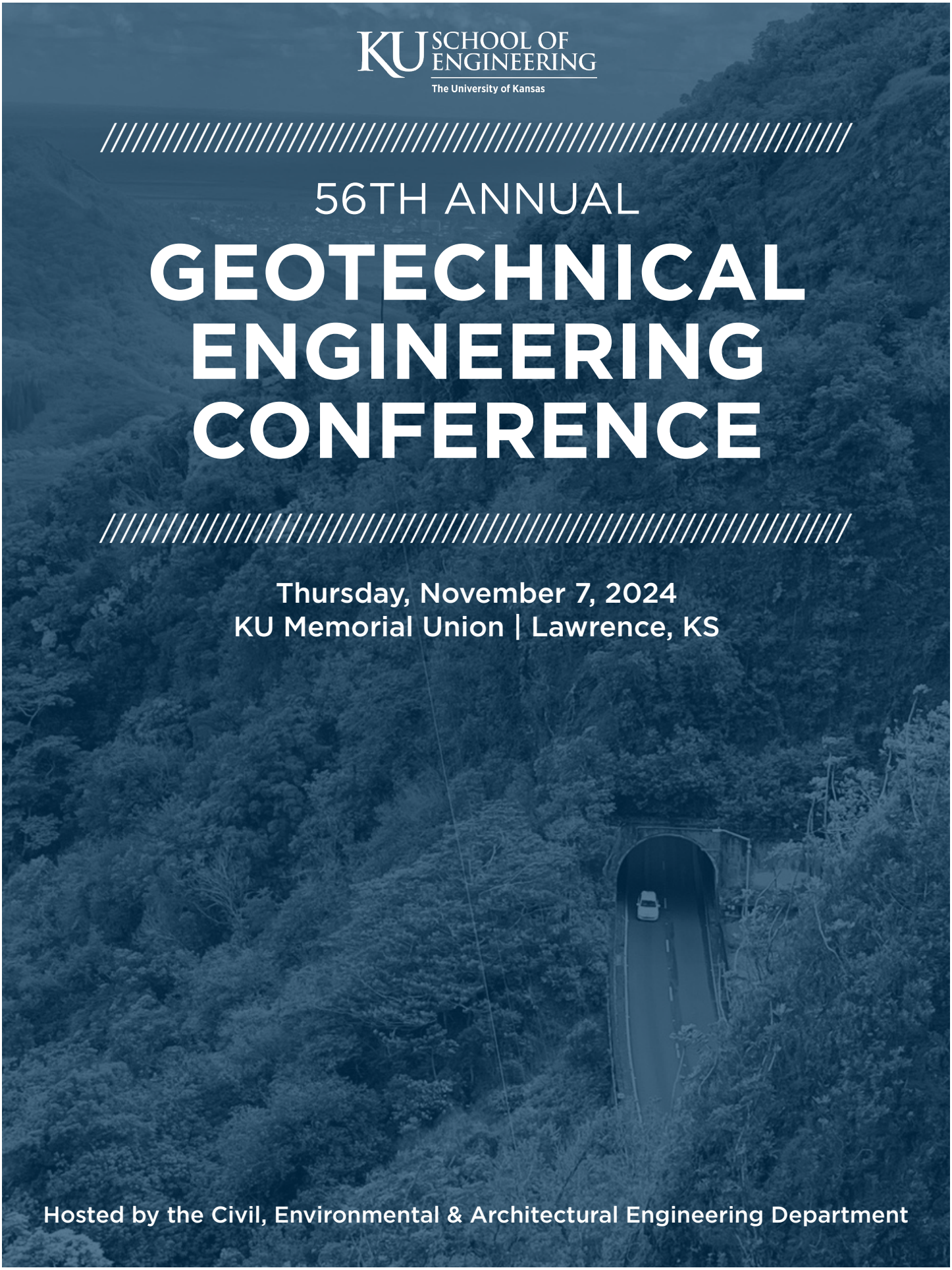
KU SCHOOL OF ENGINEERING
The University of Kansas

56TH ANNUAL

GEOTECHNICAL ENGINEERING CONFERENCE

Thursday, November 7, 2024
KU Memorial Union | Lawrence, KS



Hosted by the Civil, Environmental & Architectural Engineering Department

Conference FAQs

PDHs

This conference offers a total of 6.5 professional development hours. The PDH certificate will be provided in an email after the event.

