E., F.ASCE, *University of Kansas, KS,* Robert Parsons, Ph.D., P.E., M.ASCE, *University of Kansas, KS*

Effect of Mine Process Solutions on the Internal Shear Strength of Geosynthetic Clay Liners, Shahin Ghazizadeh, *Colorado State University, CO,* Christopher Bareither, Ph.D., P.E., M.ASCE, *Colorado State University, CO*

Comparisons of Geotextile-Water Characteristic Curves for Wicking and Non-Wicking Geotextiles, Chuang Lin, Ph.D., S.M.ASCE, *Missouri University of Science and Technology, MO,* Xiong Zhang, Ph.D., M.ASCE, *Missouri University of Science and Technology, MO*

Wind Tunnel Study of ClosureTurf Landfill Final Cover System, Junxing Zheng, Ph.D., A.M.ASCE, *Iowa State University, IA,* Partha Sarka, F.SEI, M.ASCE, *Iowa State University, IA,* Mohammad Jafari, S.M.ASCE, *Iowa State University, IA,* Fangwei Hou, *Iowa State University, IA,* Zhaochao Li, *Iowa State University, IA,* Quan Sun, S.M.ASCE, *Iowa State University, IA,* Ming Zhu, Ph.D., P.E., M.ASCE, *Watershed Geosynthetics, GA*

Track K | Greenway H

PAVEMENTS "Geotechnical Aspects of Pavement Systems"
Moderators: Halil Ceylan, Ph.D., A.M.ASCE, Bora Cetin, Ph.D., Isaac L. Howard, Ph.D., P.E., F.ASCE, Charles W. Schwartz, M.ASCE

Use of FWD Data to Subdivide Pavement Sections for MEPDG Calibration, Kazi Mainul Islam, M.S, S.M.ASCE, *University of South Carolina, SC,* Mostaqur Rahman, Ph.D., P.E., M.ASCE, *Transportation Business Unit S&ME, Inc., SC,* Sarah Gassman, Ph.D., P.E., M.ASCE, *University of South Carolina, SC*

Practical Considerations and Potential Impacts of Implementing AASHTO PP 92-18 PM Device Soil-Cement Protocols, W. Griffin Sullivan, P.E., *Mississippi Department of Transportation, MS,* Phong Ly, S.M.ASCE, *Mississippi State University, MS,* Isaac Howard,Ph.D., P.E., F.ASCE, *Mississippi State University, MS*

Effect of Geogrid Stabilization on Performance of Granular Base Course Over Weak Subgrade, Tanya Walkenbach, EIT, M.ASCE, *University of Kansas, KS,* Jie Han, Ph.D., P.E., F.ASCE, *University of Kansas, KS,* Zexia Li, EIT, *Data Forensics,* Robert Parsons, Ph.D., P.E., *University of Kansas, KS*

Implementing An Analytical Framework to Quantify the Magnitude and Rate of Subgrade Pumping in Flexible Pavement, Behnoud Kermani, Ph.D., M.ASCE, *The Transtec Group, Inc., PA,* Ming Xiao, Ph.D., P.E., M.ASCE, *The Pennsylvania State University, PA,* Shelley M. Stoffels, D.E., M.ASCE, *The Pennsylvania State University, PA*

Real-Time Modulus Mapping of Pavement Foundation Layers at MnROAD, Pavana Vennapusa, Ph.D., P.E., M.ASCE, *Ingios Geotechnics, Inc., TX,* David J. White, Ph.D., P.E., M.ASCE, *Ingios Geotechnics, Inc., TX,* John Siekmeier, P.E., M.ASCE, *Minnesota Department of Transportation, MN,* Haluk S. Coban, M.S., S.M.ASCE, *Iowa State University, IA and* Bora Cetin, Ph.D., *Iowa State University, IA*

Evaluation of Field and Laboratory Stiffness of Recycled Materials Used in Pavement Base Layers, Haluk Sinan Coban, S.M.ASCE, *Iowa State University, IA,* Bora Cetin, Ph.D., A.M.ASCE, *Iowa State University, IA,* Halil Ceylan, Ph.D., A.M.ASCE, *Iowa State University, IA,* Tuncer Edil, Ph.D., P.E., DGE, *University of Wisconsin-Madison, WI,* Soheil Nazarian, Ph.D., P.E., D.GE, F.ASCE, *University of Texas at El Paso, TX*

Track L | Greenway I

GEOENVIRONMENTAL "Conserving Natural and Constructed Resources: Geoenvironmental Engineering Advances"
Moderators: Dimitrios Zekkos, P.E., M.ASCE, Tugce Baser, Ph.D., A.M.ASC, Kevin Foye, Ph.D., P.E., M.ASCE

Role of Temperature in Microbial Methane Oxidation in Landfill Cover Soil, Raksha Rai, M.ASCE, *University of Illinois at Chicago,* Krishna Reddy, P.E., F.ASCE, *University of Illinois at Chicago,* Jyoti Chetri, M.ASCE, *University of Illinois at Chicago*

Quantification of Non-Methane Volatile Organic Compound Emissions from California Landfills, Derek Manheim, Ph.D., *California Polytechnic State University,* James Hanson, Ph.D., P.E., M.ASCE, *California Polytechnic State University,* Nazli Yesiller, Ph.D., A.M.ASCE, *California Polytechnic State University*

Benzene migration in Unsaturated Profile with Subsurface Drainage Concrete Pipe, Zahra Faeli, *North Carolina State University,* Sultan Alhomair, *North Carolina State University,* Mohammed Gabr, Ph.D., P.E., F. ASCE, *North Carolina State University,* Mohammad Pour-Ghaz, Ph.D., A.M.ASCE, *North Carolina State University,* Cyrus Parker, *North Carolina Department of Transportation*

Geothermal Modeling of Elevated Temperature Landfills, Milind Khire, Ph.D., P.E., *UNC Charlotte, NC,* Terry Johnson, P.G., *Waste Management, Inc, MN,* Richard Holt, P.E., *Geothermal Science, Inc., CA*

Heat Generation and Accumulation from Industrial Wastes in Landfills, Navid Jafari, Ph.D., A.M.ASCE, *Louisiana State University,* Haq Murad Nazari, *Louisiana State University,* Krishnaswamy Nandakumar, *Louisiana State University,* Mohammad Saghayezhian, *Louisiana State University*

Waste Settlement Measurements using Unmanned Aerial Vehicles at a Municipal Solid Waste Landfill in Michigan, Cassandra Champagne, EIT, S.M.ASCE, *University of Michigan, MI,* Dimitrios Zekkos, P.E., M.ASCE, *University of Michigan, MI,* Jerome P. Lynch, Ph.D., M.ASCE,*University of Michigan, MI, and* Scott O'Loughlin, *City of Midland, MI*

Thursday, February 27 (continued)

1:30 – 3:00 p.m. **Technical Sessions 4**

Track B | Lakeshore A

University of Minnesota Geotechnical Conference
Moderator: Bryan Field, P.E.

Special Session 27 | Part A
University of Minnesota 68th Geotechnical Engineering Conference Concurrent Sessions

Gas Explosion Analysis, Otto D.L. Strack, *Professor, Civil, Environmental, and Geo-Engineering University of Minnesota, Twin Cities*

Quo Vadis? Inakeyaa! Inferring Flow Direction Using a Bayesian Approach, Randal J. Barnes, *Associate Professor, University of Minnesota, Twin Cities*

Computational Tools for the Analysis of Stability of Embankments in Frictional-Cohesive Soils, David Saftner, P.E., A.M.ASCE, *Associate Professor, Civil Engineering, University of Minnesota, Duluth*

Experimental Study of Forces Induced in Mechanical Excavation of Rock, John Pultorak, Aff.M.ASCE, *Research Assistant, Civil, Environmental, and Geo- Engineering, University of Minnesota, Twin Cities*

Track C | Lakeshore B

University of Minnesota Geotechnical Conference
Moderator: Brent Theroux, P.E.

Special Session 27 | Part B
University of Minnesota 68th Geotechnical Engineering Conference Concurrent Sessions

The Use of Steel Pile as Permanent Building Foundation Walls: Lessons Learned over 15 years of Design in Minneapolis, Minnesota USA, Chad A. Underwood, P.E., D.GE, M.ASCE, *Principal, Engineering Partners International LLC, Eagan, MN*

Supporting a Bridge Between Countries Case Study: Construction of Baudette Bridge Drilled Shafts, Nathan W Iverson, P.E., M.ASCE, *Chief Geotechnical Engineer, Foundation, Division, Veit and Companies, Rogers, MN*

Eisenhower Bridge North Abutment and Approach Settlement: A Case History or Timber Pile Downdrag and Comparative Downdrag Effect on Steel Piles, Steven J. Olson, P.E., M.ASCE. *,Senior Geotechnical Engineer, HDR Engineering, Inc., Minneapolis, MN*

Kennedy Bridge Instrumentation: A Pier Review, James C. Bennett, P.E., LEED AP, M.ASCE, *Associate Principal – Project Engineer, Braun Intertec Corporation, Minneapolis, MN*

Track D | Greenway A

GeoDebate – Limit Equilibrium vs. Finite Element Analysis
Moderator: James Schneider, A.M.ASCE, and Dan VandenBerge, Ph.D., P.E., M.ASCE

Special Sesion 20 and 28
LE vs. FEA GeoDebate and Limit Analysis Education

A live poll will be active throughout the Session on the GeoCongress mobile app. We will use this to obtain feedback from the audience.

Brief overview presentations of analysis methods, teaching, and use in practice.

Speakers:

Erik Loehr, P.E., F.ASCE, *Professor, University of Missouri, Colin Smith,* **Professor,** *University of Sheffield,* **Vaughan Griffiths,** *Professor, Colorado School of Mines*

Debaters:

Tiffany Adams,Ph.D., P.E., M.ASCE, *BCG Engineering*

Thomas Brandon *Virginia Tech*

Ethan Dawson, Ph.D., A.M.ASCE, *AECOM*

Kristian Krabbenhoft, *Professor, University of Liverpool*

Debate Organizers/Co-Chairs:

Dan VandenBerge, *Professor, Tennessee Tech*

James Schneider *USACE - Co Chair*

Track E | Greenway B

Rock Mechanics
Moderators: Lianyang Zhang, P.E., F.ASCE, Abdolreza Osouli, Ph.D., P.E., M.ASCE, Ahmadreza Hedayat, Ph.D., A.M.ASCE, Cheng Zhu, Ph.D., A.M.ASCE, Ehsan Ghazanfari, Ph.D., P.E., Joe Labuz, Ph.D., P.E., F.ASCE, Kamelia Atefi-Monfared, Ph.D., A.M.ASCE

Fabric-dependent Hydro-mechanical Behavior of Pre-fractured Rocks, Shahrzad Roshankhah, Ph.D., *California Institute of Technology, CA,* Kami Mohammadi, Ph.D., A.M.ASCE, *California Institute of Technology, CA*

Reliability Based Optimum Design of Anchored Rock Slopes considering Rock Bolt and Rock Mass Interaction, B Munwar Basha, Ph.D. M.ASCE, *Indian Institute of Technology, Hyderabad,* Adapa Gautham, *Indian Institute of Technology, Hyderabad,* Arif Ali Baig Moghal, Ph.D., M.ASCE, *National Institute of Technology, Warangal*

Three-Dimensional Stability Analysis of Rock Slope using Aerial Photogrammetry Data, Surya Sarat Chandra, Ph.D., S.M.ASCE, *Texas A&M University, TX,* Prince Kumar, S.M.ASCE, *Texas A&M University, TX,* Ujwalkumar Patil, Ph.D., P.E., M.ASCE, *University of Guam,* Tejo Bheemasetti, Ph.D., M.ASCE, *South Dakota School of Mines and Technology,* Anand Puppala, Ph.D., P.E., F.ASCE, *Texas A&M University, TX*

Evaluation of Crack Initiation and Damage in Intact Barre Granite Rocks Using Acoustic Emission, Sana Zafar, S.M.ASCE, *Master's in Civil, Colorado School of Mines, CO,* Ahmadreza Hedayat, Ph.D., A.M.ASCE, *Colorado School of Mines, CO,* Omid Moradian, *Swiss Federal Institute of Technology (ETH)*

Free-Free Resonant Column Testing of Rock Cores from Two Spillways and Adjacent Exposed Rock Areas of a Dam, Reihaneh Hosseini, M.Sc, S.M.ASCE, *University of Texas at Austin, TX,* Kenneth Stokoe, Ph.D., P.E., NAE, D.GE, Dist.M.ASCE, *University of Texas at Austin, TX,* Gunwoong Kim, S.M.ASCE*University of Texas at Austin, TX,* Sungmoon Hwang, Ph.D, *University of Texas at Austin, TX,* Farnyuh Meng, Ph.D., *University of Texas at Austin, TX,* Charles Woodruff, , Ph.D., *University of Texas at Austin, TX,* Hande Gerkus-Harris, Ph.D., P.E., M.ASCE, *Freese and Nichols, Inc.,* Dustin Mortensen, P.E., *Freese and Nichols, Inc.*

Track F | Greenway C

U.S.-Canada Joint Session on Innovative Approaches for Mine Waste Management
Moderator: Nazli Yesiller, Ph.D., A.M.ASCE, and Bruno Bussière

Special Session 2
United States and Canada Session on Tailings and Mine Waste

Organizer:
Nazli Yesiller, Ph.D., A.M.ASCE, *Director, Global Waste Research Institute, California Polytechnic State University, San Luis Obispo, California, USA.*

Co-Organizers:
Bruno Bussière, Ph.D., *Professor, Research Institute on Mines and Environment (RIME), UQAT, Rouyn-Noranda, Quebec, Canada.*

Thomas Pabst, Ph.D.,*Assistant Professor, Research Institute on Mines and Environment (RIME), Polytechnique Montréal, Montréal, Quebec, Canada.*

Technical Advisor:
Michel Aubertin, Ph.D., M.ASCE, *Professor Emeritus, Research Institute on Mines and Environment (RIME), Polytechnique Montréal, Montréal, Quebec, Canada.*

Presentations:

Innovative Mine Waste Disposal Approaches for Hard Rock Mines, Bruno Bussière, Ph.D., and Thomas Pabst, Ph.D., *RIME-Canada*

Mixed Mine Waste Rock and Tailings in Mine Waste Management, Christopher Bareither, Ph.D., Colorado State University-USA

Integrated Mine Waste Management Simulation Using Systems Dynamic Modeling, Nicholas Beier, *University of Alberta-Canada*

Innovations in Mine Closure and Cleanup, Jason Cumbers, *Stantec Consulting-USA*

Track G | Greenway D

Determining Pavement Design Criteria for Recycled Aggregate Base and Large Stone Subbase
Moderators: John Siekmeier, P.E., M.ASCE, David Van Deusen, P.E.

Special Session 4
Recycled Base and Large Sub-Base

This session describes the 2017 construction and ongoing monitoring of test sections sponsored by the National Road Research Alliance (NRRA) and built at the MnROAD facility operated by the Minnesota DOT. The study objectives are to develop pavement design criteria and performance-based specifications that will optimize the use of recycled aggregate base and large stone subbase in pavement systems. The expected benefits include: cost savings from the use of recycled materials, longer pavement service life, reduced life cycle costs, conservation of natural resources, and reduced environmental impact. Geosynthetics were also included in some of the test sections to facilitate construction. The research team is evaluating both the geomechanical and environmental properties of these pavement systems, developing a method to estimate the stiffness and permeability of recycled aggregate base and large stone subbase designs, and preparing construction specifications.

Introduction

15 Minute Presentations

Bora Cetin, *Michigan State University*

David White, *Ingios Geotechnics*

Mark Wayne, *Tensar International*

Soheil Nazarian, *University of Texas El Paso*

Panel Conversation with the Audience

Track H | Greenway E

Temporal Forecasting of Geo-Risk in Distributed Infrastructure
Moderator: Mark Vessely, P.E., M.ASCE, Scott Anderson, Ph.D., P.E., M.ASCE

Special Session 17
Temporal Forecast GeoRisk Distributed Infrastructure

Distributed infrastructure systems include the road and rail networks, pipelines, canals, and electrical transmission lines that enable the welfare of communities and the economic viability of nations. These complex and aging infrastructure systems are distributed across varying physiographic and geologic terrains, resulting in risks from deterioration and natural hazards. Over time, these risks will change due to any number of variables such as increased user dependency, maintenance practices, climate change, or geohazard events with magnitudes that are misaligned with performance expectations and design codes.

Panelists will present experience, opportunities, and opinion regarding our ability to forecast the risk in the future, and ultimately inform decisions that prevent harm and benefit society.

Machine Learning for Forecasting of Risk Infrastructure Systems, Suzanne Lacasse, Ph.D., *Norwegian Geotechnical Institute*

Probable Maximum Precipitation Studies and Climate Change,Bill Kappel, *Applied Weather Associates*

Evidence-Based Risk Reduction for Pipeline Operators Performing Geohazard Risk Management, Michael Porter, *BGC Engineering*

Adaptation of Road, Pipeline and Communication Networks in Thawing Permafrost, Lukas Arenson, Ph.D., *Canadian Permafrost Association/BGC Engineering*

Predictive Risk Management for Natural Hazards in Northwest Italy, Davide Bertolo, *Valle d'Aosta*

Wildfire hazards and future infrastructure risks, Don Lindsay, *California Geological Survey*

Track I Greenway F

SOIL IMPROVEMENT "Understanding Innovative Trends in Ground Improvement"
Moderators: Jie Han, Ph.D., P.E., F.ASCE, Jie Huang, Ph.D., P.E., M.ASCE, Leon van Paassen, Ph.D., A.M.ASCE, Prabir K Kolay, Ph.D., P.E., M.ASCE, Lyle Simonton, P.E., LEED AP, Fathey Elsaid, P.E., M.ASCE

Stability Analysis of an Embankment Supported by Spatially Variable Soil-cement Columns, Edward Coldwell, MS, *Montana State University, MT,* Mohammad Khosravi, Ph.D., A.M.ASC, *Montana State University, MT,* Steven Perkins, Ph.D., *Montana State University, MT,* Shahab Zare, Ph.D., *Montana State University, MT,* Jack Montgomery, Ph.D., A.M.ASCE, *Auburn University*

Analytical and Numerical Investigation of Effectiveness of Ground Modification Around Piled-Raft Foundation for Tall Wind Turbine in Weak Soil, Nadarajah Ravichandran, Ph.D., EIT, M.ASCE, *Clemson University, SC,* Saphal Phuyal, S.M.ASCE, *Clemson University, SC,* Shweta Shrestha, Ph.D., S.M.ASCE, *Clemson University, SC*

Sandy Soil Improvement Through Biopolymer Assisted EICP, Mohamed Refaei, *University of Sharjah, UAE,* Mohamed G. Arab, Ph.D., M.ASCE, *University of Sharjah, UAE,* and Maher Omar, Ph.D., *Mansoura*

Introduction to Low-Density Cellular Concrete and Advanced Engineered Foam Technology, Nico Sutmoller, Aff. ASCE, *Aerix Industries, PA*

Experimental Investigations on Bio-Modified Soil, Divya Viswanath, S.M.ASCE, *CMR Institute of Technology,* Asha Nair, Ph.D., A.M.ASCE, *CMR Institute of Technology*

Feasibility Study of Collapse Remediation of Illinois Loess, Using Electrokinetics Technique by Nano-silica and Salt, Pourya Kargar, *Southern Illinois University, IL,* Abdolreza Osouli, Ph.D., P.E., M ASCE, Brent Vaughn, P.E., M.ASCE, *Southern Illinois University, IL,* Arash Hosseini, *Temple University, PA,* Hamid Rostami, *Southern Illinois University, IL*

Track J | Greenway G

Soil Properties and Modeling
Moderators: Brina Montoya, Ph.D., P.E., M.ASCE, Yao Zhang, Ph.D., P.E., M.ASCE, Ujwalkumar Patil, Ph.D., P.E., M.ASCE, Bret Lingwall, Ph.D., P.E., M.ASCE

Experimental Study of Crushing in Cone Penetration Tests in Silica Sands, Ehsan Ganju, E.I.T., S.M.ASCE, *Purdue University, IN,* Fei Han, Ph.D., A.M.ASCE, Ayda Galvis-Castro, Ph.D. S. M.ASCE, *Purdue University, IN,* Monica Prezzi, Ph.D., A.M.ASCE, *Purdue University, IN,* Rodrigo Salgado, Ph.D., P.E., D.GE., F. ASCE, *Purdue University, IN*

Assessing the Frictional Resistance Between Fiber-Optic Sensor Cable and Different Soil Types, Katherine Winters, Ph.D., P.E, M.ASCE, *U.S. Army Corps of Engineers, Engineer Research and Development Center, MS,* Meghan Quinn, P.E., *U.S. Army Corps of Engineers, Engineer Research and Development Center, MS,* Oliver-Denzil Taylor, Ph.D., P.E., M.ASCE, *U.S. Army Corps of Engineers, Engineer Research and Development Center, MS*

Monotonic Behavior of Calcareous Sands with Increasing Particle Crushing, Wenjing Cai, *Iowa State University, IA,* Cassandra Rutherford, Ph.D., P.E., M.ASCE, *Iowa State University, IA,* Junxing Zheng, Ph.D., A.M.ASCE, *Iowa State University, IA*

Particle Size Effects on the Strength and Fabric of Granular Media, Kevin Kuei, EIT, MS, *University of California, Davis, CA,* Jason DeJong, Ph.D., M.ASCE, *University of California, Davis, CA,* Alejandro Martinez, EIT, A.M.ASCE, *University of California, Davis, CA*

X-ray CT Imaging-based and Machine learning-enabled Characterization of Multi-constituent Granular Materials, Qiushi Chen, Ph.D., A.M.ASCE,*Clemson University, SC,* Zhengshou Lai, Ph.D., *Sun Yat-sen University, China,* Feiyang Chen, S.M.ASCE, *Clemson University, SC*

Effect of Concrete Grinding Residue on Roadside Soil Properties, Bo Yang, *Iowa State University, IA,* Yang Zhang, *Iowa State University, IA,* Chenyi Luo,*Iowa State University, IA,* Bora Cetin, Ph.D., *Iowa State University, IA,* Halil Ceylan, Ph.D., A.M.ASCE, *Iowa State University, IA,* Sunghwan Kim, *Iowa State University, IA,* Robert Horton, P.E., M.ASCE, *Iowa State University, IA*

Track K | Greenway H

Sustainability in Geoengineering
Moderators: Dipanjan Basu, Ph.D., M.ASCE, Kimberly Marti, P.E., S.M.ASCE, Kamelia Atefi-Monfared, Ph.D., A.M.ASCE, Omid Ghasemi Fare, Ph.D., A.M.ASCE, Guney Olgun, Ph.D., Ranjiz Gupta

Life Cycle Assessment of Site Characterization Methods, Chris Purdy, *University of California, Davis, CA,* Alena Raymond, S.M.ASCE, *University of California, Davis, CA,* Jason DeJong, Ph.D., M.ASCE, *University of California, Davis, CA,* Alissa Kendall, M.ASCE, *University of California, Davis, CA*

Effects of Recycled Crushed Asphalt Shingles on the Compaction and Permeability Properties of Local Memphis Loess, Andrew Assadollahi, Ph.D., P.E., M.ASCE, *Christian Brothers University, TN,* Ashley Martinez, S.M.ASCE, *Christian Brothers University, TN,* Viridiana Gonzalez, S.M.ASCE, *Christian Brothers University, TN,* Leonardo,Garcia De La Cruz, *Christian Brothers University, TN*

Pipe-Pile-Based Micro-Scale Compressed Air Energy Storage (PPMS-CAES) for Buildings: Experimental Study and Energy Analysis, Jingtao Zhang, P.E., S.M.ASCE, *University of Nebraska-Lincoln, NE,* Junyoung Ko, Ph.D., *Yonsei Univ., South Korea,* Sihyun Kim, Ph.D., M.ASCE, *Bradley University, IL,* Hoyoung Seo, Ph.D., P.E., M.ASCE, *Texas Tech University, TX,* Seunghee Kim, Ph.D., M.ASCE,*University of Nebraska-Lincoln, NE*

Effect of Specimen Size on the Leaching Characteristics of Coal Gangue, Mohammed Ashfaq, M.ASCE, NIT, Warangal, Heera Lal, *NIT, Warangal,* Arif Ali Baig Moghal, Ph.D., M.ASCE, *NIT, Warangal*

Fly Ash-Granulated Rubber Mixtures as Lightweight Geomaterials, Bhargav Kumar Karnam Prabhakara, *IIT, Hyderabad,* Umashankar, Balunaini, Ph.D., *IIT, Hyderabad*

Particle Breakage and Fines Generation of Recycled Concrete Aggregates Subjected to Compaction, Tyler Klink, *University of Wisconsin-Madison, WI,* William Likos, Ph.D., M.ASCE, *University of Wisconsin-Madison, WI,* Bu Wang, Ph.D., Aff.M.ASCE, *University of Wisconsin-Madison, WI*

ADA Accessible Trail Improvement with Volcanic Ash Supplemented Portland Cement, Matthew Sleep, Ph.D., *Oregon Institute of Technology, OR,* Damian Matzen, *Oregon Institute of Technology, OR*

Thursday, February 27 *(continued)*

3:30 – 5:00 p.m. — **Technical Sessions 5**

Track A | Greenway A

Special Session 9

USACE Dams and Performance Monitoring

Moderator: Georgette Hlepas, Ph.D., P.E.

The U.S. Army Corps of Engineers is responsible for over 700 dams nationwide. As this infrastructure is aging, performance monitoring is an essential part of dam safety. The USACE has developed recommendations for a successful instrumentation and monitoring program based on a national level internal peer review of its dam safety program. In addition, USACE is undergoing an effort implement a national level Geographic Information System (GIS) to help manage the national dam inventory project data and studies on internal erosion processes. The results of some of the experiments related to overtopping erosion as well as case studies highlighting the importance of performance monitoring at three of the USACE dam projects will be presented.

Track B | Lakeshore A

University of Minnesota 68th Geotechnical Engineering Conference Concurrent Sessions

Moderator: Bryan Field, P.E.

Washington Park Reservoir Improvements: Accommodating Ancient Landslide Movement with a Compressible Inclusion, Thomas Westover, P.E., M.ASCE, *Associate Engineer, Comforth Consultants, Inc., Portland, OR*

Detecting Pile Lengths of Sign Structures and High Mast Poles, Daniel V. Kennedy, *Research Assistant, Civil, Environmental, and Geo- Engineering, University of Minnesota, Twin Cities*

A Failure Mechanism around Axially Loaded Sockets in Weak Rock, Pouyan Asem, Ph.D., A.M.ASCE, *Post-Doctoral Fellow, Civil, Environmental, and Geo-Engineering, University of Minnesota, Twin Cities*

A Review of LRFD Bridge Foundation Design and Construction in South Dakota, Brett E. Belzer, P.E., M.ASCE, *Project Engineer, RESPEC Mining and Energy, Rapid City, SD*

Track C | Lakeshore B

University of Minnesota 68th Geotechnical Engineering Conference Concurrent Sessions, Part B.

Moderator: Brent Theroux, P.E.

A Retrospective on the Evolution of Geotechnical Sensing and Instrumentation for Monitoring at MnDOT, Joel N. Swenson, P.E., *Senior Geotechnical Engineer, Barr Engineering, Minneapolis, MN*

An Overview of Performance Monitoring for Drilled Full Displacement Type Rigid Inclusions under Highway Embankments, Liang Chern Chow, P.E., M.ASCE, Geotechnical Engineer, American Engineering Testing, Inc., Saint Paul, MN

Sky Harbor Airport Runway Realignment, Hector D. Flores, P.E., *Engineer, Short Elliott Hendrickson, Inc., Saint Paul, MN*

On Solid Ground: Preventative and Responsive Geotechnical and Structural Mitigation of Geologic Hazards Impacting Oil and Gas Production, Charles D. Hubbard, P.E., P.G., *Principal, Braun Intertec Corporation, Minneapolis, MN*

Track D | Lakeshore C

Special Session 26 Part 1

Biogeotechnics Symposium

Lifecycle Analysis and Bio-mediated Ground Improvement

Moderators: Jason DeJong Ph.D., P.E., M.ASCE, Douglas D Cortes, Ph.D., A.M.ASCE

This session contains 11 papers on lifecycle analysis for geotechnologies and bio-mediated ground improvement.

Hotspot Life Cycle Assessment for Environmental Impacts of EICP as a Ground Improvement Technology, Kimberly K. Martin P.E., S.M.ASCE, Hamed Khodadadi Tirkolaei, Ph.D., Mikhail Chester, Ph.D., A.M.ASCE, and Edward Kavazanjian, Jr., Ph.D., P.E., NAE, D.GE, Dist.M.ASCE

Lifecycle Liquefaction Hazard Assessment and Mitigation, Mertcan Geyin, Brett Maurer, Sjoerd Van Ballegooy

Examining the Liquefaction Resistance of Lightly Cemented Sands Using Microbially Induced Calcite Precipitation (MICP), Minyong Lee, Michael Gomez. Maya El Kortbawi, S.M.ASCE , Katerina Ziotopoulou Ph.D., A.M.ASCE

Feasibility Study on Liquefaction Mitigation of Fraser River Sediments by Microbial Induced Desaturation and Precipitation (MIDP), Liya Wang, Leon Van Paassen, Ph.D., A.M.ASCE, Ed Kavazanjian, Ph.D., P.E., NAE, D.GE, Dist.M.ASCE

Dissolution and Recrystallization of Iron Oxide during MICP, Junghwoon Lee, S.M.ASCE, Susan Burns, Ph.D., P.E., F.ASCE, Frederick Colwell, Dimitrios Ntarlagiannis, Juliette Ohan, Sina Saneiyan

Investigating the Effect of Microbial Activity and Chemical Concentrations on the Mineralogy and Morphology of Ureolytic Bio-cementation, Robert Burdalski, S.M.ASCE, and Michael Gomez

Reduction of Water Erosion Using Bacterial Enzyme Induced Calcite Precipitation (Beicp for Sandy Soil, Xinyi Jiang, Cassandra Rutherford, Ph.D., P.E., M.ASCE, Bora Cetin Ph.D., and Kaoru Ikuma, Ph.D.

Experimental Study to Determine an EICP Application Method Feasible for Field Treatment for Soil Erosion Control, Rashidatu Ossai, EIT, S.M.ASCE, Lucas Rivera, S.M.ASCE, and Paola Bandini, Ph.D., P.E., M.ASCE

Post-fire Mudflow Prevention by Biopolymer Treatment of Water Repellent Slopes (Mahta Movasat S.M.ASCE, and Ingrid Tomac

Erosion Behavior of Earth Levee Models Treated with Biopolymer Hydrogel Assessed with Hydraulic Flume Apparatus, Sojeong Lee, Yeong-Man Kwon, Gye-Chun Cho, Ph.D, and Ilhan Chang Ph.D., A.M.ASCE

Bio-grouting of Rock Joints, C. Wu, J. Chu, and S. Wu

Friday, February 28

8:00 – 9:30 a.m. **Technical Sessions 6**

Track C | Greenway A

Mosul Dam – Emergency Construction in a Contingency Environment
Moderator: Georgette Hlepas, P.E., M.ASCE

Special Session 10A

USACE Mosul Dam Part 1

Mosul Dam, located in Iraq, is constructed on an extremely problematic karstic foundation requiring continuous foundation grouting. Armed conflict in Iraq has resulted in a much less aggressive grouting program and increasing the potential for foundation seepage pathways. USACE became the Engineer of Record to oversee Emergency Drilling and Grouting and Rehabilitation of the Outlet Works. The USACE work onsite was coincident with ongoing armed conflict in Iraq.

This special session will discuss I) the background and history of the project and USACE involvement ii) the potential failure modes and scopes of work to address them iii) personal reflections on challenges faced and the life of working in a contingency environment, iv) the state-of-the-art technology, such as Synthetic Aperture Radar, near-real time Automated Data Acquisition Systems, Hydraulic computer modeling, and special tools used during the exploratory and verification on program to verify project performance and inform decision makers.

Track D | Greenway B

Emerging Biogeotechnologies
Moderator: Ed Kavazanjian, Ph.D., P.E., NAE, D.GE, Dist.M.ASCE

Special Session 26 Part 2

Biogeotechnics Symposium

Biogeotechnical engineering, or biogeotechnics is one of the most prominent emerging areas in geotechnical engineering. It includes both bio-mediated geotechnics, wherein biological processes are used directly for geotechnical purposes, and bio-inspired geotechnics, wherein biological processes are used abiotically for geotechnical purposes. This session will include a special report on the Center for Bio-mediated and Bio-inspired Geotechnics (CBBG), an $18.5 million National Science Foundation investment in these emerging technologies, plus reports from four other groups in the United States and Europe who have deployed field trials of biogeotechnologies. This special session is supplemented by two technical sessions with additional papers on current developments in this field.

Special Report on Biogeotechnics at the Center for Bio-Mediated and Bio-inspired Geotechnics

Overview of CBBG Research and Educational Activities, Edward Kavazanjian, Ph.D., P.E., NAE, D.GE, Dist.M.ASCE

Liquefaction Mitigation Research at CBBG, Jason T. DeJong, Ph.D., M.ASCE

Infrastructure Construction Research at CBBG, Paola Bandini, Ph.D., P.E., M.ASCE

Bio-inspired Research for Underground Exploration at CBBG, A. Martinez

Life Cycle Sustainability Assessment (LCSA): A Research Evaluation Tool for Emerging Geotechnologies, Alena Raymond, S.M.ASCE, Alissa Kendall, Jason DeJong, Ph.D., A.M.ASCE

A Full-Scale Application of Slope Stabilization via Calcite Bio-mineralization followed by Long-term GIS Surveillance, Dimitrios Terzis, Sarah Dornberger, Ray Harran, S.M.ASCE, Lyesse Laloui, Ph.D.

Case Histories of Full-scale Microbial Bio-Cement Application for Surface Erosion Control, Tasha Hodges and Bret Lingwall, Ph.D., M.ASCE, P.E.

Field Application of the Microbially Induced Calcium Carbonate Precipitation on a Coastal Sandy Slope, Pegah Ghasemi, S.M.ASCE, and Brina Montoya, Ph.D., P.E., M.ASCE

Application of Bio-Stimulated Calcite Precipitation to Stabilize Expansive Soils: Field Trials, Bhaskar Chittoori, Ph.D., P.E., M.ASCE., Anish Pathak, BSCE, Malcolm Burbank, Ph.D., Md Touhidul Islam, EIT, A.M.ASCE

Track E | Greenway C

Design of Geosynthetic Reinforced MSE Walls, Part 1
Moderator: Silas Nichols, P.E., M.ASCE and Ryan Berg, P.E., D.GE, F.ASCE

Special Session 32A

This two-session program will review and document the progression of design methods for geosynthetic reinforced mechanically stabilized earth (MSE) wall structures. This topic is particularly timely due to the impending expansion of design methods allowed for geosynthetic reinforced MSE walls within the AASHTO LRFD Bridge Design Specifications and FHWA Design Manual for MSE Walls.

Each of the six design methods, from the early 1980s through 2020, will be presented, with the focus on the internal stability analysis specific. The six methods will be summarized with a comparison of results for example structures.

These sessions will also have broad-based appeal to geotechnical and structural engineers. The two new design methods introduced are very significant to engineers specifying and/or designing highway works. Engineers will need to quickly develop an understanding of these procedures, and be able to contrast to existing procedures, to guide implementation within their states. There is a significant need for most practitioners to gain knowledge in this area, and to do so in 2020.

Tieback Wedge Design Procedure (and Task Force 27), Rudolph Bonaparte, Ph.D., P.E., NAE, D.GE, F.ASCE, *Geosyntec Consultants and* Ryan Berg, P.E., D.GE, F.ASCE, *Ryan R. Berg & Associates, Inc.*

Development of NMCA SRW Design Procedure, Michael Simac, P.E., M.ASCE, *Earth Improvement Technologies,* Richard Bathurst, Ph.D., M.ASCE, *Professor, Royal Military Academy of Canada*

FHWA/AASHTO Simplified Design Method, Barry Christopher, Ph.D., M.ASCE, *Christopher Consultants ,* Jerry DiMaggio, P.E., D.GE, *ARA Consultants*

This session continues after the Networking Break

Track F | Greenway D

Risk and Modeling in Tailings Ponds
Moderator: Benjamin Gallagher, P.E., M.ASCE

Special Session 25

Breaches of tailings impoundments can result in significant loss of life and environmental damage. Models of breaches and flow are used to help assess risk and protect vulnerable downstream populations. When breached impoundments contain both liquids and solids, such as tailings dams and ash ponds, modeling breaches and flows is complex. Panelists will discuss recent physical and numerical models of tailings dam and ash pond embankments and breaches and their application to risk reduction, including modeling of closing and closed facilities.

Organizer:

Benjamin Gallagher, *Senior Technical Leader Electric Power Research Institute*

Presenters:

Alejandro Martinez, Ph.D., *Assistant Professor Civil and Environmental Engineering University of California Davis*

W. Daley Clohan, P.Eng., *Water Resources Engineer and Global CFD Lead Golder Associates Ltd.*

Robert C. Bachus, Ph.D., P.E., D.GE, *Senior Principal, Geosyntec*

Michel Aubertin, ing. Ph.D., FCAE, FEIC, FCSCE, *Professor Emerite, Polytechnique Montréal*

This special session will address an important topic to the engineering community. Major tailings dams failures tend to occur at a rate of about 1 per year, worldwide. Modeling flow from breached dams can help improve emergency action plans, and help identify means for risk reduction for operating facilities. In addition, the US power industry will be closing hundreds of ash ponds over the next decade, and understanding the modeling of breaches from closing and closed facilities is important to closure planning. Civil engineers need to communicate the risk of breaches to dam safety officials, emergency mangers, and the public. This panel session and discussion will help practicing geoprofessionals understand state-of-the-art research on tailings dams, ash ponds and breaches for these structures. The presentations and discussion are expected to include studies on physical and numerical modeling of ash ponds and tailings dams, in-situ site characterization, and modeling of a recent tailings dam breach in Canada.

Track G | Greenway E

"Panel Session": Special Session on Women in Tunneling
Moderators: Lizan Gilbert, M.ASCE, and Zuzana Skovajsova, EIT

Special Session 31

The first woman awarded a bachelor's degree in engineering was Elizabeth Bragg in 1876 from UC Berkely. Through World War II, engineering career opportunities for women grew due to the drafting of men into the armed forces. Post World War II, the number of women entering engineering fields grew as they continued to enter the engineering field and shifted their roles toward the workforce. As the numbers of women have grown across the engineering and engineering construction fields, the tunneling industry has been on the tailing edge as this field in particular has historical roots that excluded women. For example, it was "bad luck" for a women to enter a tunnel in construction. Today, the presence of women in the industry is changing how projects are designed and built. A discussion of the challenges and benefits to the industry and the women that are entering this industry – from the perspectives of both men and women professionals – will provide opportunities to learn where we really are today!

Participants:

Lizan Gilbert, M.ASCE, *Atkinson Construction*

Zuzana Skovajsova, *COWI*

Gevan McCoy, A.M.ASCE, *Atkinson*

Rosa Castro-Krawiec, *JCK Underground*

Renee Fippin, *McMillen Jacobs Associates*

Priscilla Nelson, Ph.D., Hon.D.GE, Dist.M.ASCE, *Colorado School of Mines*

Track H | Greenway F

Local Governments and Geotechnical Topics: City of Minneapolis and Minnesota DOT
Moderators: Derrick Dasenbrock, P.E., D.GE, F.ASCE, and Brent Theroux, P.E.

Special Session 15 and Special Session 24

Innovations at the City of Minneapolis Engineering Lab (15 minutes)
Chris DeDene, Ph.D., P.E., City of Minneapolis

The City of Minneapolis operates a full-service construction materials testing (CMT) laboratory charged with testing asphalt, concrete and soils. This presentation highlights several new technologies that took the lab from the analog to the digital age, including use of tablet computers, leveraging cloud-based solutions to speed-up and more-accurately share data with our customers and stakeholders, and how we've begun the transition to a paperless laboratory.

Crossing the Mississippi River using Micro Tunneling (15 minutes)
Peter Pfister, P.E., City of Minneapolis

The City of Minneapolis operates a water distribution system that serves 500,000 people each day. The system is backboned by a grid of large-diameter transmission mains that span a city that is divided by the Mississippi River. Because of the difficulty in crossing the river, the number of river crossings is limited. The City needed to replace one of its crossings, suspended from a bridge, and decided to place the new main under the river, requiring careful consideration of and exploration of the existing geology. This presentation outlines the exploration during design phase, the design itself, and tunneling technology employed.

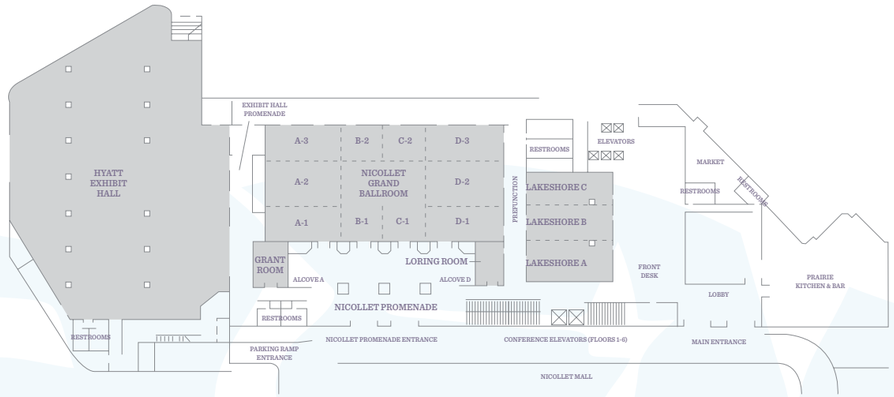
Minnesota DOT Geotechnical Advances – A Bridge Engineer's Perspective (30 min)
Kevin Western, P.E., State Bridge Engineer, MnDOT

Minnesota DOT Geotechnical Advances – Development and Implementation of Minnesota's new LRFD Dynamic Pile Driving Formula (30 min)
Nick Haltvick, PE, North Region Bridge Construction Engineer, MnDOT

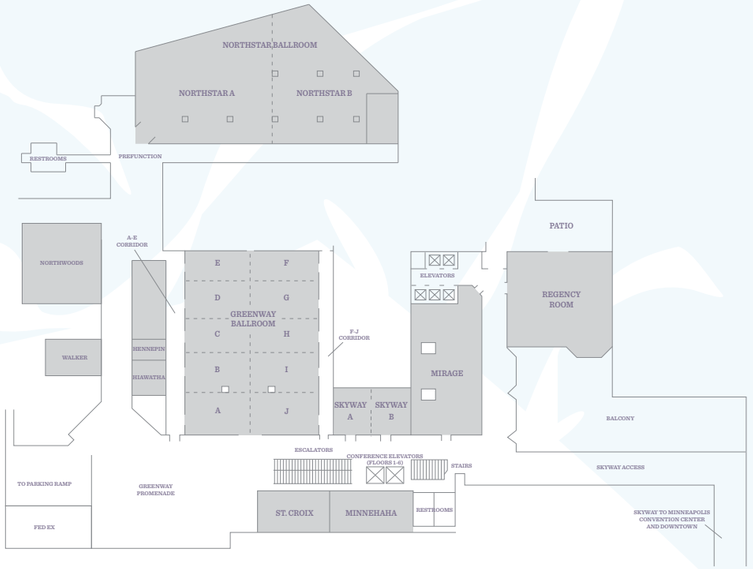
The most common bridge foundation type in Minnesota is driven piling. MnDOT began implementing the use of LRFD for pile foundations in 2005. Stating in 2007, two research projects worked to develop a more accurate and statistically supported dynamic formula that was first implemented in construction in 2012. This presentation will discuss experiences, challenges, and observations made as MnDOT implemented these pile driving changes.