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PRESENTATIONS

For presentations that can be shared, a PDF copy will be available after the conference website.

Conference Planning

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ASCE Kansas City Geo-Institute Chapter
Kansas Department of Transportation (KDOT)
Deep Foundations Institute (DFI)
Geosynthetics Magazine
Kansas University Geotechnical Society (KUGS)

Save the Date

The 57th Annual Geotechnical Engineering Conference will be held on **Thursday, November 6, 2025.**

Agenda

7:30 - 8:30 a.m.	**Registration and Continental Breakfast**
8:30 - 8:40 a.m.	**Welcome and Opening Remarks** *Jie Han, Ph.D., P.E., F.ASCE, Roy A. Roberts Distinguished Professor*
8:40 - 9:30 a.m.	**The Terzaghi Lecture: Soil Models in Prediction, Design and Geotechnical Problem Solving** *Andrew Whittle, Sc.D., Professor, Massachusetts Institute of Technology*
9:30 - 10:20 a.m.	**Roadways on Expansive Clays: Characterizing the Problem and Solving It with Geosynthetics** *Jorge Zornberg, Ph.D., P.E., F.ASCE, Profesor, University of Texas at Austin*
10:20 - 10:50 a.m.	**Break** *Moderator: Robert Parsons, Ph.D., P.E., F.ASCE*
10:50 - 11:40 a.m.	**H.Bolton Seed Award Lecture: Insights on Seismic Soil-Structure Interaction for Bridges from Large-Scale Field Tests** *Kyle Rollins, Ph.D., Professor, Brigham Young University*
11:40 a.m. - 12:30 p.m.	**Recent AASHTO Specifications Updates and their Impact on Mechanically Stabilized Wall Design** *James G. Collin Ph.D., P.E., BC.GE, F.ASCE, President, The Collin Group, Ltd.*
12:30 - 1:30 p.m.	**Lunch Break** *Moderator: Masoud Darabi, Ph.D., P.E.*
1:30 - 2:15 p.m.	**Ground Response to Foundation and Ground Improvement Installation** *Timothy C. Siegel, Senior Principal Engineer/CEO, Dan Brown & Associates*
2:15 - 3 p.m.	**Geotechnical Challenges of Building an LNG Project on a Very Soft Soil Site** *Anil Bhandari, Ph.D., P.E., Principal Geotechnical Engineer, Bechtel Corporation*
3 - 3:30 p.m.	**Break** *Moderator: Jie Han, Ph.D., P.E., F.ASCE, Roy A. Roberts Distinguished Professor*
3:30 - 4:15 p.m.	**Geotechnical Remediation during a Primary Crusher Relocation** *Trevor B. Ames, P.Eng., Mining Geotechnical Services Director, GeoStabilization International*
4:15 - 5 p.m.	**Use of Wick Drains and Surcharge to Economize Foundations for New Detention Center** *Alex Potter-Wright, Regional Sales Manager, Menard USA*
5 p.m.	**Closing Remarks and Adjorn**

8:30 -
9:30 a.m.

Terzaghi Lecture

Soil Models in Prediction, Design and Geotechnical Problem Solving

Andrew Whittle, Sc.D.