Hyatt Regency Hotel **Floor Plans**

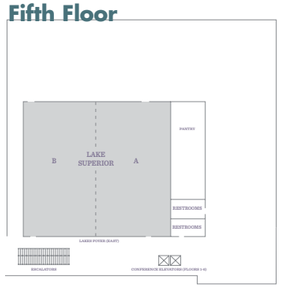
Main Floor



Second Floor



Fifth Floor



Friday, February 28 *(continued)*

10:00 – 11:30 a.m. **Technical Sessions 7**

Track B | Lakeshore A

"I Couldn't Agree More." The Latest Geotechnical Developments Where We Agree Improvement Is Needed.
Moderator: Silas Nichols, M.ASCE

Special Session 34

"I Couldn't Agree More"– A Cross-Disciplinary Panel Discussion on Topics in Transportation Geotechnics – Hydraulics, Geotechnical, and Construction Practice, with Emphasis on Current FHWA Initiatives.

Where we are today as practitioners and what topics and areas are of current interest. What can we agree needs to be done- and who can do it.The concept of the Special Session called "I Couldn't Agree More" came from a discussion about several topics at the 2019 TRB Annual Meeting where one practitioner would offer a comment and another individual- would respond with- "I couldn't agree more."

Organized by Silas Nichols, *FHWA and* **Derrick Dasenbrock,** *Minnesota DOT*

Track C | Greenway A

Mosul Dam – Emergency Construction in a Contingency Environment
Moderator: Georgette Hlepas, P.E., M.ASCE

Special Session 10B

USACE Mosul Dam Part 2

Mosul Dam, located in Iraq, is constructed on an extremely problematic karstic foundation requiring continuous foundation grouting. Armed conflict in Iraq has resulted in a much less aggressive grouting program and increasing the potential for foundation seepage pathways. USACE became the Engineer of Record to oversee Emergency Drilling and Grouting and Rehabilitation of the Outlet Works. The USACE work onsite was coincident with ongoing armed conflict in Iraq.

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This session will provide time for a facilitated question and answer session with the presenters from USACE.

Track D | Greenway B

Biogeotechnics for Reinforcement, Penetration, and Foundations
Moderator: Susan Burns, Ph.D., P.E., F.ASCE, and Paola Bandini, Ph.D., P.E., M.ASCE

Special Session 26 Part 3

Biogeotechnics Symposium

This session contains nine papers on bio-mediated and bio-inspired applications for earth reinforcement, ground penetration, and foundation construction.

Measuring the Effect of Grass Roots on Shear Strength Parameters of Sandy Soils, Ryan Cardoza M.S., *County of Fresno, California,* Lalita G. Oka Ph.D., A.M. ASCE, *California State University*

Enhancement of Bio-Sandy Brick through Discrete Randomly Distributed Fiber, Lin Li, F.ASCE, P.E., *Tennessee State University,* Kejun Wen, E.I.T., *Jackson State University,* Changming Bu, *Chongqing University of Science and Technology, and* Farshad Amini, F.ASCE, P.E., *Jackson State University*

Bio-inspired 3D-Printed Honeycomb for Soil Reinforcement, Mohamed Arab, Ph.D., A.M.ASCE, *University of Sharjah, Mansoura University,* Maher Omar, Ph.D., *University of Sharjah,* Emran Alotaibi, *University of Sharjah,* Omar Mostafa, *University of Sharjah,* Marwan Naeem, *University of Sharjah,* Osama Badr, *University of Sharjah*

Analysis of the Self-Penetration Process of a Bio-Inspired In-Situ Testing Probe, Yuyan Chen, *University of California Davis,* Ali Khosravi, Ph.D., *Oregon State University,* Alejandro Martinez, Ph.D., A.M.ASCE, *University of California Davis,* Jason DeJong, Ph.D., M. ASCE, *University of California Davis, and* Dan Wilson, Ph.D., M.ASCE, *University of California Davis*

Impact of Shell-opening of a Model Razor Clam on the Evolution of Force Chains in Granular Media, S. Huang, *Arizona State University,* N. Mahabadi, *Arizona State University, and* J. Tao, *Arizona State University*

An Examination of the Foundations of Mega-flora; Implications for Biomimetic Geotechnics, Bret N. Lingwall Ph.D., P.E., M.ASCE, *South Dakota School of Mines and Technology*

Bio-Inspiration through Tree Root Pullout Tests for Innovative Anchorage Design, Matthew Burrall, S.M.ASCE, *University of California Davis,* Jason T. DeJong, M. ASCE, *University of California Davis,* Alejandro Martinez, Assoc.M.ASCE, *University of California Davis,* Daniel W. Wilson, M. ASCE, *University of California Davis, and* Lin Huang, S.M.ASCE, *University of California Davis*

Microbially Induced Carbonate Precipitation Process for Soil Improvement Adjacent to Model Pile by Innovative Delivery System, Jinung Do, S.M.ASCE, *North Carolina State University,* Brina M. Montoya, Ph.D., P.E., M.ASCE, *North Carolina State University,* Mohammed A. Gabr, Ph.D., P.E., D.GE., F.ASCE, *North Carolina State University*

Enzyme-Induced Carbonate Precipitation: Scale-up of Bio-cemented Soil Columns, Kimberly K. Martin, P.E., S.M.ASCE, *Arizona State University,* Hamed Khadadadi T., Ph.D., P.E., A.M.ASCE, *Arizona State University, and* Edward Kavazanjian, Jr., Ph.D., P.E., D.GE, NAE, F. ASCE, *Arizona State University*

Track E | Greenway C

Design of Geosynthetic Reinforced MSE Walls Part 2
Moderator: James G. Collin, Ph.D., P.E., D.GE, F.ASCE, and Ryan Berg, P.E., D.GE, F.ASCE

Special Session 32B

This second part of a two session program will review and document the progression of design methods for geosynthetic reinforced MSE wall structures. This topic is particularly timely due to the impending expansion of design methods allowed for geosynthetic reinforced MSE walls within the AASHTO LRFD Bridge Design Specifications and FHWA Design Manual for MSE Walls.

FHWA/AASHTO Limit Equilibrium Design Method, Dov Leshchinsky, M.ASCE, *Professor Emeritus, University of Delaware, and* Ben Leshchinsky, Ph.D.,P.E.,M.ASCE, *Associate Professor, Oregon State University*

AASHTO Stiffness Design Method, Tony Allen, P.E., M.ASCE, *Washington DOT and Chair, AASHTO T15; and* Richard Bathurst, Ph.D., M.ASCE, *Professor, Royal Military College of Canada*

Proposed AASHTO Modifications for Closely Spaced Reinforcement, Jorge G. Zornberg, Ph.D., P.E., F.ASCE, *Professor, UT-Austin*

Track F | Greenway D

Static Liquefaction of Mine Tailings
Moderator: Iván A. Contreras, P.E., D.GE, M.ASCE, Jeong-Yun Won, Ph.D., C.Eng, P.E., M.ASCE, Raul Velasquez,Ph.D., P.E., M.ASCE, Aaron Grosser, P.E., D.GE, M.ASCE

Special Session 30

Mine tailings, which consist of ground rock and process effluent, are generated following mineral extraction from ore. Tailings are often deposited as a slurry in surface impoundments. Due to the hydraulic depositional environment, tailings typically come into equilibrium in a loose, saturated condition. Relatively low plasticity, a saturated state, loose condition, and young geologic age typically make tailings susceptible to liquefaction. Liquefaction, which can be triggered statically or dynamically, is characterized by the sudden, significant drop in shear strength under undrained conditions. While liquefaction triggered by dynamic events, such as the occurrence of an earthquake, is generally well-understood, static (flow) liquefaction potential is more difficult to assess. Despite this difficulty, static liquefaction should be accounted for in design by assuming the existence of a trigger. This special session will explore the challenges associated with static liquefaction of mine tailings and share assessment, analysis, and design insights. After a brief introduction, three presentations will be given, followed by an open-forum discussion.

Static Liquefaction Triggering, Gonzalo Castro, Ph.D., P.E., NAE, F. ASCE

Liquefied Shear Strength Determination, Scott M. Olson, Ph.D., P.E.

Static Liquefaction Analysis, Bryan D. Watts, P. ENG

Organizers

Iván A. Contreras, Ph.D., P.E., DGE
Kurt J. Schimpke, P.E.
Aaron T. Grosser, P.E., DGE
Jeong-Yun Won, Ph.D., P.E.

Panelists

Gonzalo Castro, Ph.D., P.E., NAE, F. ASCE
Scott M. Olson, Ph.D., P.E.
Bryan D. Watts, P. ENG

Track G | Greenway E

Geo-Education
Moderators: Aaron Budge, P.E., M.ASCE, and David Saftner, Ph.D., A.M.ASCE

Establishing Collaborations Between Academia and Professional Practitioners Through Engineering Course Mentorship, Malay Ghose Hajra, Ph.D., P.E., ENV SP, M.ASCE, *The University of New Orleans, LA;* David Lourie, P.E., D.GE., M.ASCE, *Lourie Consultants, LA*

Enriching the Geotechnical Engineering Classroom through Novel Multidisciplinary Examples, Gabrielle Howell, S.M.ASCE, *Rowan University, NJ,* Mark Vail, *Rowan University, NJ,* Cheng Zhu, Ph.D., A.M.ASCE, *Rowan University, NJ*

Developing Authentic Design Experiences Using Case Studies in a Senior Design Course, Tyler Oathes, S.M.ASCE, *University of California, Davis, CA;* Colleen Bronner, Ph.D., EIT, A.M.ASCE, *University of California, Davis, CA;* Jason DeJong, Ph.D., M.ASCE, *University of California, Davis, CA*

Implementing and Assessing a Game-Based Module in Geotechnical Engineering Education, Victoria Bennett, Ph.D., *Rensselaer Polytechnic Institute;* Casper Harteveld, Ph.D., *Northeastern University;* Tarek Abdoun, Ph.D., M.ASCE, *Rensselaer Polytechnic Institute;* Usama El Shamy, P.E., M.ASCE, *Southern Methodist University;* Flora McMartin, Ph.D., *Broad-based Knowledge;* Binod Tiwari, Ph.D., P.E., M.ASCE, *California State University Fullerton;* Anirban De, P.E., F.ASCE, *Manhattan College*

Moving Beyond Technical Skills: Fostering the Development of Essential Skills Needed for a Successful Career in Engineering, Jean Larson, Ph.D., *Arizona State University, AZ,* Wendy Barnard, Ph.D., *Arizona State University, AZ,* Jennifer Chandler, Ph.D., M. O'Donnell, Ph.D., *Arizona State University, AZ,* W. Savenye, Ph.D., *Arizona State University, AZ,* C.E. Zapata, Ph.D., A.M.ASCE, *Arizona State University, AZ*

Emphasizing Underlying Science in Geotechnical Education through Flipped Classroom, Amy Rechenmacher, Ph.D., P.E., M.ASCE, *University of Southern California, CA*

Track H | Greenway F

Overview of Recent Twin Cities Based Underground Projects
Moderators: Michael Haggerty and Thomas Pullen

Special Session 12

The geology of the Twin Cities has been historically advantageous to provide for underground excavations and tunnels to support infrastructure. Much of the in-place infrastructure is being updated or replaced around the area, which has resulted in a number of rehabilitation and new construction projects to support the growth of the metropolitan area. This special session will consist of a panel discussion with the intent of highlighting a variety of recent projects from various perspectives within the local industry and discuss challenges or lessons learned from these projects on topics of ground conditions, risk, constructability, and design considerations.

The special session will consist of a series of short 10-15 minute presentations by each panelist followed by discussion and questions with the panelists. Four panelists will be a participating and represent various views including a local geologist, a local underground design engineer, a local contractor, and a former infrastructure manager offer views from the owner's perspective.

Track I Greenway G

Geo-Systems
Moderator: T. Matthew Evans, Ph.D., A.M.ASCE

Drained Interface Strength between Pipelines and Clays using Tilt Table and Direct Shear Tests, Roba Houhou, S.M.ASCE, *American University of Beirut;* Rayan Bou Mjahed, *American University of Beirut;* Salah Sadek, M.ASCE, *American University of Beirut;* Shadi Najjar, A.M.ASCE, *American University of Beirut*

Effect of Initial Moisture Content on Critical Temperature of Three Sandy Soils, Hyunjun Oh, S.M.ASCE, *University of Wisconsin-Madison, WI;* James Tinjum, Ph.D., P.E., F. ASCE, *University of Wisconsin-Madison, WI*

Effect of Heating Rate on Thermally Induced Pore Water Pressures and Volume Change of Saturated Soils, Seyed Morteza Zeinali, S.M.ASCE, *Stony Brook University, NY;* Sherif Abdelaziz, Ph.D., A.M.ASCE, *Stony Brook University, NY*

Freezing-Thawing Effect on Saturated Clay Microstructure, Seyed Morteza Zeinali, S.M.ASCE, *Stony Brook University, NY;* Sherif Abdelaziz, Ph.D., A.M.ASCE, *Stony Brook University, NY*

Laboratory Testing and Engineering Analysis of an Underground Stormwater Detention System, Steven MacLean, Ph.D., P.E., *Exponent, Inc.;* Antonios Vytiniotis, Ph.D., P.E., M.ASCE, *Exponent, Inc.;* David Sykora, Ph.D., P.E., G.E., D.GE, M.ASCE, *Exponent, Inc.*

Optimization of Energy Pile Grids During Unbalanced Heating and Cooling Operations, Celal Olgun, Ph.D., *Virginia Tech, VA;* George Bowers, P.E., M.ASCE, *Schnabel Engineering*

Track J | Greenway H

Underground Engineering and Construction
Moderators: Tom Pennington, P.E., M.ASCE, Sotirios Vardako, Ph.D., C.Eng, M.ASCE, Eric Wang, P.E., M.ASCE, Mike Wongkaew, Ph.D., P.E., M.ASCE

Using an Existing Tunnel to Dewater the St. Peter Sandstone, Joshua Zimmermann, EIT, GIT, *Brierley Associates, MN;* Thomas Pullen, PG, *Brierley Associates, MN*

The Fremont Siphon Replacement Project: A Hybrid Approach to Baselining Microtunnel Projects, Michael Coryell, P.E., M.ASCE, *McMillen Jacobs Associates, WA;* Jeremy Johnson, P.E., *McMillen Jacobs Associates, WA,* William Sroufe, PMP, *King County Wastwater Treatment Division, WA*

Evaluation of the Efficiency of the Umbrella Arch Method in Urban Tunneling Subjected to Adjacent Surcharge Loads, Ali Morovatdar, S.M.ASCE, *University of Texas at El Paso, TX;* Massoud Palassi, Ph.D., *University of Tehran,* Mahsa Beizaei, Ph.D., *University of Texas at El Paso, TX*

Effect of Sand and Water Content on Squeezing Behavior, Hamed Tohidi, M.S., M.ASCE, *University of Memphis, TN, and* James W. Mahar, Ph.D., LPG, PG, PHG, *Idaho State University, ID*

Physical Modeling of the Lined Tunnels in Squeezing Ground Conditions, Ketan Arora, S.M.ASCE, *Colorado School of Mines, CO;* Marte Gutierrez, A.M.ASCE, *Colorado School of Mines, CO;* Ahmadreza Hedayat, *Colorado School of Mines, CO*

Incorporating Spatial Uncertainty into Site-Investigations for Tunneling Applications, Rojat Gangrade, S.M.ASCE, *Colorado School of Mines, CO;* Mike Mooney, Ph.D., P.E., M.ASCE, *Colorado School of Mines, CO;* Whitney Trainor-Guitton, Ph.D., *Colorado School of Mines, CO*

Track K | Greenway I

UNSATURATED SOILS: State-of-the-Art in Unsaturated Soil Mechanics: From Theory to Application
Moderators: John McCartney, Ph.D., P.E., F.ASCE, Majid Ghayoomi, Ph.D., P.E., M.ASCE, Idil Akin, Ph.D., A.M.ASCE, Xiong Zhang, Ph.D., A.M.ASCE, Laureano Hoyos, Ph.D.

Seismic Compression of Unsaturated Sand Under Undrained Conditions, Wenyong Rong, M.S., S.M.ASCE, *University of California San Diego, CA;* John McCartney, Ph.D., P.E., F.ASCE, *University of California San Diego, CA*

Analysis of Cylindrical Cavity Expansion in Partially Saturated Soils, Shengli Chen, Ph.D., *Louisiana State University, LA;* Lin Li, Ph.D., *Louisiana State University, LA;* Zhongjie Zhang, Ph.D., P.E., *Louisiana State University, LA*

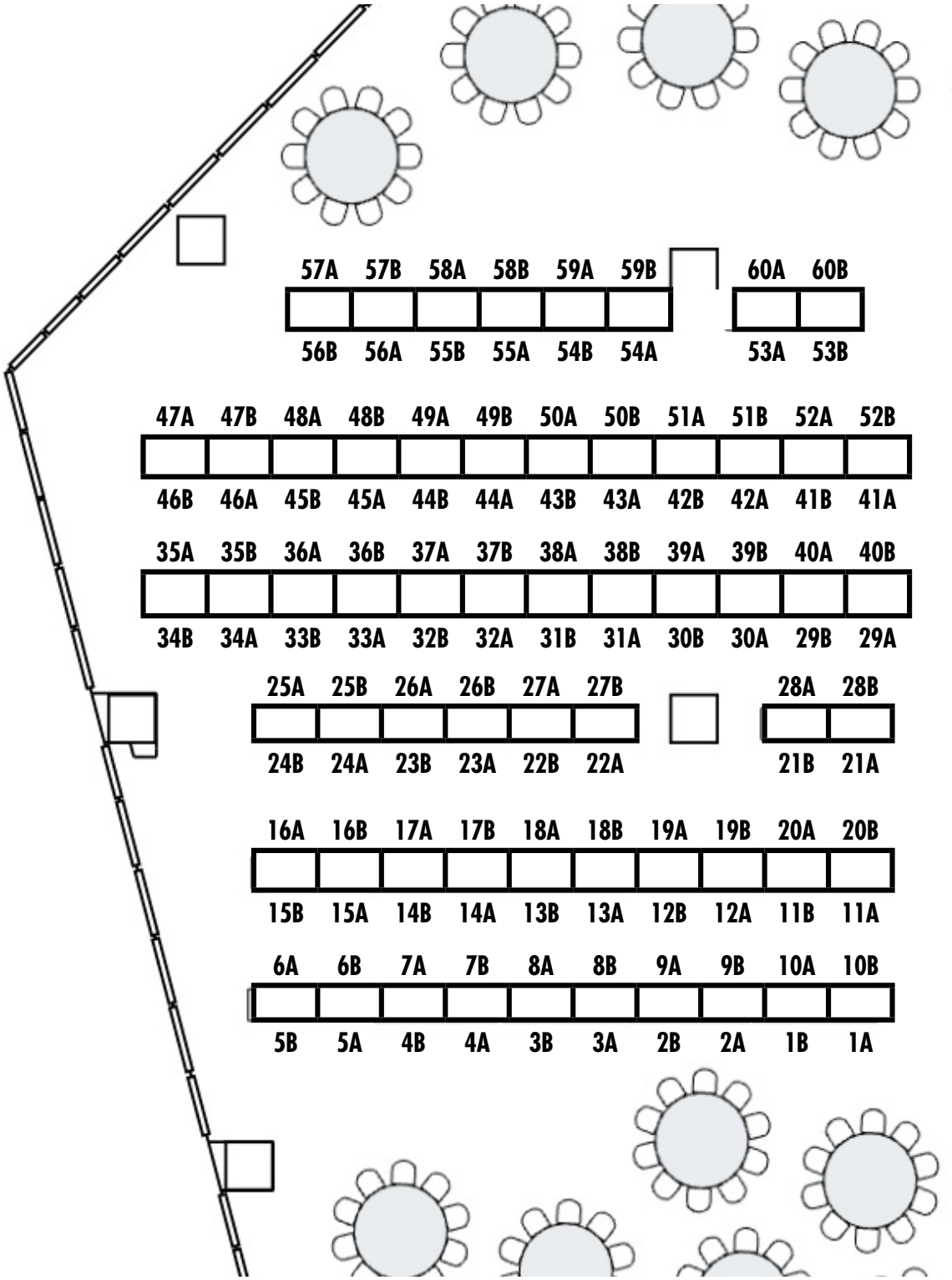
Prediction of Lateral Swelling Pressure in Expansive Soils, Masood Abdollahi, S.M.ASCE, *Mississippi State University, MS;* Farshid Vahedifard, Ph.D., P.E., M.ASCE, *Mississippi State University, MS*

Using Modified State Surface Approach to Study the Hydro-Mechanical Behavior of Unsaturated Soils, Beshoy Riad, S.M.ASCE, *Missouri University of Science and Technology, Rolla, MO,* Xiong Zhang, Ph.D., A.M.ASCE, *Missouri University of Science and Technology, Rolla, MO*

Stress-Dilatancy of Unsaturated Soil, Aritra Banerjee, Ph.D., AM.ASCE, *University of Texas at Arlington Research Institute, TX;* Anand Puppala, Ph.D., P.E., F.ASCE., D.GE, F.ICE, *Texas A&M University, TX;* Prince Kumar, SM.ASCE, *Texas A&M University, TX;* Laureano Hoyos, Ph.D., P.E., M.ASCE, *University of Texas at Arlington, TX*

Saturated and Unsaturated Hydraulic Properties of Ponded Coal Ash, Milind Khire, PhD., P.E., *UNC Charlotte, NC,* Banafsheh Saghaei, *UNC Charlotte, NC,* Bristol Grohol, UNC Charlotte, NC

Poster Diagram



February 26, 2020

Topic A/Geotechnics of Coasts, Oceans, Ports, and Rivers

1A: Effects of Organic Matter on Settling Characteristics of Coastal Sediments: *Malay Ghose-Hajra, Ph.D., P.E., ENV SP, M.ASCE, The University of New Orleans, Louisiana, Brittany M. Roberts, The University of New Orleans, Louisiana*

1B: Numerical Experiments of Seabed Liquefaction During Ocean Wave Loading: *Yingqing Qiu, Oregon State Univ, H. Benjamin Mason, Ph.D., M.ASCE, Oregon State Univ*

2A: Geotechnical Characterization of an Eroding Wetland: *Brian D. Harris, S.M.ASCE, Louisiana State University, Jack Cadigan, S.M.ASCE, Louisiana State University, Donnie Day, Louisiana State University, Navid Jafari, Ph.D., M.ASCE, Louisiana State University*

2B: Permeability of Soilcrete Specimens Made from the Mekong Delta's Soft Clay Mixed with Cement Slurry: *Hoang-Hung Tran-Nguyen, Asc. Prof., Ph.D., Ho Chi Minh City University of Technology, Khanh D.T. Nguyen, Ho Chi Minh City University of Technology, Tam T. Nguyen, Ho Chi Minh City University of Technology*

3A: In-Situ Geotechnical Investigation of a Short Section of the Brazos River Post Hurricane Harvey Using a Portable Free Fall Penetrometer: *Reem Jaber, S.M.ASCE, Virginia Tech, Nina Stark, Ph.D., Aff.M.ASCE, Virginia Tech, Navid Jafari, Ph.D., M.ASCE, Louisiana State University, Nadarajah Ravichandran, Ph.D., EIT, M.ASCE, Clemson University*

Topic AA/Underground Engineering and Construction

3B: Experimental Study on the Stress Distribution and Failure Mode of the Holes for Underexcavation in Building Rectification: *Qingxia Yue, Ph.D., Shandong Jianzhu University, Xin Zhang, Ph.D., P.E., M.ASCE, Shandong Jianzhu University*

4B: 3D Ground Movements Due To Tunnel Face Collapse: *Abdelaziz Ads, P.E., SM.ASCE, New York University, Tanta University, Magued Iskander, Ph.D., P.E., F.ASCE, New York University, Ashraf K. Nazir, Ph.D., Tanta University*

5A: Using Foam as a Transportation Medium for Backfilling Underground Voids: *Nico Sutmoller, Global Lightweight Fill Specialist, Aerix Industries, Rich Palladino, President, Aerix Industries, David Hallman, Ph.D., P.E., P. G., Manager, Principal Geological Engineer, Applied GeoLogic, LLC*

5B: Development of a New Geopolymer Based Cementitious Material for Pumpable Roof Supports in Underground Mining: *Arash Nikvar-Hassani, University of Arizona, Lianyang Zhang, Ph.D., P.E., M.ASCE, University of Arizona*

Topic AB/Unsaturated Soils

12A: Effect of Fines on Hysteretic Hydraulic Conductivity of Unsaturated Soil: *Puneet Bhaskar, S.M.ASCE, Univ. of Texas at Arlington, Burak Boluk, Univ. of Texas at Arlington, Leila Mosadegh, S.M.ASCE, Univ. of Texas at Arlington, Aritra Banerjee, Ph.D., A.M.ASCE, Univ. of Texas at Arlington Research Institute, Anand J. Puppala, Ph.D., P.E., D.GE., F.ASCE, F-ICE, Texas A&M University*

12B: Coupled Thermo-hydro-mechanical Modeling of Saturated Boom Clay: *Mohammadreza Mir Tamizdoust, S.M.ASCE, University of Louisville, Omid Ghasemi-Fare, Ph.D., A.M.ASCE, University of Louisville*

11B: A Photogrammetric Computer Vision Approach for 3D Reconstruction and Volume-change Measurement of Unsaturated Soils: *Xiaolong Xia, Missouri University of Science and Technology, Xiong Zhang, Ph.D., P.E., M.ASCE, Missouri University of Science and Technology and Zhaozheng Yin, Missouri University of Science and Technology*

Topic E/Geo-Education

11A: Integrating Geotechnical Engineering Research into K-12 Education Through a Graduate Course in Engineering Education: *Alena J. Raymond, S.M.ASCE, University of California, Davis, Colleen E. Bronner, Ph.D., EIT, A.M.ASCE, University of California, Davis*

Topic F/Construction, Inspection, and Monitoring

20A: Calibration and Assessment of Capacitance-Based Soil Moisture Sensors: *Mohammad Zahidul I. Bhuiyan, S.M.ASCE, The University of Newcastle, Shanyong Wang, Ph.D., M.ASCE, The University of Newcastle, John Carter, Ph.D., D.Eng., The University of Newcastle, Tabassum Mahzabeen Raka, The University of Newcastle*

20B: Construction and Post-Construction Deformation Analysis of an MSE Wall using Terrestrial Laser Scanning: *Devon Adamson, EIT, University of Manitoba, Marolo Alfaro, Ph.D.., P.Eng, University of Manitoba, James Blatz, Ph.D.., P.Eng, FEC, University of Manitoba, Kent Bannister, M.Sc., P.Eng, TREK Geotechnical Inc.*

21A: Performance Monitoring of Temporary Sediment Control Basins: *Jaime Schussler, B.S., EIT, LEED GA, Iowa State University, Michael A. Perez, Ph.D., EI, A.M.ASCE, Auburn University, Bora Cetin, Ph.D., A.M.ASCE, Michigan State University, Blake Whitman, Ph.D., CPESC, Middle Tennessee State University*

21B: Evaluation of the 2018 "Father's Day Flood" using Technology-Based Tools: *Alice Roache, P.E., M.ASCE, OHM Advisors, R. Michael Cousins, GISP, OHM Advisors, Mark R. Muszynski, Ph.D., P.E., M.ASCE, Gonzaga University*

Topic H/Geo-Systems

35A: Impact on Surface Hydraulic Conductivity of EICP Treatment for Fugitive Dust Mitigation: *Miriam A. Woolley, M.S., Arizona State University, Leon van Paassen, Ph.D., Aff.M.ASCE, Arizona State University, Edward Kavazanjian Jr., Ph.D., P.E., D. GE., Dist.M.ASCE, NAE, Arizona State University*

35B: Effect of Biofilm Treatment Strategy on the Permeability Reduction of Sands: *Atefeh Zamani, Ph.D., University of California at Davis, Casey Phradichith, University of California at Davis, Jason DeJong, Ph.D., P.E., M.ASCE, University of California at Davis, Douglas Nelson, Ph.D., University of California at Davis, Rebecca Parales Ph.D., University of California at Davis*

36A: A Biopolymer-Based Waterproofing Mortar for Irrigation Channel Joints: *M. Khosravi, Ph.D., A.M.ASCE, Golestan University, A.R. Tabarsa, Golestan University, Abdolreza Osouli,Ph.D., P.E., M.ASCE, Southern Illinois University Edwardsville, N. Latifi, Ph.D., M.ASCE, Terracon Consultants, Inc*

Topic I/Computational Geotechnics

18B: Comparisons between Two-Dimensional and Three-Dimensional Fabric Characterizations Based on Scalar Parameters for Sands: *Quan Sun, M.S., Iowa State University, Junxing Zheng, Ph.D., M.ASCE, Iowa State University*

19A: Hydromechanical Coupled Cohesive Zone Modeling of Induced Earthquakes under Fluid Injections: *Danilo Zeppilli, Southwest Petroleum University, Rowan University, Cheng Zhu, Ph.D., A.M.ASCE, Southwest Petroleum University, Rowan University, Amade Pouya, Ph.D., Escole des Paris Tech*

19B: Evaluation of Pull-Out Capacity of Helical Anchors in Clay Using Finite Element Analysis: *Akhil Pandey, Madan Mohan Malaviya University of Technology, Vinay Bhushan Chauhan, Ph.D., Madan Mohan Malaviya University of Technology*

Topic J/Deep Foundations

46A: Design & Construction Solution of Foundation for Landmark 81 – the Tallest Tower in Vietnam: *Quang The Truong, Arup Vietnam Company, Thi Huong Phan, Arup Vietnam Company, Quoc Dung Pham, Bachy Soletanche Vietnam Company, Hoang Nhan Pham, Bachy Soletanche Vietnam Company*

46B: A Numerical Study on Lateral Load Response of Caissons in Static Conditions: *Kaustav Chatterjee, Ph.D., A.M.ASCE, Indian Institute of Technology Roorkee, Mohit Kumar M.Tech., S.M.ASCE, Indian Institute of Technology Roorkee*

45A: Behavior of Caisson Foundations under Lateral Loading in Layered Cohesive Soil: *Shibayan Biswas, Indian Institute of Technology Bombay, Deepankar Choudhury, Ph.D., M.ASCE, Indian Institute of Technology Bombay*

45B: Behavior of Disconnected and Connected Piled-Raft Foundations Subjected to Vertical and Lateral Loads Simultaneously: *Kajal Tarenia, Indian Institute of Technology, Kanpur, Nihar Ranjan Patra, Ph.D., M.ASCE, Indian Institute of Technology, Kanpur*

44A: Performance of Energy Piles Considering Reinforced Concrete Non-Linearity: *Cristiano Garbellini, Swiss Federal Institute of Technology in Lausanne, Lyesse Laloui Ph.D., Swiss Federal Institute of Technology in Lausanne*

44B: Combined Pile-CPT Method: Using Log-normal Distribution Properties to Optimize the Estimation of Ultimate Pile Capacity: *Murad Abu-Farsakh, Ph.D., P.E., F. ASCE, Louisiana State University, Mohsen Amirmojahedi, Ph.D. Student, S. ASCE, Louisiana State University, George Voyiadjis, Louisiana State University*

43A: Development of p-y Curves from Experimental Studies on Piles Near Sloping Ground: *Bhishm Singh Khati, Ph.D., Govind Ballabh Pant Institute of Engineering and Technology, Vishwas Sawant, Ph.D., Indian Institute of Technology Roorkee, Ashish Gupta, Ph.D., Bundelkhand Institute of Engineering and Technology*

43B: Observed and Predicted Forces on Auger Cast Piles: *Evelio N. Horta, Ph.D.., P.E.., GE., MASCE, Ardaman and Associates Inc.*

42A: Equivalent Top Loading Curve Extrapolations and Their Impact on the Resistance Factor Calibration: *Rozbeh B. Moghaddam, P.E., Ph.D., M.ASCE, GRL Engineers, Inc, Patrick J. Hannigan, MSCE, P.E., M.ASCE, GRL Engineers*

42B: Size Effects of Ground Improvement on Seismic Response of Piles: Derivation and Validation of p-y Curves: *Hoda Soltani, Ph.D., M.ASCE, Shannon and Wilson Inc., Kanthasamy K. Muraleetharan, Ph.D., P.E., G.E., F.ASCE, University of Oklahoma*

Topic K/Earth Retaining Structures

53A: An Innovative Driven Soil Nail (x-Nail): A Promising Alternative to Conventional Soil Nails: *Mohammad Zahidul I. Bhuiyan, S.M.ASCE, The University of Newcastle, Shanyong Wang, Ph.D., M.ASCE, The University of Newcastle, John P. Carter, Ph.D., D.Eng., The University of Newcastle, Tabassum Mahzabeen Raka, The University of Newcastle*

53B: Numerical Analysis of Soil Nail Walls in Hybrid Retaining Wall Systems: *Hussein Abbas, M.Sc., Shair and Partners, Ramy El. Sherbiny, Ph.D., P.E., M.ASCE, Cairo University, Salam, A., Ph.D. Cairo University*

52B: Investigating the Practical Conditions to Utilize Brick Stair Wall Method as a Supporting Structure in Urban Excavation: *Mahsa Beizaei, S.M.ASCE, The University of Texas at El Paso, Ehsan Seyedi Hosseininia, Ph.D., University of Mashhad, Ali Morovatdar, S.M.ASCE, The University of Texas at El Paso*

51B: Engineering around Manhattan's History to Construct a Cutting-Edge University Building: Excavation Support and Foundations for the 181 Mercer Street Project: *Samuel W. Singer, P.E., M.ASCE, Langan*

Topic L/Earthquake Engineering and Soil Dynamics

56A: Polymer Injection and Liquefaction-Induced Foundation Settlement: A Shake Table Test Investigation: *Athul Prabhakaran, University of California San Diego, Kyungtae Kim, Ph.D., EIT, A.M.ASCE, University of California San Diego, Milad Jahed Orang, University of Nevada Reno, Zhijian Qiu, University of California San Diego, Ahmed Ebeido, Ph.D., M.ASCE, Jacobs, Muhammad Zayed, S.M.ASCE, University of California San Diego, Reza Boushehri,S.M.ASCE, University of Nevada Reno, Ramin Motamed, Ph.D., P.E., M.ASCE, University of Nevada Reno, Ahmed Elgamal, Ph.D., M.ASCE, University of California San Diego, Cliff Frazao, P.E., EagleLift*

56B: Implementation and Verification of NorSand Model in General 3D Framework: *Zhao Cheng, Ph.D., P.E., M.ASCE, Itasca Consulting Group, Inc., Michael Jefferies, P.Eng., Lincoln*

55B: Evaluation of Substructure and Direct Modeling Approaches in the Seismic Response of Tall Buildings: *Jaime A. Mercado, S.M.ASCE, Univ. of Central Florida, Luis G. Arboleda-Monsalve, Ph.D., M.ASCE, Univ. of Central Florida, Kevin Mackie, Ph.D., F.ASCE, Univ. of Central Florida, Vesna Terzic, Ph.D., California State Univ.*

54A: Liquefaction Numerical Analysis of a Cantilevered Retaining Wall Using a Simple Finn-Byrne Model: *Amin Iraji, Ph.D., F.ASCE, Urmia University, Abdolreza Osouli, Ph.D., P.E., M.ASCE, Southern Illinois University*

54B: Sensitivity and Numerical Analysis using Strain Space Multiple Mechanism Model for a Liquefiable Sloping Ground: *Anurag Sahare, M.Tech., S.M.ASCE, Kyoto University, Kyohei Ueda, Ph.D., Kyoto University, Ryosuke Uzuoka, Ph.D., Kyoto University*

47A: Flexural Wave Attenuation in a Multi-Frequency Locally Resonant Phononic Beam Resting on Elastic Foundations: *Li C., Southeast University, Miao L.C., Ph.D., Southeast University, You Q., Southeast University, Liang X.D., Southeast University, Lei L.J., Southeast University*

47B: Evaluating Liquefaction Triggering Potential Using Seismic Input Parameters that Are Consistent with ASCE 7-16: *Russell A. Green, Ph.D., P.E., M.ASCE, Virginia Tech, Rachel Kizer, S.M.ASCE, Virginia Tech*

48A: Comparison of Simplified and Specific Stress-Based Procedures to Evaluate Liquefaction Potential Using Cone Penetration Tests: A Case Study in the Coastal Area of Mayaguez, Puerto Rico: *Andrés F. Villarreal-Arango, Ph.D., University of Puerto Rico at Mayagüez, Alesandra C. Morales-Vélez, Ph.D., University of Puerto Rico at Mayagüez, K. Stephen Hughes, Ph.D., University of Puerto Rico at Mayagüez*

48B: The Effect of Static Shear Stress on Cyclic Resistance of a Uniform Gravel: *Michelle R. Basham, S.M.ASCE, University of Michigan, Adda Athanasopoulos-Zekkos, Ph.D., A.M.ASCE, University of Michigan*

49A: Physical Modeling of Fine Coal Refuse using Shake Table Testing: *Sajjad Salam, S.M.ASCE, The Pennsylvania State University, Ming Xiao, A.M.ASCE, The Pennsylvania State University, Jintai Wang, A.M.ASCE, Geosyntec Consultants*

49B: The Benefits of Deeper Subsurface Investigation at a Site with Unknown Bedrock Depth in Seismic Site Response Analyses: *Shawn C. Griffiths, Ph.D., P.E., University of Wyoming, Joshua Frazier, M.S., Power Engineers, Inc.*

50A: Comparison of Earthquake-Induced Pore Water Pressure and Deformations in Earthen Dams Using Non-Linear and Equivalent Linear Analyses: *Leila Mosadegh, S.M.ASCE, University of Texas at Arlington, Arlington, Sayantan Chakraborty, Ph.D., A.M.ASCE, Texas A&M University Nripojyoti Biswas, S.M.ASCE, Texas A&M University, Puneet Bhaskar, S.M.ASCE, University of Texas at Arlington, Arlington, Anand J. Puppala, Ph.D., P.E., D.GE, F. ASCE, F. ICE, Texas A&M University*

50B: Effect of Stress Reversal and Consolidation on Undrained Behaviour of Granular Materials under Cyclic Loading: A DEMStudy: *Rohini Kolapalli, MEng, Md., University of South Australia, Mizanur Rahman, Ph.D., Md., University of South Australia Rajibul Karim, Ph.D., University of South Australia, Hoang Bao Khoi Nguyen, Ph.D., University of South Australia*

51A: Evaluating Liquefaction Triggering Potential at Sites Impacted by the 2016 Mw5.8 Pawnee, Oklahoma, Induced Earthquake: *Tyler Quick, P.E., S.M.ASCE, Virginia Tech, Russell A. Green, Ph.D., P.E., M.ASCE, Virginia Tech, Ellen Rathje, University of Texas at Austin, James K. Mitchell, ScD., P.E., NAE, NAS, Virginia Tech*

Topic M/Embankments, Dams, and Slopes

57A: Centrifuge Modeling of Fly Ash Deposit Dewatering: *Srikanth S. C. Madabhushi, Ph.D., Univ. of California, Davis, Kyle O Hara, S.M.ASCE, Univ. of California, Davis, Alejandro V. Martinez, Ph.D., M.ASCE, Univ. of California, Davis, Daniel. W. Wilson, Ph.D., M.ASCE, Univ. of California, Davis, Ross. W. Boulanger, Ph.D P.E. NAE, Univ. of California, Davis, Bruce L. Kutter, Ph.D., Univ. of California, Davis, Ken Ladwig, Electrical Power Research Institute*

57B: Influence of Anisotropic Permeability on Slope Stability Analysis of an Earthen Dam During Rapid Drawdown: *Nripojyoti Biswas, S.M.ASCE, Texas A&M University, Sayantan Chakraborty, Ph.D., A.M.ASCE, Texas A&M University, Leila Mosadegh, S.M.ASCE, Texas A&M University, Anand J. Puppala, Ph.D., P.E., F. ASCE, F. ICE, DGE, Texas A&M University, Maureen Corcoran, Ph.D., RPG, U.S. Army Engineer Research and Development Center*

58A: Design of a Performance Monitoring System for an Innovative Geotechnical Slope Stabilization Design-Build Project: *David A. Provost, Barr Engineering Co, Joel N. Swenson, P.E., Barr Engineering Co, Aaron T. Grosser, M.ASCE, D.G.E., P.E., Barr Engineering Co*

58B: Multi Hazard Analysis of Earth Slopes Using Coupled Geotechnical-Hydrological Finite Element Model: *Tharshikka Vickneswaran, S.M.ASCE, Clemson University, Nadarajah Ravichandran, Ph.D., M.ASCE, Clemson University*

59A: Numerical Analysis of Geosynthetic-Reinforced Pile-supported Embankments Subjected to Different Surface Loads: *Zhen Zhang, Ph.D., Tongji Univ., Fengjuan Tao, S.M.ASCE, Tongji Univ., Jie Han, Ph.D., P.E., F.ASCE, Univ. of Kansas, Guanbao Ye, Ph.D., Tongji Univ, Liu Liu, Tongji Univ*

59B: Stabilization of a Large Landslide impacting Highway 73 in the Missouri River Badlands: *Aaron Grosser, D.GE, M.ASCE, Barr Engineering Company, Jed Greenwood, P.E., D.GE, PG, Barr Engineering Company, Miguel Wong, Ph.D., P.E.,Barr Engineering Company, Brian Albrecht, Ph.D., P.E., Barr Engineering Company, Colter Schwagler, P.E., North Dakota Department of Transportation, Matthew Kurle, P.E., North Dakota Department of Transportation*

60A: A Mathematical Model for Shear Strength Prediction of Vetiver Rooted Soil: *Mohammad S. Islam, Bangladesh University of Engineering and Technology, Faria F. Badhon, The University of Texas at Arlington*

60B: Effectiveness of Vetiver Grass on Stabilizing Hill Slopes: A Numerical Approach: *Md Azijul Islam, S.M.ASCE, University of Texas at Arlington, Mohammad Shariful Islam, Bangladesh University of Engineering and Technology, Ph.D., Tausif E Elahi, Bangladesh University of Engineering and Technology*

Topic N/Engineering Geology and Site Characterization

8B: Piezocone Identification of Organic Clays and Peats: *Paul W. Mayne, Ph.D., P.E., M.ASCE, Georgia Institute of Technology, Shehab S. Agaiby, Ph.D., Cairo University,and Derrick Dasenbrock, P.E., D.GE, F.ASCE, Minnesota DOT Office of Materials and Road Research*