Professor, Massachusetts Institute of Technology

Andrew J. Whittle's research deals with the development of constitutive models for soil behavior and their application in predicting the performance of foundations and underground construction projects. He is a licensed professional engineer and an active consultant who has worked on more than 30 major onshore and offshore construction projects. He was an expert involved in the investigations into the collapse of the Nicoll Highway (Singapore) and review panels for hurricane protection systems in New Orleans (NRC); 'stem-to-stern' safety of the Big Dig tunnels (Boston); and causes of construction delays for the XRL project (Hong Kong). He served on the Board of Directors for the Massachusetts DOT (2009-2015). Dr Whittle has published more than 260 papers in refereed journals and conferences and received several awards for his research work and papers from ASCE. He is an Honorary Professor at Tsinghua University (2019) and was elected to the US National Academy of Engineering (2010). He presented the 60th ASCE Karl Terzaghi Lecture at the 2024 GeoCongress in Vancouver, BC.

Abstract

The development of robust, commercial software for numerical analyses of soil continua (finite element, difference methods etc.) has transformed the practice of geotechnical engineering over the course of my professional career. Embedded in these formulations are constitutive equations that represent the material behavior (mechanical, hydraulic, thermal etc.), most notably those related to the complex deformation and shear strength properties of saturated soils that are often represented by theoretical frameworks such as elasto-plasticity. In this lecture I show how advances in soil modeling capabilities have been closely linked to the understanding of soil properties (measured in laboratory tests) from critical states to non-linear and anisotropic behavior.

Learning Objectives

1. Understand how soil models affect predictions of deformation and stability.
2. Learn about new understanding of static liquefaction as an instability problem.
3. Become familiar with numerical limit analyses for stability problems.

Roadways on Expansive Clays

Characterizing the Problem and Solving It with Geosynthetics

9:30 - 10:20 a.m.

Jorge Zornberg, Ph.D., P.E., F.ASCE

Professor, The University of Texas at Austin

Prof. Zornberg has over 35 years of experience in practice and research in geotechnical and geosynthetics engineering. His research focuses on transportation geotechnics, geosynthetics, unsaturated soils, expansive clays and environmental geotechnics. He served as president of the International Geosynthetics Society (IGS). Prof. Zornberg received numerous prestigious awards, including the Presidential Early Career Award for Scientists and Engineers (PECASE), from the President of the United States. The IGS established the "Zornberg Lecture," an honorary lecture recognizing his contributions to the discipline of geosynthetics.

Abstract

The presence of expansive clays has led to poor performance of flexible pavements, which typically develop significant longitudinal cracks during periods of drought. This presentation includes innovations in (1) the characterization of expansive clays and (2) the use of geosynthetics to stabilize pavements where their presence is prevalent.

A novel approach involving centrifuge technology has been recently developed to characterize clay swelling. The procedure involves soil samples subjected to water infiltration during comparatively small testing periods. What makes the centrifuge approach special is that the variable of interest (i.e., the vertical rise) is directly measured. The centrifuge approach is particularly appropriate for use with the Potential Vertical Raise (PVR) approach.

The second part of the presentation includes the results of a comprehensive research program conducted to assess the use of geosynthetics to mitigate pavement problems associated with expansive clays. Specifically, the Texas Department of Transportation has successfully used stabilization of the pavement base course. A comprehensive field evaluation was conducted, which involved the construction of test sections with multiple types of geosynthetic reinforcement, lime treatment and control sections. The benefits of using geosynthetic reinforcements were clearly quantified.

Learning Objectives

1. Understanding expansive clay characterization.
2. Understanding roadway distress due to expansive clays.
3. Solving the problem using geosynthetics.

10:50 - 11:40 a.m.

H. Bolto Seed Award Lecture

Insights on Seismic Soil-Structure Interaction for Bridges from Large-Scale Field Tests

Kyle Rollins, Ph.D.

Professor, Brigham Young University

Kyle Rollins received his BS degree from Brigham Young University and his Ph.D. from the University of California at Berkeley. After working as a geotechnical consultant, he joined the Civil Engineering faculty at BYU in 1987. ASCE has recognized his work with the Huber Research Award, the Wellington Prize, the Wallace Hayward Baker Award, and the H. Bolton Seed Medal.