10A: Uncertainty Quantification of Soil Total Unit Weight Based on Random Field Model and Linear Dynamic System: A Comparative Study: *Lu-Yu Ju, Wuhan University, Cong Miao, Wuhan University, Zi-Jun Cao, Ph.D., Wuhan University, Peter Hubbard, S.M.ASCE, University of California, Kenichi Soga, M.ASCE, University of California, Dian-Qing Li, Ph.D., M.ASCE, Wuhan University*

9B: Case Study: Geotechnical Site Characterization for the I-35W Stormwater Storage Facility: *Michael B. Haggerty, P.E., M.ASCE, Barr Engineering Co., Ivan Contreras, P.E., Ph.D., M.ASCE, Barr Engineering Co.*

9A: Evaluation of CPTU-based Soil Classification Charts for Offshore Sediments in Pearl River Delta, China: *Yu Du, P.E., CCCC-FHDI Engineering CO., LTD, Liuwen Zhu, P.E., CCCC-FHDI Engineering CO., LTD, Haifeng Zou, Ph.D., Hong Kong University of Science and Technology, Limin Zhang, Ph.D., F. ASCE, HKUST Shenzhen Research Institute, Guojun Cai, Ph.D., Southeast University, Songyu Liu, Ph.D., M.ASCE, Southeast University*

10B: Image Analysis and Hardware Developments for the Vision Cone Penetrometer (VisCPT): *Andrea Ventola, S.M.ASCE, The University of Michigan, Ron Dolling, ConeTec Investigations Ltd., Roman D. Hryciw, Ph.D., M.ASCE, The University of Michigan*

Topic O/Geoenvironmental Engineering

25A: Effect of Sand Content on Cyclic Swell-Shrink Behavior of Compacted Expansive Soil: *Sabari Ramesh, M.Tech., S.M.ASCE, Indian Institute of Technology Madras, T. Thyagaraj, Ph.D., Indian Institute of Technology Madras*

25B: Leaching Behavior of Metals and Sulfate from Taconite Tailings Used in Pavement Constructions: *Samuel Schreck, S.M.ASCE, Iowa State University, Masrur Mahedi, S.M.ASCE, Iowa State University, Bora Cetin, M.ASCE, Iowa State University*

26A: Role of Alkali Concentration on the Micro-Level Characteristics of Kaolinitic Clay: *Lakshmi Sruthi P, National Institute of Technology Warangal, Hari Prasad Reddy, Ph.D., National Institute of Technology Warangal, Arif Ali Baig Moghal M.ASCE, National Institute of Technology Warangal*

26B: Field Monitoring of Landfill Gas Emission through an Intermediate Cover with Co-Extruded EVOH Geomembrane in an Operating Landfill: *Yuan Feng, University of Nebraska-Lincoln, Lincoln, M Sina Mousavi, University of Nebraska-Lincoln, Lincoln, Jongwan Eun, Ph.D., P.E., M.ASCE, University of Nebraska-Lincoln, Lincoln*

27A: Effect of Acid and Alkali Contamination on Swelling Behavior of Kaolin Clay: *Rama Vara Prasad Chavali, Ph.D., Siddhartha Engineering College, Sai Kumar Vindula, National Institute of Technology Warangal, K Venkata Vydehi, National Institute of Technology Warangal, Hari Prasad Reddy, Ph.D., National Institute of Technology Warangal, Arif Ali Baig Moghal,Ph.D., M.ASCE, National Institute of Technology Warangal*

27B: Effect of Fly Ash on Heavy Metal's Status in Soil and Water: Removal by Adsorption: *Aravind T, National Institute of Technology Warangal, Sharath K, Government of Telangana, Hari Prasad Reddy P, National Institute of Technology Warangal*

Topic Q/Geosynthetics

29A: Hydraulic Conductivity of Bentonite-Polymer Geosynthetic Clay Liners to Coal Combustion Product Leachates: *Binte Zainab, A.M.ASCE, George Mason University, Kuo Tian, Ph.D., A.M.ASCE, George Mason University*

29B: Interface Shear Strength Behavior of Marginal Soils with Geotextiles and Geogrids: *Sagarkumar Khunt, Indian Institute of Technology Gandhinagar, Naman Kantesaria, Indian Institute of Technology Gandhinagar, Ajanta Sachan, Ph.D., A.M.ASCE, Institute of Technology Gandhinagar*

30A: Influence of Reinforcement Parameters on the Seismic Response of Reinforced Earth Dams: *Reza Boushehri, S.M.ASCE, University of Nevada, Seddigheh Hasanpour Estahbanati, University of Nevada, Seyed Majdeddin Mir Mohammad Hosseini, Amirkabir University of Technology, Abbas Soroush, Ph.D., Amirkabir University of Technology*

Topic T/Pavements

34A: Effect of Paving Fabric on Reduction of Reflective Cracking: *Kejun Wen, Ph.D.,EIT,A.M.ASCE, Jackson State University, Farshad Amini, P.E., F.ASCE, Jackson State University*

34B: Effect of Using Geosynthetics in Mitigation of Freeze-Thaw Through Numerical Analysis: *Asif Ahmed, Ph.D., P.E., M.ASCE, State University of New York (SUNY) Polytechnic Institute, Md. Azijul Islam, S.M.ASCE, University of Texas at Arlington*

33A: Binding Capacity of Quarry Fines for Granular Aggregates: *Sajjad Satvati, EIT, S.M.ASCE, Iowa State University, Bora Cetin, Ph.D., A.M.ASCE, Michigan State University, Jeramy C. Ashlock, Ph.D., A.M.ASCE, Iowa State University, Halil Ceylan, Ph.D., A.M.ASCE, Iowa State University, Cassandra Rutherford, Ph.D., P.E., M.ASCE, Iowa State University*

33B: Validated Intelligent Compaction using AASHTOWare Pavement Mechanistic Empirical (ME) Modulus Target Values: Case History I-25 North Express Lanes: *Lake Carter, P.E., M.ASCE, Ingios Geotechnics, Pavana Vennapusa, Ph.D., P.E., M.ASCE, Ingios Geotechnics, David J. White, Ph.D., P.E., M.ASCE, Ingios Geotechnics*

32A: Two Non-Destructive Approaches for Assessment of Field Lift Thickness: *William J. Baker III, S.M.ASCE, University of Delaware, Christopher L. Meehan, Ph.D., P.E., F.ASCE, University of Delaware*

32B: Performance of Geocell-Reinforced Recycled Asphalt Pavement (RAP) Bases in Flexible Pavements Built on Expansive Soils: *Md Ashrafuzzaman Khan, S.M.ASCE, Texas A&M University, Nripojoyti, Biswas, S.M.ASCE, Texas A&M University, Aritra Banerjee, Ph.D., A.M.ASCE, University of Texas at Arlington Research Institute, Anand J. Puppala, Ph.D., P.E., F. ASCE, F. ICE, D.GE, Texas A&M University*

31A: Investigation of the Performance of Different Surface Aggregate Materials for Granular Roads: *Sajjad Satvati, EIT, S.M.ASCE, Iowa State University, Bora Cetin, Ph.D., A.M.ASCE, Michigan State University, Jeramy C. Ashlock, Ph.D., A.M.ASCE, Iowa State University, Cheng Li, Ph.D., Changan University*

31B: Sensitivity Analysis of New Reflective Cracking Model in Pavement Mechanistic-Empirical Design: *Leela Sai Praveen Gopisetti, Iowa State University, Halil Ceylan, Ph.D., A.M.ASCE, Iowa State University, Bora Cetin, Ph.D., A.M.ASCE, Michigan State University, Sunghwan Kim, Ph.D., State University, Orhan Kaya, Iowa State University*

30B: Bender Element Shear Wave Measurement Based Local Stiffness Characteristics Related to Permanent Deformation Behavior of Geogrid-Stabilized Aggregate Specimens: *Joon Han Kim, University of Illinois at Urbana-Champaign, Mingu Kang, University of Illinois at Urbana-Champaign, Yong-Hoon Byun, Ph.D., Kyungpook National University, Issam I.A. Qamhia, Ph.D., University of Illinois at Urbana-Champaign, Erol Tutumluer, Ph.D., M.ASCE, University of Illinois at Urbana-Champaign, Mark H. Wayne, Ph.D., P.E., Tensar International Corporation*

Topic W/Shallow Foundations

41A: Bearing Capacity of Circular Foundation on Sand of Limited Thickness under Inclined Loading: *Khaled Sobhan,Ph.D., AM.ASCE, Florida Atlantic University, Chittaranjan Patra, Ph.D., National Institute of Technology, Rourkela, B. Sethy, Ph.D., P.E., National Institute of Technology, Rourkela, Braja M. Das, Ph.D., P.E., F.ASCE, California State University*

41B: LRFD for Shallow Foundations using Plate Load Test Data: *Sherif S. AbdelSalam, Ph.D., M.ASCE, Nile University, Mona B. Anwar, Ph.D., German University in Cairo, Demah I. Esmail, German University in Cairo*

40A: Challenges Evaluating Performance of Innovative Wind Turbine Foundation via 3D Numerical Modeling: *Raul A. Velasquez, P.E., Ph.D., Minnesota Department of Transportation, Kirk B. Morgan, P.E., P.Eng., Barr Engineering Co., Douglas J. Krause, RUTE Foundation Systems Inc.,*

40B: Results of a Class C Blind Prediction Competition on the Numerical Simulation of a Large-Scale Liquefaction Shaking Table Test: *Ramin Motamed, Ph.D., P.E., M.ASCE, University of Nevada Reno, Milad Jahed Orang, University of Nevada Reno, Athul Parayancode, S.M.ASCE, University of California San Diego, Ahmed Elgamal, Ph.D., M.ASCE, University of California San Diego*

39: Modulus to SPT Blow Count Correlation for Settlement of Footings on Sand: *Mostafa Bahmani, S.M.ASCE, Texas A&M University, Jean-Louis Briaud, Ph.D., P.E., D.GE, Dist.M.ASCE, Texas A&M University*

38: Factors Influencing Immediate Settlements in Central Florida Soils Using Conical Load Tests: *Sina Nassiri, University of Central Florida, Sergio Savater, University of Central Florida, Luis Arboleda-Monsalve, Ph.D., M.ASCE, University of Central Florida, Manoj Chopra, University of Central Florida, Larry Jones, P.E., Florida Department of Transportation*

Topic X/Soil Improvement

6A: Numerical Evaluation of Geogrid Encased Stone Columns in Soft Soil Under Embankment Loading : *Balbir Kumar Pandey, S.M.ASCE, Indian Institute of Technology Kanpur, Sathiyamoorthy Rajesh, Ph.D., Indian Institute of Technology Kanpur, Sarvesh Chandra, Ph.D., Indian Institute of Technology Kanpur*

6B: Optimization of Enzyme Induced Carbonate Precipitation (EICP) as a Ground Improvement Technique: *Isaac Ahenkorah, University of South Australia, Md Mizanur Rahman, Ph.D., M.ASCE, of South Australia, Md Rajibul Karim, Ph.D., University of South Australia, Peter R. Teasdale, Ph.D., University of South Australia*

7A: Elemental Testing of Carbonated Silty Sand Treated with Lime: *SK Belal Hossen, S.M.ASCE, University of Maine, Aaron P. Gallant, Ph.D., M.ASCE, University of Maine, Warda Ashraf, Ph.D., University of Maine*

7B: Self-Healing and Desiccation Crack Behavior of Kaolinite-Rich Clay Soil: *Tanzila Tabassum,South Dakota School of Mines and Technology, Tejo Bheemasetti, Ph.D., A.M.ASCE, South Dakota School of Mines and Technology*

15A: In Situ Evaluation of Using Lignosulfonate for Subgrade Stabilization: *Yizhou Li, Iowa State University, Yang Zhang, Ph.D., Iowa State University, Halil Ceylan, Ph.D., A.M.ASCE, Iowa State University, Sunghwan Kim, Ph.D., P.E., Iowa State University*

15B: Resilient Modulus of Expansive Soils in North Texas treated with Liquid Ionic Soil Stabilizer (LISS): *Nice Kaneza, S.M.ASCE, of Texas at Arlington, Shi He, University of Texas at Arlington, Xinbao Yu, Ph.D., P.E., University of Texas at Arlington, Anand J. Puppala, Ph.D., P.E., F.ASCE, Texas A&M University, Sayantan Chakraborty, Ph.D., A.M.ASCE, Texas A&M University*

14A: Effect of Drained Heating and Cooling on the Preconsolidation Stress of Saturated Normally Consolidated Clays: *Radhavi A. Samarakoon, M.S.C.E, S.M.ASCE, University of California, John S. McCartney, Ph.D., P.E., F.ASCE, University of California*

14B: Pozzolanic Activity of Municipal Sewage Sludge Ash and Its Potential Use for Soft Soil Stabilization: *Xiaochao Tang, Ph.D., P.E., M.ASCE, Widener University, Ian Nordfors, E.I.T., Widener University*

13A: Lightweight Design Alternative for I-95 Reconstruction in Philadelphia: *James A. McKelvey, III, P.E., D.GE, F.ASCE, Earth Engineering Incorporated, Sarah McInnes, P.E., Pennsylvania Department of Transportation,Robert Crawford, P.E., M.ASCE, James J. Anderson Construction Co., Majid Khabbazian, Ph.D., P.E., M.ASCE, Schnabel Engineering*

13B: Parametric Assessment of Stiff Column Behavior under Lateral Load: *Alfonso J. Rivera, Ph.D., A.M.ASCE, Virginia Polytechnic Institute and State University, C. Guney Olgun, Ph.D., Missouri University of Science and Technology, Thomas L. Brandon, Ph.D., M.ASCE, P.E., Virginia Polytechnic Institute and State University, Frederic Masse, Menard Group USA*

8A: Ground Improvement for Foundation Support in Organic Soils: *Brian C. Metcalfe, P.E.,M.ASCE, Geopier Foundation Company, Kord J. Wissmann, Ph.D., P.E.,D.GE., Geopier Foundation Company, Stephen S. Weyda, P.E.,M.ASCE, Ground Improvement Engineering, Bruce Bush, G.I.T., Geopier Foundation Company*

Topic Y/Soil Properties and Modeling

24A: A Proposed Coupled Model for Predicting Land Subsidence in Aquifers Caused by Groundwater Withdrawal: *Fei Wang, Ph.D., P.E., M.ASCE, Tarleton State University, Linchang Miao, Ph.D., Southeast University, Jie Huang, Ph.D., P.E., M.ASCE, University of Texas at San Antonio*

24B: Feasibility of Using High-Speed Imaging and Digital Image Correlation Techniques to Analyze Particle Breakage Process: *Zhen Zhang, Iowa State University, Yi Zheng, Iowa State University, Junxing Zheng, Ph.D.,M.ASCE, Iowa State University, Beiwen Li, Ph.D., Iowa State University*

23A: Analysis of In-Situ Soil Thermal and Hydraulic Data from a Subgrade Sensor Network Under a Granular Roadway: *Derya Genc, Iowa State University, Jeramy Ashlock, Ph.D., A.M.ASCE, Iowa State University, Bora Cetin, Michigan State University, Kristen Cetin, Ph.D, A.M.ASCE, Michigan State University, Masrur Mahedi, Ph.D., A.M.ASCE, Iowa State University, Robert Horton, Ph.D., Iowa State University, Halil Ceylan, Ph.D., A.M.ASCE, Iowa State University*

23B: 3D Printed Soil Analogs for Modeling of Coarse-Grained Soil Behavior: *Sheikh Sharif Ahmed, University of California, Davis, Alejandro Martinez, Ph.D., M.ASCE, University of California, Davis*

22A: Discrete Element Modelling of Undrained Consolidated Triaxial Test on Cohesive Soils: *Joash Bryan Adajar, University of Manitoba, Irene Olivia Ubay, University of Manitoba, Marolo Alfaro, Ph.D., University of Manitoba, Ying Chen, Ph.D., University of Manitoba*

22B: Particle Size Characteristics of Unconventionally Large Aggregate Particles by Stereophotography: *Haluk Sinan Coban, Iowa State University, Quan Sun, Iowa State University, Bora Cetin, Ph.D., A.M.ASCE, Michigan State University, Junxing Zheng, Iowa State University*

16A: A System-Level Gravel Loss Prediction Model: *Shafkat Alam-Khan, Michigan State University, Bora Cetin, Michigan State University, H. David Jeong, Ph.D., Texas A&M University, Jeramy C. Ashlock, Ph.D., A.M.ASCE, Iowa State University*

16B: Evaluation of Deformation Behavior of Sand-Clay Mixture Under Traffic Loads: *Halil I. Fedakar, Ph.D., Abdullah Gül University, Wenjing Cai, Ph.D. Candidate, Iowa State University, Cassandra J. Rutherford, Ph.D., P.E., M.ASCE, Iowa State University, Bora Cetin, Ph.D., A.M.ASCE, Iowa State University*

17A: Modified Hyperbolic Stress-Strain Response of Philippine Limestone Waste Blended Materials: *Erica Elice S. Uy, Ph.D., De La Salle University, Mary Ann Q. Adajar, Ph.D.,De La Salle University, Jonathan R. Dungca, D.Eng., De La Salle University*

17B: Effect of Particle Size and Morphology on Laboratory Maximum Density Determination of Sands: *James P. Hanley, S.M.ASCE, Villanova University, Gregory Boccafola, Villanova University, Russell Graziano, Villanova University, Michael A. Haefeli, EIT, S.M.ASCE, Villanova University, Jonathan F. Hubler, Ph.D., A.M.ASCE, Villanova University*

18A: Effective Stress Failure Envelope Forms and Parameter Variability: *Daniel R. VandenBerge, Ph.D., P.E., M.ASCE, Tennessee Tech, Michael P. McGuire, Ph.D., P.E., M.ASCE, Lafayette College, Bernardo A. Castellanos, Ph.D., P.E., P.M.P., M.ASCE, Virginia Tech*

February 27, 2010

Topic A/Geotechnics of Coasts, Oceans, Ports, and Rivers

39A: Variations in Sediment Strength across a Sandy Peninsula: *Nicola C. Brilli,S.M.ASCE, Virginia Tech, Nina Stark, Ph.D., M.ASCE, Virginia Tech*

39B: Novel Approach to Modelling of Three Phase Strength Development of Cement Treated Clays: *Siau Chen Chian, Ph.D., National University of Singapore, Jurong Bi, Ph.D., National University of Singapore*

40A: Integrated Assessment of Multidisciplinary Data for Geo-Structural Evaluations: *Michael J. Byle, P.E., F.ASCE, Tetra Tech Inc., Stephen Ernst, P.E., Tetra Tech Inc.*

40B: Slope Stability Problems and Solutions in the Red River Valley: *Christopher W. Behling, P.E., U.S. Army Corps of Engineers*

Topic AB/Unsaturated Soils

41A: A Least Square Optimization Approach for Determining the Soil Boundary and Absolute Volume of Unsaturated Soils: *Sara Fayek, Missouri University of Science and Technology, Xiaolong Xia, Missouri University of Science and Technology, Xiong Zhang, P.E., Ph.D., Missouri University of Science and Technology*

41B: Development and Validation of a Double-Column Soil Cell for 1-D Heating Test: *Gang Lei, S.M.ASCE., the University of Texas at Arlington, Nice Kaneza, S.M.ASCE., the University of Texas at Arlington, Teng Li, S.M.ASCE, the University of Texas at Arlington, Omid Habibzadeh-Bigdarvish, S.M.ASCE, the University of Texas at Arlington, Xinbao Yu, Ph.D., P.E., the University of Texas at Arlington*

42A: An Experimental Study on the Clarity of Transmitted Bender Element Signals in Unsaturated Silt And Sand: *Mehrzad Rahimi, The Ohio State University, Parisa Shahbazan, Iran University of Science and Technology, Amin Gheibi, S.M.ASCE, Colorado School of Mines, Ali Khosravi, Ph.D., A.M.ASCE, Sharif University of Technology, Ali Pak, Ph.D., Sharif University of Technology, Mehdi Yarmahmoodi, Islamic Azad University of Estahban*

42B: Saturated and Unsaturated Hydraulic Properties of Ponded Coal Ash: *Milind V. Khire, Ph.D., P.E., UNC Charlotte, Banafsheh Saghaei, M.ASCE, UNC Charlotte, Bristol Grohol, Duke Energy*

Topic AC/Other

52B: Bio-Inspired Dual-Anchor Burrowing: Effect of vertical Curvature of the Shell: **S. Huang, S.M.ASCE**, *Arizona State University,* **J. Tao, Ph.D., A.M.ASCE**, *Arizona State University*

Topic D/The Geotechnics of Alternative Project Delivery

28A: Subsurface Risk Management Tools for Alternative Project Delivery: *Douglas D. Gransberg, Ph.D., P.E., M.ASCE, Gransberg & Associates, Bora Cetin, Ph.D., A.M.ASCE, Michigan State University*

28B: Geotechnical BIM in 2020: *Strahimir Antoljak, M.ASCE, Terracon Consultants, Inc.*

Topic G/Advances in Geo-Computing

53A: A DEM Study of the Evolution of Fabric of Coarse-Grained Materials during Oedometric and Isotropic Compression: *Mandeep Singh Basson, S.M.ASCE, University of California, Davis, Alejandro Martinez, Ph.D., M.ASCE, of California, Davis*

53B: Effect of Earthquake Intensity on Probabilistic Analysis of Dam-Reservoir-Foundation Systems: *Hamid Taghavi Ganji, Amirkabir University of Technology, Reza Boushehri, S.M.ASCE, University of Nevada, Reno, Mohammad Alembagheri, Tarbiat Modares University, Mohammad Houshmand Khaneghahi, Texas State University, Seddigheh Hasanpour Estahbanati, University of Nevada, Reno*