Abstract

Soil-structure interaction has important consequences on the performance of bridges that result from passive force on abutment walls and reduction of lateral pile resistance near Mechanically Stabilized Earth (MSE) walls. Passive tests involved a simulated abutment 11 ft wide and 5.5 ft tall with sand and gravel backfills. We conducted tests with abutment skew angles of 0°, 15°, 30°, and 45°. Skewed abutment bridges make up 40% of bridges in the US but have experienced greater distress for both static and seismic conditions. Test results indicate that the passive force decreases significantly as the abutment skew angle increases with reductions of 50% for a 30° skew. The results also indicate that the reduced passive force can be accounted for by using a simple adjustment factor that is a function of skew angle.

We investigated lateral resistance of piles near MSE walls with full-scale tests conducted on 24 piles located at 2, 3, 4, and 5 pile diameters behind 15 ft and 20 ft high MSE walls. Lateral pile resistance was unaffected by the wall when piles were located more than about four pile diameters behind the wall but decreased significantly at closer spacings. We developed p-multipliers to account for the presence of the wall. This simple approach was successful in providing reasonable agreement with measured response for a wide range of displacements. We also developed equations to predict the tensile force induced during lateral pile loading.

Learning Objectives

1. Learn to compute passive force for different abutment wing wall geometries and backfill densities.
2. Understand how to account for the effect of a skewed bridge abutment on the ultimate passive force.
3. Learn how to use p-multipliers to reduce lateral pile capacity behind an MSE wall.

Recent AASHTO Specifications Updates and their Impact on Mechanically Stabilized Wall Design

11:40 a.m. - 12:30 p.m.

James G. Collin, Ph.D., P.E., BC.GE., F.ASCE

President, The Collin Group, Ltd.

Dr. Collin founded The Collin Group, Ltd., in 1995. He was author of the National Highway Institutes "Ground Improvement Methods Manual," "Soil Slope and Embankment Design Manual", "Slope Maintenance and Slide Restoration", and "Shallow Foundations Manual". Dr. Collin is also the lead author for the 2023 update to GEC 11 "Design and Construction of Mechanically Stabilized Earth (MSE) Walls". He developed the companion NHI courses for the above manuals as well as the Soil Nail Wall Design course. He has performed MSE system evaluations for State DOT approval in Illinois, Idaho, Maryland, New Mexico, North Carolina, Pennsylvania, Texas, Utah and Virginia. Dr. Collin has served as an expert witness for over 100 geotechnical and or construction related failures both in the U.S. and abroad.

Abstract

In 2020, AASHTO's LRFD Bridge Specifications made significant changes to the design requirements for MSE walls. This included adding two design methods (i.e., stiffness method and Limit Equilibrium Method). This presentation will briefly review the differences and similarities between the four AASHTO approved MSE design methods and their potential impact on the supply and design of MSE walls.

Learning Objectives

1. Understand what design method may be used with what reinforcement type.
2. Apply the correct LRFD reduction factors for each design method.
3. Recognize the potential economic benefit of one design method verse the others.

1:30 - 2:15 p.m.

Case Study

Ground Response to Foundation and Ground Improvement Installation

Timothy C. Siegel

Sr. Principal Engineer/CEO, Dan Brown & Assoc.

Tim Siegel is CEO and Senior Principal Engineer for Dan Brown and Associates LLC. He is active in several professional organizations and has served on committees for the Geo-Institute, DFI, and TRB. He is currently a board member for AGP.

Siegel was part of the University of Tennessee faculty between 2004 and 2014 teaching seniors and graduate students foundation engineering. He is currently co-editor-in-chief for the DFI Journal.

Abstract

This presentation summarizes data from a number of projects where the ground response from foundation and/or ground improvement was unexpected. One of the projects involved installing CFA piles in sand with varying numbers of auger rotations to measure the effect on soil loosening. Another project re-tested piles and a significant difference was observed from the initial load testing.

Learning Objectives

1. Does auger CFA pile rotations loosen sands?
2. Does the geotechnical resistance pile change with loading history?
3. What is a neutral plane and how Does it affect pile behavior?

Geotechnical Challenges of Building an LNG Project on a Very Soft Soil Site

2:15 - 3 p.m.