Topic H/Geo-Systems

34A: Laboratory Study in the Treatment of Burned Soils with Microbial Augmentation for Erosion Control : *Tasha M. Hodges, South Dakota School of Mines and Technology, Bret N. Lingwall, Ph.D., P.E., M.ASCE South Dakota School of Mines and Technology*

34B: Microfluidic-Based Study on the Activation and Evolution of Calcite Bio-Mineralization for Geotechnical Applications: *Ariadni Elmaloglou, Swiss Federal Institute of Technology, Lausanne, Dimitrios Terzis, Ph.D., Swiss Federal Institute of Technology, Lausanne, Pietro De Anna, Ph.D., Swiss Federal Institute of Technology, Lausanne, Lyesse Laloui, Ph.D., University of Lausanne, Stéphane Mahé, P.h.D, University of Lausanne, Filippo Miele, University of Lausanne*

33A: Effects of Asperity Height on Monotonic and Cyclic Interface Behavior of Bioinspired Surfaces under Constant Normal Stiffness Conditions: *Kyle B. O'Hara, M.S., S.M.ASCE, University of California Davis, Alejandro Martinez, Ph.D., A.M.ASCE, University of California Davis*

33B: Study of Interface Frictional Anisotropy at Bioinspired Soil-Structure Interfaces with Compliant Asperities: *Lin Huang, S.M.ASCE, University of California, Davis, Alejandro Martinez, Ph.D., A.M.ASCE, University of California, Davis*

Topic I/Computational Geotechnics

30: Influence of Slip Surface Shape on 3D Slope Stability Analysis: *Murray D. Fredlund, Ph.D., Bentley Systems Inc., Gilson de F. N. Gitirana Jr., Ph.D., Universidade Federal de Goiás, Zenja Ivkovic, M.Sc., Bentley Systems Inc., HaiHua Lu, M.Sc. Bentley Systems Inc.*

31: Numerical Study of the Effects of Deep Excavations on Dynamic Performance of Buried Pipelines: *Seddigheh Hasanpour Estahbanati, University of Nevada, Reno, Reza Boushehri, University of Nevada, Reno, Abbas Soroush, Ph.D., Amirkabir University of Technology, Omid Ghasemi-Fare, Ph.D., A.M.ASCE, of Louisville*

32: Application of Computational Limit Analysis to LRFD Design: *Colin C. Smith, Ph.D., University of Sheffield, M. Gilbert, Ph.D., M.ASCE, University of Sheffield*

Topic J/Deep Foundations

47A: Improved α- and ß-Methods for the Estimation of Shaft Resistance of Steel-H Piles Driven into Intermediate Geomaterials: *Pramila Adhikari, Ph.D., University of Wyoming, Kam W. Ng, Ph.D., P.E., M.ASCE, University of Wyoming, Yrgalem Z. Gebreslasie, Arup Group Ltd, Shaun S. Wulff, Ph.D., University of Wyoming*

47B: An Approach to Predict Unknown Diameter of Hollow-Bar Micropiles (HBMs) in Sandy Soils Considering Installation Parameters: *Mohammad Ahsanuzzaman, P.E., S.M.ASCE, Carolina State University, Mohammed A. Gabr, Ph.D., D.GE., P.E., F.ASCE, North Carolina State University, Roy H. Borden, Ph.D., P.E., North Carolina State University*

48A: Construction of Large and Deep Bridge Pier Foundations with Pressed-in Pipe Pile Cells: *Takefumi Takuma, A.M.ASCE, Giken Ltd., c/o Giken America Corp., Koji Kajino, Giken Ltd., c/o Giken America Corp., Tsunenobu Nozaki, Giken America Corp, Masashi Nagano, A.M.ASCE, Giken America Corp*

48B: A Hybrid, Multi-scale Full Waveform Inversion Approach to Evaluate the Structural Integrity of Drilled Shafts: *Alireza Kordjazi, Ph.D.,EIT, A.M.ASCE, Temple University, Joseph T. Coe, Ph.D., A.M.ASCE, Temple University, Michael Afanasiev, Ph.D., Mondaic Ltd.*

49A: Evaluation of Pile Setup Phenomenon for Driven Piles in Alabama: *Md. Nafiul Haque, Ph.D., A.M.ASCE, Ardaman and Associates, Eric J. Steward, Ph.D., P.E., M.ASCE, University of South Alabama*

49B: An Effort to Develop a Novel Foundation Through Biomimicry Using 3D Finite Element Modeling: *Shweta Shrestha, S.M.ASCE, Clemson University, Nadarajah Ravichandran, Ph.D., M.ASCE, Clemson University*

50A: Evaluation of Axial Capacity and Plugging Condition of Pipe Piles Installed in Variable Clay and Sandy Alluvial Soils: *Michael J. Givens, P.E., P.G., Ph.D., M.ASCE, Group Delta Consultants, Inc, Mahsa Khosrojerdi, Ph.D., M.ASCE, Arup North America, Ltd, Lucy Taylor, Arup North America, Ltd*

50B: The Use of Embedded Sensors for Long Term Monitoring of Stress, Temperature, Corrosion Potential and Other Variables in Precast Concrete Elements: *Donald Robertson, P.E., Applied Foundation Testing, Aneesh Goly, Ph.D., P.E., Smart Structures*

51A: Retrofitting Uplift Capacity of Telecommunication Tower Foundation with Helical Piles in Dense Granular Soils: *Mostafa Afzalian, University of Nebraska-Lincoln, Bryce Medhi, University of Nebraska-Lincoln, Jongwan Eun, Ph.D., P.E., M.ASCE, University of Nebraska-Lincoln, Tom Medhi, SE, P.E., Associated Engineering, Inc*

51B: Efficient Pile Distribution for Piled-raft Foundations for Tall Buildings:*Muawia Dafalla, Ph.D. M.ASCE, King Saud University, SalehAldeghaither, Ph.D., King Saud University, Taha, N., King Saud University, Al-Laham, M., King Saud University, Al-Zoubi, I, King Saud University*

52A: Analytical and Numerical Study on the Ultimate Bearing Capacity of Energy Piles in Sandy Soils: *Amir A.Garakani, Ph.D., Niroo Research Institute, Bahareh Heidari, BSc., University of Science and Culture, Sahar Jozani, M.S., BSc., University of Science and Culture*

Topic K/Earth Retaining Structures

54A: Predictive Equation for Estimating Lateral Deformation of GRS Abutments: *Mahsa Khosrojerdi, Ph.D., M.ASCE, Arup North America Ltd, Ming Xiao, Ph.D., P.E., M.ASCE, The Pennsylvania State University, Tong Qiu, Ph.D., P.E., M.ASCE, The Pennsylvania State University, Jennifer Nicks, Ph.D., P.E., M.ASCE, Federal Highway Administration*

54B: Numerical Evaluation of Long-term Performance of a Geosynthetic Reinforced Soil Pier and Reinforced Soil Foundation: *Mahsa Khosrojerdi, Ph.D., M.ASCE, Arup North America Ltd, Ming Xiao, Ph.D., P.E., M.ASCE, The Pennsylvania State University, Tong Qiu, Ph.D., P.E., M.ASCE, The Pennsylvania State University, Jennifer Nicks, Ph.D., P.E., M.ASCE, Federal Highway Administration*

55A: Deep Secant Pile Walls Constructed in Weak Glacial Deposits of Manhattan: *Chu E Ho, Sc.D., M.ASCE, Arup, Alfredas Daugiala, M.ASCE, Underpinning and Foundation Skanska*

55B: Geotechnical Considerations for Retaining Walls below Interstate I-5 and SR-52 Interchange, San Diego, CA: *Moi Arzamendi, P.E., G.E.,WSP USA, Matteo Montesi, P.E., M.ASCE,WSP USA, Frank E. Owsiany, P.E.,SANDAG*

56A: The Effects of Poor Design and Construction Workmanship on a Mechanically Stabilized Earth (MSE) Segmental Retaining Wall (SRW) in North Carolina: *Antonios Vytiniotis, Ph.D., P.E., M.ASCE, Exponent Inc., David W. Sykora, Ph.D., P.E., D.GE, M.ASCE, Exponent Inc., Brendan Casey, Ph.D., P.E., M.ASCE, Formerly at Exponent, Inc.*

56B: A Reliability Study of a Retaining Wall Design with Seismic Loads: *Wenjun Dong, Ph.D., P.E., M.ASCE,Bittner-Shen Consulting Engineers, Inc*

Topic L/Earthquake Engineering and Soil Dynamics

46A: Small Strain Dynamic Properties of Silt-Clay Mixtures: *Beena Ajmera, Ph.D., P.E., M.ASCE, North Dakota State University, Binod Tiwari, Ph.D., P.E., M.ASCE, California State University, Quoc-Hung Phan, California State University*

46B: Centrifuge Tests To Evaluate Seismic Settlement of Shallow Foundation On Unsaturated Silty Sand: *Amin Borghei, Ph.D., M.ASCE, Geo-Logic Associates, Inc, Majid Ghayoomi, Ph.D., P.E., M.ASCE, University of New Hampshire, Matthew Turner, S.M.ASCE, University of New Hampshire*

45A: An Experimental Study on the Post-Liquefaction Shear Strength of Aluminum Tailings: *Brahian Roman, MEng., The University of Tokyo*

45B: Comparison of 1-D Seismic Site Response Analysis Tools for Layered Liquefiable Deposits: *Hao Yu, Ph.D., P.E., M.ASCE, DNV GL, Eric Ntambakwa, P.E., M.ASCE, DNV GL, Bruno Mendes, DNV GL, Matthew Rogers, P.E., M.ASCE, DNV GL*

44A: Seismic Displacement Assessment of New Facilities for Post-Disaster Operation at a Wastewater Treatment Plant: *Ali Ghandeharioon, Ph.D., P.Eng., Klohn Crippen Berger Ltd, Andrew Port, M.Eng., P.Eng., Klohn Crippen Berger Ltd*

44B: Analysis of the Contractive Tendency of an Instrumented Field Deposit: *Alejandro Sepúlveda, M.Sc., Universidad del Norte Vicente Mercado, Ph.D., Universidad del Norte, Waleed El-Sekelly, Ph.D., P.E., Mansoura University & New York University Abu Dhabi*

43A: Comparison of First-order Second-Moment and Latin Hypercube Sampling Methods on Probabilistic Seismic Hazard Analysis of Dam-Reservoir-Foundation Systems: *Hamid Taghavi Ganji, Amirkabir University of Technology, Reza Boushehri, University of Nevada, Reno, Mohammad Alembagheri, Tarbiat Modares University, Mohammad Houshmand Khaneghahi, Texas State University, Seddigheh Hasanpour Estahbanati, University of Nevada*

43B: Numerical Analysis of Dynamic Response of Lifelines Facilities Adjacent to Deep excavations: *Seddigheh Hasanpour Estahbanati, University of Nevada, Reza Boushehri, University of Nevada, Abbas Soroush, Ph.D., Amirkabir University of Technology, Omid Ghasemi-Fare, Ph.D., A.M.ASCE, University of Louisville*

35A: Centrifuge Modeling of Cyclic Softening in Low Plasticity Clays Partially Induced by Seismic Soil-Structure-Interaction: *Jason M. Buenker, P.E., S.M.ASCE, Univ. of California, Scott J. Brandenberg, Ph.D., P.E., M.ASCE, Univ. of California, Jonathan P. Stewart, Ph.D., P.E., F.ASCE, Univ. of California*

35B: Effect of Earthquake Induced Transverse Permanent Ground Deformation on Buried Continuous Pipeline Using Winkler Approach: *Chaidul Haque Chaudhuri, Indian Institute of Technology Bombay, Deepankar Choudhury, Ph.D., M.ASCE, Indian Institute of Technology Bombay*

36A: Seismic Slope Stability with Discretization-based Kinematic Analysis: *Siau Chen Chian, Ph.D., National University of Singapore, Changbing Qin, Ph.D., Hong Kong University of Science and Technology*

36B: A Series of Centrifuge Experiments Investigating the Effect of High Confining Pressure on Sand liquefaction: *Min Ni, M.S., Rensselaer Polytechnic Institute, Tarek Abdoun, Ph.D., M.ASCE, Rensselaer Polytechnic Institute, Ricardo Dobry, Ph.D., M.ASCE, Rensselaer Polytechnic Institute, Waleed El-Sekelly, Ph.D., P.E., New York University Abu Dhabi*

37A: Numerical Investigation of Geophysical Measurements for Liquefaction Triggering Evaluation in Soils Exhibiting Natural Spatial Variability: *Joseph T. Coe, Ph.D., Temple University, Siavash Mahvelati, Ph.D., Vibra-Tech Engineers, Alireza Kordjazi, Ph.D., Temple University*

37B: DEM Simulations of the Seismic Response of Granular Slopes: *Usama El Shamy, Ph.D., P.E., M.ASCE, Southern Methodist University, Shehab Hassan, Bryant Consultants, Inc.*

38A: Collection and Statistical Analysis of Case History Data on Liquefaction-Induced Soil Ejecta near Buildings during Past Earthquakes: *Marie Buhl, University of Nevada Reno, Ramin Motamed, Ph.D., P.E., M.ASCE, University of Nevada Reno*

38B: Parameter Estimation of a Fractional Order Soil Constitutive Model Using KiK-Net Downhole Array Data: A Bayesian Updating Approach*: Nariman L. Dehghani, The Ohio State University, Mehrzad Rahimi, The Ohio State University, Abdollah Shafieezadeh, Ph.D., The Ohio State University, Jamie E. Padgett, Ph.D., Rice University*

Topic M/Embankments, Dams, and Slopes

1A: Lateral Thrust Distribution in Column Supported Embankments: A Parametric Study Via 3D Simulations: *Zhanyu Huang, EIT, Virginia Polytechnic Institute and State University, Katerina Ziotopoulou, Ph.D., M.ASCE, University of California, Davis, George M. Filz, Ph.D., P.E., Dist.M.ASCE, Virginia Polytechnic Institute and State University*

1B: Reinforcement of a Pipeline Right-of-Way in Eastern Kentucky A Case Study: *Yao Zhang, Ph.D., P.E., M.ASCE, Terracon Consultants, Benjamin Taylor, P.E., M.ASCE, Terracon Consultants Yazen Khasawneh, Ph.D., P.E., M.ASCE, Terracon Consultants*

2A: The Use of Optical/Acoustic Televiewer and CCTV by USACE as a QA/QC Tool During Construction of Grouting and Cutoff Walls: Center Hill, Wolf Creek and Mosul Dams: *Vanessa Bateman, PG, P.E., Georgette Hlepas, P.E., US Army Corps of Engineers, Melanie Leslie, PG, US Army Corps of Engineers*

2B: Long Term Performance of Shallow Slopes Stabilized with Recycled Plastic Pins: *Prabesh Bhandari, University of Texas at Arlington, Cory Rauss,Freese and Nichols, Inc., Anuja Sapkota, Ph.D., MD, University of Texas at Arlington, Sahadat Hossain, Ph.D., P.E., University of Texas at Arlington*

3A: The Fully Softened Shear Strength of Lake Agassiz Clays: *Iván A. Contreras, Ph.D., D.GE, P.E., M.ASCE, Barr Engineering Co, Jed D. Greenwood, D.GE., P.E., Barr Engineering Co, Aaron T. Grosser, D.GE., P.E., Barr Engineering Co*

3B: A History of Relief Well Use and Current Practices in the U.S. Army Corps of Engineers: *Lucas A. Walshire, P.E., Engineer Research and Development Center, Joseph B. Dunbar Ph.D. R.P.G., Engineer Research and Development Center, Maureen K. Corcoran, Ph.D., R.P.G., Engineer Research and Development Center*

4A: Numerical Application of Full Waveform Inversion to Identify a Single Weak Layer in a Slope: *Siavash Mahvelati, Ph.D., Vibra-Tech Engineers, Joseph T. Coe, Ph.D.,Temple University*

4B: Adaptive Slope Stabilization for River Remediation: *Michael J. Byle, P.E., D.GE. Tetra Tech, Rakam Tamang, P.E., M.ASCE, Tetra Tech*

Topic O/Geoenvironmental Engineering

19A: Comparative Evaluation of Strength of Compacted Lateritic Soil Improved with Microbial-Induced Calcite Precipitate:*Kolawole Osinubi, Ph.D., F.ASCE, Ahmadu Bello University,Emmanuel W. Gadzama, Modibbo Adama University of Technology, Adrian Eberemu, Ph.D., F.ASCE, Ahmadu Bello University, Thomas Ijimdiya, Ph.D., M.ASCE, Ahmadu Bello University*

19B: Effect of Rubber Crumbs Volumetric Content on the Shear Strength of Gravelly Soil in Direct Shear Apparatus: *Ali Tasalloti, Ph.D., A.M.ASCE, University of Canterbury, Gabriele Chiaro, Ph.D., University of Canterbury, Alessandro Palermo, Ph.D., University of Canterbury, Laura Banasiak, Ph.D., Institute of Environmental Science and Research Ltd.*

20A: Slope Stability Analysis of a Saturated Riparian Buffer: A Case Study: *Loulou Dickey, Iowa State University, Andrea McEachran, Iowa State University, Cassandra Rutherford, Iowa State University, Michael A. Perez, Ph.D., EI, A.M.ASCE, Auburn University, Chris Rehmann, Ph.D., Iowa State University, Tom Isenhart, Ph.D., Iowa State University, Dan Jaynes, Ph.D., USDA, Tyler Groh, Iowa State University*

20B: Application of Organically Modified Clay in Removing BTEX from Produced Water: *Sepideh Nasrollahpour, S.M.ASCE, Babol Noushirvani University of Technology, Daryoush Yousefi Kebria, A.M.ASCE, Babol Noushirvani University of Technology, Mohammad Ghavami, A.M.ASCE, University of Louisville, Omid Ghasemi-Fare A. M.ASCE, University of Louisville*

21A: Performance Evaluation of Alternative Biofilter Media Amendments: *Chanelle Cruz, University of Minnesota Duluth, Meijun Cai, University of Minnesota Duluth, Kurt Johnson, University of Minnesota Duluth, Marsha Patelke, University of Minnesota Duluth, David Saftner, University of Minnesota Duluth, Rebecca Teasley, Ph.D., University of Minnesota Duluth*

21B: Field-Scale Evaluation of Evapotranspiration from a Landfill Cover: *Banafsheh Saghaei, University of North Carolina, Charlotte Milind V. Khire, Ph.D., P.E., University of North Carolina, Charlotte, Mike Caldwell, P.G., Waste Management, Inc, Terry Johnson, P.G., Waste Management, Inc.*

Topic P/Geophysical Engineering

25A: Ultrasonic Investigation of Shear Slip Nucleation in Granular Materials Under Variable Normal Stresses: *Amin Gheibi, S.M.ASCE, Colorado School of Mines, Lucy Davis, Colorado School of Mines, Ahmadreza Hedayat, Ph.D., Colorado School of Mines*

25B: The Use of the Spectral Element Method for Modeling Stress Wave Propagation in Non-destructive Testing Applications for Drilled Shafts: *Alireza Kordjazi, Ph.D., EIT, A.M.ASCE, Temple University, Joseph T. Coe, Ph.D., A.M.ASCE, Temple University, Michael Afanasiev, Ph.D.,Mondaic Ltd.*

26A: Evaluation of Soil Water Storage (SWS) of Evapotranspiration Cover through Geophysical Investigation: *Md. Jobair Bin Alam, Ph.D., P.E., A.M.ASCE, Prairie View A&M University, Linkan Sarker, The University of Texas at Arlington, Anuja Sapkota, Ph.D., The University of Texas at Arlington, Rakib Ahmed, Ph.D., ECS Southwest, LLP, Md. Sahadat Hossain, Ph.D., P.E., The University of Texas at Arlington*

26B: Using Microcontrollers to Create Portable, Self-Contained Seismic Sensors: *Susan Richmond, S.M.ASCE, Golder Associates, Dante Fratta Ph.D., P.E., A.M.ASCE, University of Wisconsin-Madison*

Topic R/Geotechnics of Soil Erosion

5B: Soil Properties Affecting the Onset of Erosion in Cohesive Soils: *Md Zahidul Karim, S.M.ASCE, Kansas State University, Stacey E. Kulesza, Ph.D., P.E., M.ASCE, Kansas State University*

Topic T/Pavements

57A: Strength and Modulus Implications of Incorporating Steel Slag Aggregates into Cement Stabilized Cold-in-Place Recycling: *Leigh E. W. Ayers, Mississippi State University, Isaac L. Howard, Ph.D., P.E., F.ASCE Mississippi State University*

57B: A Methodology for Determination of the Structural Layer Coefficient (SLC) of Unbound Base Materials in Florida: *Hyunchul Hwang, University of Florida, Dennis R. Hiltunen,Ph.D., P.E., M.ASCE, University of Florida*

58A: Mechanistic Performance Evaluation of Chemically and Mechanically Stabilized Granular Roadways: *Yijun Wu, Iowa State University, Jeramy C. Ashlock,Ph.D., A.M.ASCE, Iowa State University, Bora Cetin, Ph.D., A.M.ASCE, Michigan State University, Sajjad Satvati, EIT, S.M.ASCE, Iowa State University, Cheng Li, Ph.D., Chang'An University, Halil Ceylan, Ph.D., A.M.ASCE, Iowa State University*

58B: Evaluation of Correlations between Intelligent Compaction Measurement Values and In-situ Spot Measurements: *Maziar Foroutan, S.M.ASCE, University of Vermont, Bijay K C, S.M.ASCE, University of Vermont, Ehsan Ghazanfari, M.ASCE, University of Vermont*

59A: Effect of Variation in Moisture Content on the Mechanical Properties of Base Course Constructed with RAP-VA Blends: *Saad Ullah, Ph.D. Tetra Tech-AAI, Burak F. Tanyu, Ph.D., M.ASCE, George Mason University*

59B: Development of an Infiltration-Drainage Model for Saturated and Unsaturated Soils: *Chuang Lin Ph.D., S.M.ASCE, Missouri University of Science, Technology, Xiong Zhang Ph.D., M.ASCE, Missouri University of Science and Technology*

60A: Use of Wicking Fabric to Reduce Pavement Pumping: *Javad Galinmoghadam, SM.ASCE, Missouri University of Science and Technology, Xiong Zhang, Ph.D., P.E., M.ASCE, Missouri University of Science and Technology*

60B: Examination of a Geocomposite Joint Drain: *Bernard Igbafen Izevbekhai, Ph.D., P.E., Minnesota Department of Transportation*

Topic U/Risk Assessment and Management

29: Bayesian Model Calibration for Geotechnical Design of Energy Piles: *Zhe Luo, Ph.D., P.E., M.ASCE, Lamar University, Biao Hu, Tongji University*

Topic W/Shallow Foundations

10A: Case History of Column Cracking Due to Rotational Footing Movement at a site in Los Angeles, California: *Kenneth S. Hudson, M.S., G.I.T., Wood Environment and Infrastructure Solutions, Inc., Martin B. Hudson, Ph.D., P.E., G.E., Wood Environment and Infrastructure Solutions, Inc.*

10B: Soil Support Characterization in Slab-On-Grade Constructions with Fiber-Optic Distributed Strain Sensing: *Eyal Levenberg, The Technical University of Denmark, Assaf A. Klar, The Technical University of Denmark, Asmus Skar, The Technical University of Denmark*

11A: Influence of Footing Shape on the Bearing Capacity of Soft Clay: *Giovanna Pipin, SM.ASCE, New York University Abdelaziz Ads, P.E., SM.ASCE, New York University, Magued Iskander, P.E., F.ASCE, New York University*

11B: Tolerable Movement Criteria of Shallow Bridge Foundations in Cohesionless Soils: *Aseel Y. Ahmed, Ph.D., M.ASCE, FYRA Engineering, Andrzej S. Nowak, M.ASCE, Auburn University*

12A: Settlement Analysis of a New Primary Crusher in the Peruvian Andes: *Delphine Niyigena, M.ASCE, Southern Illinois University, José Clemente, Ph.D., P.E., D.GE, F.ASCE, Bechtel NS&E Abdolreza Osouli, Ph.D., P.E., Southern Illinois University, Claudio Canteros G., Bechtel*

Topic X/Soil Improvement

24A: The Drained Response of Soft Clays Reinforced with Sand Column Groups: *AbdurRahman AlMikati, American University of Beirut, Shadi Najjar, A.M.ASCE, American University of Beirut, Salah Sadek, M.ASCE, American University of Beirut*

24B: Stabilization of Expansive Soil Using Lime Pile and Lime Precipitation Techniques – A Comparative Study: *K. S. R. Kumar, Indian Institute of Technology Madras, T. Thyagaraj,Ph.D., Indian Institute of Technology Madras*

23A: Rigid Inclusions: Current State of Practice in North America: *Frederic Masse, Menard Group USA, Sonia Swift,P.E., M.ASCE Menard Group USA, Alex Potter-Weight,P.E., M.ASCE Menard Group USA, Brandon Buschmeier,P.E., M.ASCE Menard Group USA*

23B: A Large Strain Consolidation Model for Dredged Clays with High Water Content under Vacuum Preloading: *Wang Jianhua, Ph.D., Southeast University, Ding Cheng, Southeast University*

22A: Examining Spatial Control, Ammonium By-product Removal, and Chemical Reductions for Bio-cementation Soil Improvement using Meter-scale Experiments: *Alexandra C.M. San Pablo, Ph.D., University of California, Davis, Minyong Lee, University of Washington, Charles M.R. Graddy, Ph.D., University of California, Davis, Colin M. Kolbus, University of Washington, Mahanoor Khan, University of California, Davis, Atefeh Zamani, Ph.D., University of California, Davis, Nina Martin, Davis High School, Catalina Acuff, Acalanes High School, Michael G. Gomez Ph.D., A.M.ASCE, University of Washington, Jason T. DeJong, Ph.D., P.E., M.ASCE, University of California, Davis, Douglas C. Nelson, Ph.D., University of California, Davis*

22B: Stabilization of Calcareous Sand by Applying the Admixture of Alkali-Activated Slag (AAS) and Biochar: *Xiao-Le Han, University of Hawaii at Manoa, Ning-Jun Jiang, Ph.D., University of Hawaii at Manoa, Yi-Jie Wang, University of Hawaii at Manoa*

16A: Experimental Study of Consolidation Behavior of Mature Fine Tailings treated with Microbial Induced Calcium Carbonate Precipitation: *Qianwen Liu, North Carolina State University, Brina M. Montoya, Ph.D., P.E., M.ASCE, North Carolina State University*

16B: Experimental Investigation of Cement Mixing to Improve Lake Agassiz Clay: *Toshiyuki Himeno, University of Manitoba, Marolo Alfaro, Ph.D., P.Eng., University of Manitoba, Takenori Hino, Saga University*

17A: Static and Dynamic Properties of Expansive Soil Stabilised with Industrial Waste: *Piyush Parik, Indian Institute of Technology Kanpur, Nihar Ranjan Patra, Ph.D., M.ASCE, Indian Institute of Technology Kanpur*

17B: Preloading to Facilitate Shallow Foundations: *Kamil Nuzha, P.E., M.ASCE, GeoStructures, Jianchao Li, P.E., M.ASCE, GeoStructures, Bashar S. Qubain, M.ASCE, GeoStructures*

18A: Improving Soil Surface Erosion Resistance by Fungal Mycelium: *Xijin Zhang, S.M.ASCE, Case Western Reserve University, Xudong Fan S.M.ASCE, Case Western Reserve University, Chanjuan Han, Case Western Reserve University, Ph.D., Chen Wang, Ph.D., Aff. M.ASCE, Tongji University, Xiong (Bill) Yu, Ph.D., P.E., F. ASCE, Case Western Reserve University*

18B: Field Monitoring of Negative Skin Friction on Rigid Inclusion Columns under Embankments: *Liang Chern Chow, P.E., M.ASCE, American Engineering Testing, Inc, Jie Han, Ph.D., P.E., F.ASCE, University of Kansas and Gregory R. Reuter, P.E., P.G., D. GE, M.ASCE, American Engineering Testing, Inc*

Topic Y/Soil Properties and Modeling

6A: Influence of Strain-Rate on Localization and Strain-Softening in Normally Consolidated Clays with Varying Strength Profiles: *Tyler J. Oathes, SM.ASCE, University of California, Davis, Ross W. Boulanger, Ph.D, P.E., NAE, F.ASCE, University of California, Davis*

6B: Impact of Soil Compaction on Vegetated Basin Transition: *Wessam Mohammed, Villanova University, Andrea L. Welker, Ph.D., P.E., M.ASCE, Villanova University*

7A: Effects of Intergranular Strains of Hypoplasticity Models on Sinkhole-induced Ground Deformations: *Moataz H. Soliman, University of Central Florida, Luis G. Arboleda-Monsalve, Ph.D., M.ASCE, University of Central Florida, Boo Hyun Nam, Ph.D., A.M.ASCE, University of Central Florida*

7B: Consolidation Characteristics of the Tidal Marsh and the Varved Silt and Clay Deposits of the New Jersey Meadowlands: *Akhter Hossain, Ph.D., P.E. AECOM USA, Inc, Mahdi Soudkhah, Ph.D., P.E., AECOM USA, Inc*

8A: Static and Dynamic Analysis of Torpedo Anchor Penetration and Pullout in Cohesive Soils: *Abdelaziz Ads, P.E., SM.ASCE, NYU Tandon School of Engineering, Mehdi Omidvar, Ph.D., M.ASCE, Manhattan College, Stephan Bless, D.Sc., NYU Tandon School of Engineering, Magued Iskander, Ph.D., P.E., F.ASCE, NYU Tandon School of Engineering*

8B: Impact of Particle Size Distribution on Drained Shearing Response of Saturated Clays using Discrete Element Method: *Karam A. Jaradat, Ph.D., Stony Brook University, Sherif L. Abdelaziz, Ph.D., A.M.ASCE, Virginia Tech*

9A: Effect of Plastic and Silty Fines on the Behavior of Sand and Variation of Pore Water Pressure Measured at Two Different Ends of a Soil Sample: *Nikheel Padhye, Iowa State University, Cassandra J. Rutherford, Ph.D., P.E., M.ASCE, Iowa State University*

9B: Analysis Of The Oedometer Test Results Using A New Method: *Beshoy Riad, Missouri University of Science and Technology, Xiong Zhang, Ph.D., P.E., M.ASCE, Missouri University of Science and Technology*

15A: Effect of Mineralogical Composition and Pore Water Chemistry on Shearing Rate Dependent Residual Shear Strength of Soil: *Binod Tiwari, Ph.D., P.E., M.ASCE , California State University, Julianne Padgett, California State University, Beena Ajmera, Ph.D., P.E., M.ASCE , North Dakota State University, Allison Bieda, California State University*

15B: Stress Inhomogeneity in Gap-Graded Cohesionless Soils – a Contact Based Perspective: *Deyun Liu, Imperial College London, Catherine O'Sullivan, Imperial College London, Antonio Carraro, M.ASCE, Imperial College London*

14A: Continuous Compaction Control Measurements for Quality Assurance in Conjunction with Light Weight Deflectometer Target Modulus Values: *William J. Baker III, S.M.ASCE, University of Delaware, Christopher L. Meehan, Ph.D., P.E., F.ASCE, University of Delaware*

14B: A Simplified Self-Weight Consolidation Test Apparatus to Investigate the Consolidation Behavior of Dredged Material at Low Effective Stresses: *Artine Azimi, M.S., Kennesaw State University, Adam Kaplan, Ph.D., Kennesaw State University, Nader S. Rad, Ph. D, P.E., Excel Geotechnical Testing*

13A: Micro-Scale Characterization of Carbonate Sands with Nanoindentation: *C. Guney Olgun, Ph.D., A.M.ASCE, Missouri University of Science and Technology, Mertcan Geyin, Virginia Tech, Tolga Ozudogru, Ph.D., C.Eng, M.ASCE, Istanbul Technical University*

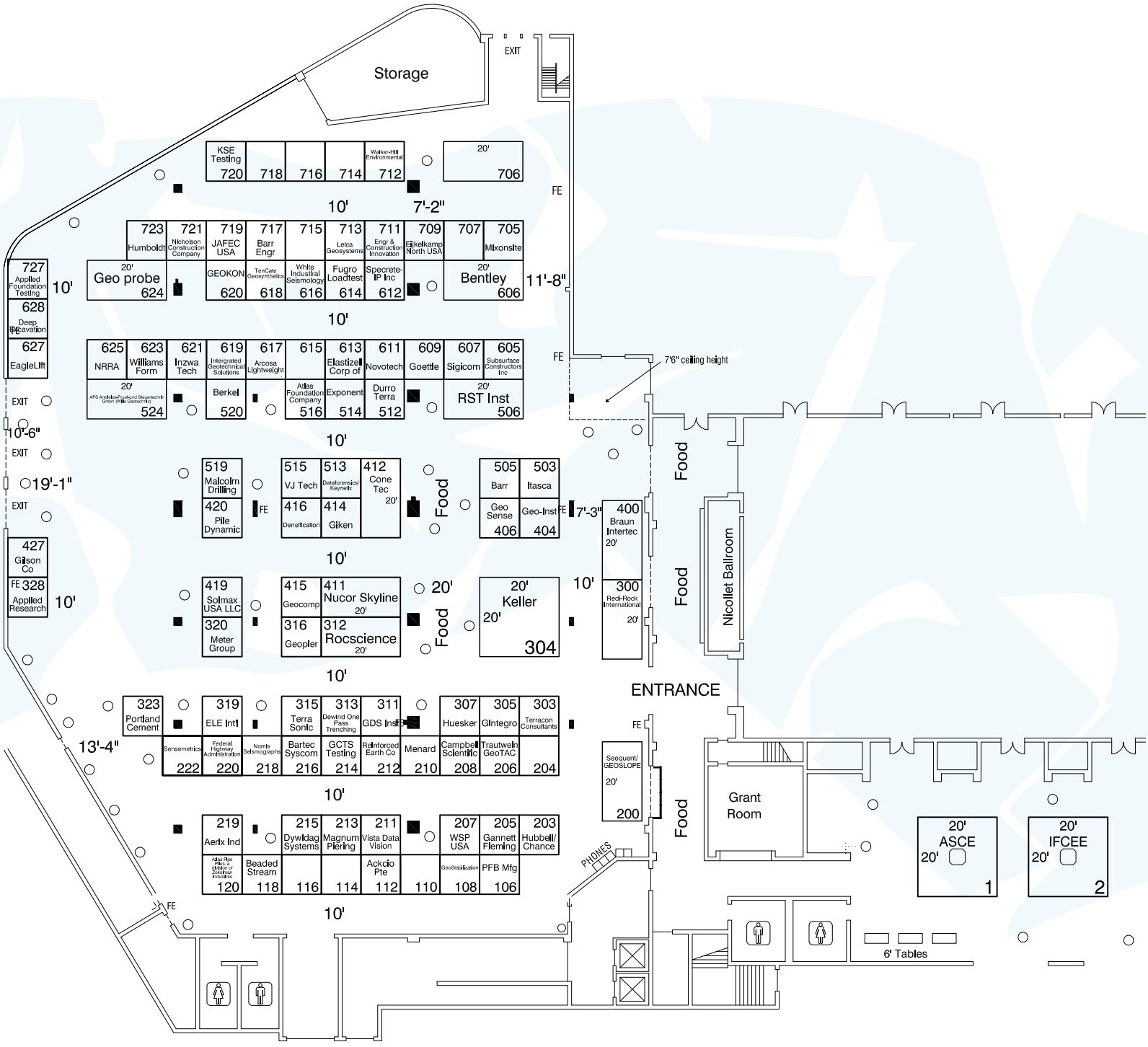
13B: Practical Guidelines for Assessing Undrained Shear Strength from Triaxial Compression with Isotropic and Anisotropic Consolidation: *Michael D. Boone, P.G., P.E., Black & Veatch, Mark J. Thompson, Ph.D., P.E., Black & Veatch, Daniel R. VandenBerge, Ph.D., P.E., Tennessee Technological University*

12B: A Critical Review of Void Ratio Relationships for Granular Soils: *Makbule Ilgac, Ph.D. Candidate, S.M.ASCE, Middle East Technical University, K. Onder Cetin, Ph.D., M.ASCE, Middle East Technical University*

Topic Z/Sustainability In Geotechnical Engineering

27: Life Cycle Sustainability Assessment (LCSA): A Research Evaluation Tool for Emerging Geotechnologies: *Alena J. Raymond, S.M.ASCE, University of California, Davis, Alissa Kendall, M.ASCE, University of California, Davis, Jason T. DeJong, Ph.D., P.E., M.ASCE, University of California, Davis*

Exhibit Hall Floor Plan



Exhibitors *(continued)*

** Denotes Organizational Member*

112
Ackcio Pte
www.ackcio.com
Specializing in long-range, low-power wireless radio mesh data transmission solutions

219
Aerix Industries*
www.aerixindustries.com
Aerix Industries is the world leading manufacturer of foam concentrate for the use in low density cellular concrete providing projects with a fast schedule cost saving alternative backfill material for roadways sub-base, bridge approaches backfill, and other pavement system solutions. Cellular concrete reduces soil loading while maintaining structural integrity.

114
Aero Aggregates of North America*
www.aeroaggregates.com
Manufacturers of Foamed Glass Aggregate- An Ultra-Lightweight fill material that is durable, sustainable, insulating and free draining, with a low unit weight (<15 pcf) and a high friction angle.

328
Applied Research Associates
www.ara.com
ARA provides services and technologies that enhance facility safety and security, and support the full infrastructure life cycle – from planning through preservation.

524
APS Antrielos- Pruef- und Steuertechnir Gmbh (Wille Geotechnik)
www.wille-geotechnik.com
APS Antriebs-,Pruf- und Steuertechnik GmbH is a highly regarded German enterprise due to its soil, rock, asphalt and material testing machines, which are marketed under the brand name "Wille Geotechnik". The initial activities of the company began in the 1990s in cooperation with universities and the implementation of research activities and development of scientific equipment.

617
Arcosa Lightweight
www.arcosalightweight.com
Arcosa Lightweight is America's largest producer of expanded shale and clay lightweight aggregate, with operations in California, Colorado, Texas, Louisiana, Alabama, Kentucky, Indiana and Arkansas.

1
ASCE – AGP, Geo-Institute, Future World Vision, Member Services, Minneasota Geotechnical Society
www.asce.org
Make sure to plan plenty of time for your visit to booth 1: that's where you'll find the Geo-Institute – and much, much more. Start at the G-I booth to learn more about programs and upcoming activities, and how you can get more involved. You can meet the staff and connect with fellow members, including members from the Minnesota Geotechnical Society (MGS). Then stop by to learn more about professional certification from the Academy of Geo-Professionals (AGP), and how it can benefit you. ASCE Member Services will also be available: join ASCE and G-I, manage your membership, update your address, subscribe to a journal, or even make a quick donation to the Voluntary Fund for student activities.

516
Atlas Foundation Company
www.atlasfoundation.com
Serving the Upper Midwest since 1968 as a deep foundation specialty contractor. Installer of piling, helical piers, drilled piers, grouted anchors, earth retention, and more.

120
Atlas Pipe Piles, a division of Zekelman industires
www.atlaspipepiles.com
Atlas Pipe Piles keeps deep foundation piling projects moving quickly. We manufacture ERW steel pipe piles and deliver them fully fabricated, with our value-added services and accessories, so they're ready to drive

505
Barr Engineering
www.barr.com
With offices in the U.S. and Canada, Barr provides engineering and environmental consulting services to clients throughout the Americas and around the world.

216
Bartec Syscom
www.syscom.ch/home
Bartec Syscom manufacture innovative vibration monitoring devices & provide tailored remote data processing software. Visit our booth for a demo.

118
Beadedstream
www.beadedstream.com
The easiest way to monitor your temperature data globally, remotely, and reliably from the comfort of your phone. BeadedStream manufactures monitoring solutions for industrial applications

606
Bentley*
www.bentley.com
Bentley is a global leader dedicated to providing engineers, architects, geospatial professionals, constructors, and owner-operators with comprehensive software solutions for the design, construction, and operations of infrastructure.

520
Berkel*
www.berkelandcompany.com
A specialty design-build contractor offering Augered Pressure Grouted (APG) and Drilled Displacement (APGD) Piles, Ground Improvement, Sheeting & Shoring, Underpinning, Anchors, Driven Piles & Drilled Shafts. Full in-house engineering and design services are available.

400
Braun Intertec*
www.braunintertec.com
Based in Minneapolis, employee-owned Braun Intertec is an engineering, environmental consulting and testing firm located in Iowa, Kansas, Louisiana, Minnesota, North Dakota, Texas and Wisconsin.

208
Campbell Scientific
www.campbellsci.com
Campbell Scientific works with cities, states, governments, research scientists, and the military to monitor critical infrastructure. Our equipment is used to track changes, evaluate performance, meet regulatory obligations, alert maintenance when repairs are needed, and prevent catastrophic failures from occurring. Our products are keeping citizens of the world safe from infrastructure disasters.

412/511
ConeTec*
www.conetec.com
ConeTec is a full service geotechnical and environmental site investigation contractor. We safely solve problems by generating high quality subsurface information used in geotechnical, environmental, and mining geotechnique. Our team of experts are dedicated to safe, quality, and efficient site investigations using the best possible equipment.

513
Dataforensics/Keynetix*
www.dataforensics.net
Dataforensics and Keynetix geotechnical and geo-environmental data management software helps geologists, geotechnical and environmental engineers accomplish field and office work in less time, with greater accuracy and data quality.

628
Deep Excavation
www.deepexcavation.com
Great software for geotechnical & structural engineers for the design and analysis of deep excavations. User-friendly, high-quality with multiple accepted design methods, calculations and training sessions

416
Densification*
www.densification.com
Densification, Inc. is a nation-wide geotechnical contracting firm, specializing in dynamic compaction. Founded in 1994, our mission is to provide property owners and developers with an attractive construction alternative when poor soils or questionable fills are encountered. At the same time, we aim to provide geotechnical consultants with a personal and practical link to project owners.

313
Dewind One Pass Trenching
www.dewindonepass.com
DeWind One Pass Trenching the leader in trenching reaching depths to 125+ feet below grade, all across North America, installing environmental & civil trenching services.

512
Durro Terra
www.duroterra.com
DuroTerra is the distributor of Ductile Iron Pile products in North America. Ductile Iron Piles are highly effective, fast and versatile driven pile systems.

215
Dywidag Systems International
www.dsiamerica.com
DYWIDAG-Systems International USA Inc. (DSI) is a leading global supplier of earth retaining and foundation support systems including double corrosion protection multistrand and DYWIDAG Threadbar ground anchors, soil nails, micropiles, tie-rods and DYWI Drill hollow bars. DSI provides also technical assistance at the job site, stressing jacks, uncoiler equipment and anchor force monitoring services, during installation and anchor's service life, using the DYNA Force® load monitoring system.

627
EagleLift
www.eaglelifting.com
EagleLIFT is an Engineering Contractor specialized in lifting and stabilizing seawalls, roadways, foundations, and sewer infrastructure that are affected by unstable soils using high-density polyurethane.

709
Eijkelkamp North America
www.eijkelkamp-usa.com
Eijkelkamp SonicSampDrill produces special soil drilling technology used in environmental drilling, mining and mineral exploration, geotechnical soil research and special foundation drilling

613
Elastizell Corporation of America
www.elastizell.com
Producing lightweight cellular concrete for quality Engineered Fill. Solving load issues for over 40 years with a national network of qualified and approved applicators.

319
ELE International
www.ele.com
ELE International specializes in the design, manufacture, and supply of high-quality construction materials testing equipment

711
Engineering And Construction Innovations
www.eciconstructors.com
ECI is a self-performing heavy civil construction company specializing in dam and renewable infrastructure, water/wastewater infrastructure, geotechnical and underground construction and rehabilitation.

615
Equipment Corp of America
www.ecanet.com
ECA maintains a comprehensive inventory of foundation construction equipment from world-class manufacturers including BAUER, Klemm, RTG, Dawson, HPSI, MAT, BETEK, WORD International, and numerous others.

514
Exponent*
www.exponent.com
Exponent is a multi-disciplinary engineering and scientific consulting firm that brings together more than 90 different disciplines to solve important engineering, science, regulatory, and business issues facing our clients.

220
Federal Highway Administration
highways.dot.gov
The FHWA supports State and local governments in the design, construction, and maintenance of the Nation's highway system and various federally and tribal owned lands

614
Fugro Loadtest*
www.loadtest.com
Fugro is the world's leading, independent provider of site characterization and deep foundations testing for large constructions, infrastructure and natural resources.

205
Gannett Fleming*
www.gannettfleming.com
Gannett Fleming, an international planning, design, technology, and construction management firm, has been providing innovative engineering and consulting solutions for more than 100 years.

214
GCTS Testing Systems
www.gcts.com
GCTS Testing Systems designs and delivers productive and precise solutions for the advanced material characterization of soils, rocks, and pavements.

311
GDS Instruments*
www.gdsinstruments.com
GDS Instruments designs, develops and manufactures materials testing machines and software used for the computer-controlled testing of soils and rocks. This technology is used to evaluate the mechanical properties that are key in geotechnical and earthquake engineering design. Since being founded in 1979, it is estimated that GDS products have been used to help achieve 1000 Phd's. As well as being the first choice for academic research, GDS products have been used in many world renowned commercial developments including the Three Gorges Dam in China, the Millau Viaduct in France, the Vasco da Gama Bridge in Portugal, Terminal Five at Heathrow and the new Crossrail links in London. GDS employs over 55 permanent members of staff at their offices in the UK, as well as working with a network of agents spanning 40 countries

404
Geo-Instruments
www.geo-instruments.com
www.geo-instruments.com
GEO-Instruments provides automated instrumentation for monitoring the safety and stability of buildings, excavations, bridges, railways, roads, tunnels, dams, embankments, and slopes. We help owners, infrastructure operators, and construction engineers identify and mitigate risk, optimize designs and methods, and document regulatory compliance.

415
Geocomp Corporation
www.gecomp.com
Geocomp creates fully automated geotechnical laboratory testing products that are easy-to-use and powerful enough to standup to the challenging demands of geotechnical testing.

620
GEOKON*
www.geokon.com
Geokon manufactures a full range of high quality geotechnical instrumentation suitable for monitoring the safety and stability of a variety of civil and mining structures.

316
Geopier*
www.geopier.com
Geopier provides an efficient and cost-effective Intermediate Foundation® solution for the support of structures. Specializing in Rammed Aggregate Pier®, Rigid Inclusions, and slope reinforcement systems.

624
Geoprobe Systems
www.geoprobe.com
Geoprobe® manufactures compact Direct Push, Rotary, Rotary Sonic drilling machines and tooling. We also manufacture the DRILLMAX® family of Water Well & Geothermal drilling machines.

406
Geosense
www.geosense.co.uk
Geosense is a leading UK manufacturer of instrumentation for the geotechnical, structural, mining and environmental industries. Geosense specialises in vibrating wire and MEMS sensors for a wide range of instruments plus automated data acquisition systems, including wireless systems.

200
GEOSLOPE
www.geoslope.com
GEO-SLOPE develops, markets, and supports state-of-the-art software for geotechnical and geo-environmental modeling. Our customers include small engineering firms, large multi-nationals, government agencies, regulatory commissions, and leading universities throughout the world.

108
GeoStabilization International*
www.geostabilization.com
GeoStabilization International® is the leading geohazard mitigation firm operating throughout North America. Our passion is to develop and install innovative solutions that protect people and infrastructure from the dangers of geohazards.

414
Giken
www.giken.com
Giken has been a pioneer in the Press-in Piling Technology, which enables driving of sheet and tube piles with very low noise and no vibration.

427
Gilson Company
www.globalgilson.com
Gilson Company, Inc. is a third generation, family-owned manufacturer and worldwide distributor of materials testing equipment serving the asphalt, aggregate, concrete and soils industries.

305
Gintegro
www.gintegro.com
Gintegro offers geotechnical software and software integration services. GEO5 is geotechnical software for variety of geotechnical problems, easy to use and affordable.

609
Goettle
www.goettle.com
Richard Goettle, Inc. is a design-build geotechnical construction firm specializing in deep foundations, earth retention systems, marine structures, and ground modification for over 60 years.

203
Hubbell/Chance
www.hubbell.com
Hubbell Power Systems, Inc (HPS) is an international leader in foundation solutions for a wide range of civil construction projects. Pioneering the industry since 1912, HPS proudly manufactures CHANCE® helical piles - the only helical pile that operates with regional distribution service partners, offering clients economies of scale and a variety of ready-to-ship material across North America. Engineered for long-term dependability, CHANCE foundation solutions suit a broad range of applications.

307
Huesker*
www.huesker.com
HUESKER is the world's leading manufacturer of geosynthetics, agricultural, and industrial textiles. Providing solutions for earthworks and foundations, roads and pavements, environmental engineering, hydraulic engineering, industry and agriculture.

723
Humboldt Mfg. Co.
www.humboldtmfg.com
Humboldt Mfg. Co. is a leading manufacturer and supplier of construction materials testing equipment designed for testing soil, concrete, cement, asphalt and aggregate. Humboldt is known for manufacturing high-quality equipment designed to comply with ASTM and AASHTO

2
IFCEE (DFI, ADSC, PDCA)
www.ifceexpo.com
IFCEE is a technical conference and equipment show dedicated to the design and construction of foundation systems, using the latest geo-engineering and geoconstruction technologies and practices. This one of a kind event will attract attendees from around the world, who will have access to various technical education programs and the world's largest equipment exposition dedicated solely to the deep foundations industry.

619
Intergrated Geotechnical Solutions
www.igs-inc.com
IGS sells, installs and monitors vibration, noise and geotechnical instrumentation for the construction, quarry and seismic industries throughout North America. We are Instantel® and Leica™ distributors.

621
Inzwa Technologies
www.inzwa.io
Inzwa provides autonomous vibration monitoring systems. Our standards-compliant equipment is easy to install and integrates with Inzwa Cloud, our automated data analytics and reporting platform.

503
Itasca
www.itascacg.com
Itasca is a global consulting, software development, and research firm that solves complex civil engineering projects through advanced numerical simulation, field experience, and practical engineering.

719
JAFEC USA
www.jafecusa.com
JAFEC USA, Inc. is a geotechnical construction company that provides ground improvement services for liquefaction mitigation, dam and levee stabilization, excavation support and seepage control.

304
Keller*
www.keller.com
Connected Companies: Anderson Drilling, Bencor, Case Foundation, Cyntech, GEO-Instruments, Hayward Baker, HJ Foundation, Keller in Canada, McKinney Drilling Company, Moretrench, Moretrench Industrial, and Suncoast Post-Tension.

720
KSE Testing Equipment
www.kesslerdcp.com
World's leading manufacturer of Dynamic Cone Penetrometers. Distributors of Zorn Light Weight Deflectometers for compaction control and MIT pavement thickness gauge & dowel bar scanners.

713
Leica Geosystems
https://shop.leica-geosystems.com
When it has to be right. With close to 200 years of experience pioneering solutions to measure the world, Leica Geosystems products and services are trusted by professionals worldwide to help them capture, analyse, and present spatial information. Leica Geosystems is best known for its broad array of products that capture accurately, model quickly, analyse easily, and visualise and present spatial information.

213
Magnum Piering
www.magnumpiering.com
Magnum Piering is an industry leader in manufacturing high capacity, high quality steel piling products for deep foundations and foundation repair applications.

519
Malcolm Drilling Company*
www.malcolmdrilling.com
"Malcolm has for 5 decades been an innovator and leader in the industry. Our services include deep foundations, retention systems, ground improvement and dewatering techniques"

506
Measurand
www.measurand.com
Measurand manufactures the ShapeArray. An integrated measuring tool that is installed vertically, horizontally or in an arc, to measure lateral deformation, settlement, or convergence in real-time.

210
Menard*
www.menardgroupusa.com
Menard is a design-build specialty geotechnical contractor offering expertise in ground improvement for sites with poor soil. Combining creative design and innovative techniques, Menard delivers practical, sustainable solutions that can be attractive alternatives to deep foundations. Top tier engineers, geologists, operators, mechanics, laborers and managers come together to craft the most efficient and economical solutions for you.

Exhibitors *(continued)*

** Denotes Organizational Member*

320
Meter Group
www.metergroup.com
METER Group delivers real-time, high-resolution data with applications in hydrology and geotechnical engineering. METER instruments measure water and heat transfer in natural and engineered systems.

705
Mixonsite USA
www.mixonsite.com
MixOnSite produces and installs Geofill® LD Cellular Concrete. Applications include load reducing fill/annular space grout/ underwater placement/filling abandoned lines/structures on highways, bridges, tunnels, heavy/civil projects.

721
Nicholson Construction Company*
www.nicholsonconstruction.com
Nicholson is a leader and an innovator in the geotechnical construction industry with expertise in deep foundations, earth retention systems and ground treatment solutions.

218
Nomis Seismographs
www.nomis.com
Nomis seismograph equipment allows you to monitor ground vibrations and air over-pressure for blasting and civil projects where a permanent record is needed.

611
Novotech
www.novotechsoftware.com
Leading provider of geotechnical engineering software solutions since 1997: field test processing, borehole logging, engineering analyses, 3D visualization, geotechnical correlations, etc. Visit our website for more details

625
NRRA
www.dot.state.mn.us/nrra
The NRRA includes experts from state agencies, industry, academia, and associations working together to strategically implement cooperative, real-world pavement research.

411/413
Nucor Skyline
www.nucorskyline.com
Nucor Skyline supplies and manufactures an unparalleled assortment of Bearing Piles, Sheet Piles, Pipe, Accessories, Anchors, Micropiles, Tie Rods and Structurals. Visit www.nucorskyline.com.

106
PFB Manufacturing
www.plastifab.com
Plasti-Fab's mission is to provide its customers with expanded polystyrene (EPS) Product Solutions for constructing energy efficient buildings, floatation for marine construction, lightweight fill and compressible fill for Geotechnical construction projects, and component solutions for Original Equipment Manufacturers.

420
Pile Dynamic/ GRL Engineers*
www.pile.com, www.grlengineers.com
Pile Dynamics, Inc. is the world's leading developer and manufacturer of quality assurance testing systems for the deep foundations industry.

323
Portland Cement Association
www.cement.org
The Portland Cement Association (PCA), founded in 1916, is the premier policy, research, education, and market intelligence organization serving America's cement manufacturers.

300
Redi-Rock International
www.redi-rock.com
Redi-Rock of SE Pa and JDM are producers of PennDot approved retaining wall blocks for commercial industrial and landscaping installations. Visit us at Booth 820

212
Reinforced Earth Company*
www.reinforcedearth.com
Reinforced Earth® MSE walls are economical gravity structures having high strength, a limited footprint, flexibility to distribute loads evenly, and a variety of architectural finishes.

314/312
Rocscience*
www.rocscience.com
Rocscience, is a world leader in developing geotechnical engineering software. For over 20 years, we've used leading-edge research to build tools used by 7,000+ engineers for slope stability, excavation design, and geotechnical analysis.

506
RST Instruments
www.rstinstruments.com
Since 1977, RST Instruments has positioned itself as the world leader in the design, manufacturing and sale of geotechnical, environmental and structural monitoring instruments and data collection. RST Instruments provides reliable & accurate instruments and data acquisition for safe, productive structures that require monitoring and measuring: Dams, Mines, Tunnels, Pipelines, Bridges, Buildings and related infrastructure.

200
Seequent
www.seequent.com
A global leader in the development of visual data science software. Our latest solution, Leapfrog Works, is a fast and dynamic 3D subsurface modelling solution for the Civil Engineering and Environmental industries.

222
Sensemetrics
www.sensemetrics.com
Sensemetrics offers a complete end-to-end sensor data management solution for distributed sensor networks. Connect your sensors to our easy-to-deploy and ruggedized cloud connect device - the THREAD - to effortlessly collect and send real time sensor data to our intuitive browser-based software interface for analysis and reporting. No configuration required. Create alerts, view layered data from multiple sensor types, and integrate with third-party software via API. The sensemetrics platform integrates all types of spatial, structural and geotechnical sensors from the world's leading sensor manufacturers. We reduce the cost and complexity of sensor data management and power smarter decision making.

607
Sigicom
www.sigicom.com
Sigicom develops, manufactures, and markets measurement systems for remote monitoring of vibration, noise, and other environmental variables affected by activities such as large-scale construction.

727
Smart Infrastructure Group
www.testpile.com
AFT, RADISE and Smart Structures provides Transformational, Innovative and Resourceful engineering consulting services for Civil Infrastructure; Statnamic Load Testing, Geotechnical Engineering, and Pile Driving Analyzer.

419
Solmax USA LLC
www.solmax.com
Solmax is the world's largest geosynthetics manufacturer. Our products contain and drain, shielding the soil, water, and air from toxins and pollutants in applications as critical as the landfills of the world's most populated cities and mines operating in fragile ecosystems.

612
Specrete - IP Incorporated
www.specrete.com
Specrete develops and manufactures additives specifically for underground grouting applications. Benefits include pressure filtration resistance, bleed elimination, viscosity modification, stability, water retention and water reduction.

605
Subsurface Constructors Inc*
www.subsurfaceconstruction.com
Geotechnical Contractors: Ground Improvement (Aggregate Piers/Vibro Stone Columns, Rigid Inclusions/Vibro Concrete Columns, Compaction Grouting, Vibrocompaction), Earth Retention (Soldier Pile Walls, Augercast Pile Walls, Soil Nail Walls….) and Deep Drilled Foundations.

618
TenCate Geosynthetics*
www.tencategeo.us
TenCate Geosynthetics is the global leader in geosynthetics. Our geogrids and geotextiles are engineered with advanced application knowledge to meet project specifications for transportation construction, mechanically stabilized earth, erosion control, and water and waste management.

315
Terra Sonic International
www.terrasonicinternational.com
Terra Sonic International is the most experienced Sonic drill rig and tooling manufacturer with over a combined 250 years of field and design experience.

303
Terracon Consultants
www.terracon.com
Terracon is a 100 percent employee-owned consulting engineering firm providing high quality services to clients. Since 1965, Terracon has evolved into a successful multidiscipline firm specializing in Environmental, Facilities, Geotechnical and Materials.

206
Trautwein GeoTAC
www.geotac.com
GeoTAC provides equipment for automated geotechnical testing including: Sigma-1™ and GeoJac™ load frames, DigiShear™ direct and simple shear, DigiFlow™ pumps, and TestNet™ data acquisition systems.

116
Veit Company
www.veitusa.com
Veit is on site for the most critical points of your project. Specialty contracting services include earthwork, foundations, demolition, utilities, dredging, diving and industrial cleaning.

211
Vista Data Vision
www.vistadatavision.com
Focus on your work and let Vista Data Vision handle your project data. Monitor,analyze and mange you instrumentation data with VDV.

515
VJ Tech
www.vjtech.co.uk
Since 1991, UK based VJ Tech Ltd. has supplied high-quality soil testing instruments to civil engineering companies & research institutions located in over 85 countries.

712
Walker-Hill Environmental
www.whenv.com
Walker-Hill Environmental is a full service drilling company with CPT, HSA, mud rotary, and Sonic capabilities. Call Chris at 850.564.5059

616
White Industiral Seismology
www.whiteseis.com
White™ consults, manufactures and distributes a wide range of seismographs, remote data acquisition systems, custom-built assemblies and software to customers all over the world.

623
Williams Form Engineering Corp
www.williamsform.com
Williams Form Engineering Corporation has been offering Ground Anchors, Concrete Anchors, Post Tensioning Systems, and Concrete Forming Hardware to the construction industry for over 95 years.

207
WSP USA*
www.wsp.com
WSP USA is a leader in tunneling and underground construction, from New York City to Istanbul. The firm has participated in the design and construction of some of the longest, largest, and most complicated bridges & tunnels in the world.

Assumption of Risk

All ASCE/G-I events and activities are purely voluntary activities, and attendees are fully responsible for their own conduct and well-being, including, and without limitation, determining their level of fitness to take part in any such event or activity. In participating in any event or activity, attendees shall be deemed to understand and accept all risk of possible physical injury that might occur as a result of such participation. Children under the age of 18 are not allowed in the exhibit hall. ASCE/G-I hopes that your visit to GeoCongress 2020 will be free from illness or injury, but in case you or a family member needs medical attention during your time at the event, contact the front desk.

Childcare Provided by KiddieCorp

**Additional Fee Required*

This program is for children ages 6 months through 12 years old. The dates for the program are February 26 – 28, 2020 and will be located at the Hyatt Regency Minneapolis in the Lake Superior Room on the 5th Floor. Snacks and water will be provided and meals need to be supplied by parents.

Activities include exciting themes, arts & crafts, group games, music & movement, board games, story time, dramatic play, etc. We provide activities appropriate for each age group, using safe, sturdy equipment that you can feel comfortable with. Children can make their own choices within KiddieCorp's program.

Children should be pre-registered, however, space may still be available for on-site sign up. See a KiddieCorp representative in the Lake Superior Room to check availability.

Diversity and Inclusion

The ASCE/G-I policy of Diversity and Inclusion fosters a culture that encourages the free expression and exchange of engineering ideas by all members, regardless of gender, race, ethnic origin, religion, age, marital status, sexual orientation, disabilities, or any other reason not related to scientific or technical merit.

Meeting Room Overcrowding

ASCE/G-I will make every effort to schedule popular events in rooms large enough to accommodate anticipated attendance. Since many events are extremely popular, it is wise to select alternative events as you plan your conference schedule. ASCE/G-I and the Hyatt Regency Hotel are REQUIRED to follow local fire regulations and may ask participants in rooms filled to capacity to choose another event.

No Smoking Policy

Smoking is not allowed at any ASCE/G-I event or in the Hyatt Regency or Millennium hotels..

Program and Session Cancellation

ASCE/G-I reserves the right to cancel programs and/or sessions. In the unlikely event of a cancellation, all registrants will be notified. Programs and sessions are subject to change, and ASCE/G-I reserves the right to substitute a program, session, and/or speaker of equal caliber to fulfill the educational requirements.

Photographs and Video

Photographs and Video of the event may be taken by ASCE/G-I, its agents, contractors, or representatives, and such photographs and video may be used for any purpose at ASCE/G-I discretion.

Yoga

Join fellow early-risers and start the day refreshed by joining a yoga class in the StayFit Fitness on Demand Studio located in the Hyatt Regency Fitness Center.

Classes will be held daily Wednesday, February 26 through Friday, February 28, from 6:30 – 7:30 a.m. There are only 30 spots per class, so plan to arrive early and stake your claim.

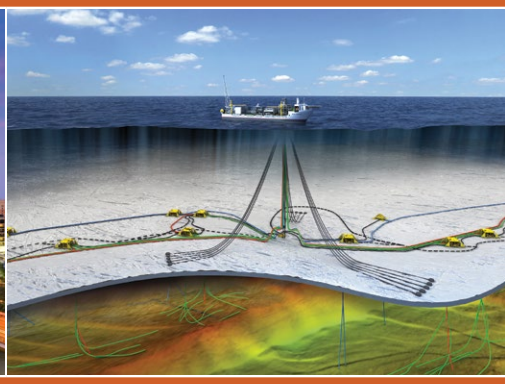
SAVE THE DATE

ISFOG 2020

August 16-19, 2020 | Austin, Texas, USA

4th International Symposium on Frontiers in Offshore Geotechnics





www.isfog2020.org

Hosted by TEXAS
The University of Texas at Austin

SAVE THE DATE

International Foundations Congress and Equipment Exposition (IFCEE 2021)

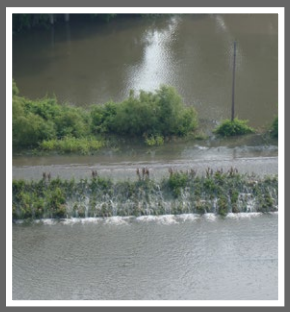
May 10 – 14, 2021
Hyatt Regency Dallas Dallas, TX USA

IFCEE is a technical conference and equipment show dedicated to the design and construction of foundation systems, using the latest geo-engineering and geo-construction technologies and practices. This one of a kind event will attract attendees from around the world, who will have access to various technical education programs and the world's largest equipment exposition dedicated solely to the deep foundations industry.

10th International Conference on Scour and Erosion (ICSE-10)

Arlington, Virginia, USA | November 15-18, 2020

Understanding Scour and Erosion Processes and Improving Countermeasure Design through Integration of Hydraulics and Geotechnics



Join us for ISCE-10

The International Conference on Scour and Erosion brings researchers and practitioners from Geotechnical and Hydraulic Engineering together to tackle the complex challenges of surface and subsurface scour and erosion.

Topic tracks:

• Engineering • Research • Monitoring • Mitigation • Risk Assessment

ICSE-10 is organized under the auspices of the ISSMGE Technical Committee 213, Scour and Erosion

GeoInstitute GeoInstitute GeoInstituteASCE

www.2020icse.org

GEO-CONGRESS 2020

Minneapolis, Minnesota | February 25-28

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