Anil Bhandari, Ph.D., P.E.

Principal Geotechnical Engineer, Bechtel Corp.

Dr. Anil Bhandari is the Geotechnical and Hydraulic Engineering Services Lead for the Energy GBU of Bechtel Corporation. He holds a Ph.D. in Civil Engineering from The University of Kansas, along with a Master's in Geotechnical Engineering from the Asian Institute of Technology. Since joining Bechtel in 2012, Dr. Bhandari has led numerous large-scale infrastructure projects, particularly in LNG facilities, pipelines, transportation infrastructure and marine structures.

Abstract

Based on a recent study, global energy demand is expected to increase from about 580 quadrillion BTU in 2024 to 650 quadrillion BTU by 2050. Liquefied Natural Gas (LNG) is one of the major energy sources and is anticipated to contribute significantly to the energy transition towards a carbon-neutral energy landscape. For example, natural gas supplies about one-third of the United States' primary energy consumption, with its primary uses being heating and electricity generation. LNG export capacity from North America is expected to more than double by 2027.

Since most LNG projects are developed in near-shore areas, there often exists a relatively thick layer of very soft and highly compressible fine-grained soils. This presentation discusses the geotechnical challenges associated with constructing an LNG project on a very soft soil site, using a project built on a former dredge disposal site as an example. A comprehensive geotechnical investigation program was performed. Various ground improvement methods, such as wick drains, shallow soil stabilization and Deep Mixing Method columns, were implemented. A drilled displacement pile foundation was used, and QA/QC for these ground improvement and deep foundation methods are also included in this presentation.

Learning Objectives

1. Gain knowledge of a comprehensive geotechnical investigation for subsurface characterization.
2. Familiarize with ground Improvement techniques for soft soil improvement.
3. Understand QA/QC needs for drilled displacement piles.

3:30 - 4:15 p.m. | Geotechnical Remediation during a Primary Crusher Relocation

Trevor B. Ames, P.Eng.

Mining Geotechnical Services Director, GeoStabilization International

Trevor Ames currently works for GeoStabilization International (GSI) as their Mining Geotechnical Services Director and is a licensed Professional Engineer. Trevor has more than 26 years of surface mining, quarrying experience and managing large Civil and Hydro projects throughout North America. Trevor is a mining engineer and specializes in complex emergency slope stability repairs such as landslide remediation, highwall and slope instability as well as rockfall mitigation.

Abstract

GeoStabilization International, Inc. was contracted to perform this design-build stabilization project over two areas that experienced unfavorable geological structure and rockfall events at the Texas Quarry in Maryland. The work areas required a prompt resolution due to critical infrastructure under construction. The focus areas included primary crusher outer highwall corner stabilization, rockfall along the conveyor in proximity to the highwall with optional hybrid attenuator barrier fence, and six micropiles caps limited access to structurally support the dump ramp deck.

Learning Objectives

1. Preventative steps to take during mine planning to minimize ground instabilities.
2. Unique solution for Micropile footing construction.
3. Better sequencing to improve safety during construction phase.

Use of Wick Drains and Surcharge to Economize Foundations for New Detention Center

4:15 - 5 p.m.

Alex Potter-Weight

Regional Sales Manager, Menard USA

Alex Potter-Weight is a Regional Sales Manager for Menard USA, a design-build geotechnical contractor specializing in ground improvement. Alex received his B.S. in Civil Engineering from Case Western Reserve University and is a licensed professional engineer in nine states, including Kansas. He currently serves on the Board of Directors of the Illinois Section of ASCE and is also a past chair of the Illinois Geo-Institute. Out of Menard's Chicago office, he currently manages pursuit efforts for future ground improvement opportunities across the Midwest. Alex's passion at work is helping his clients solve complex geotechnical challenges across all industries and providing economical and sustainable alternatives to piles and caissons. Outside of work, Alex enjoys playing basketball and volleyball, kayaking, and spending time with his wife, Catherine, and their dog, Cal.

Abstract

For the construction of a new detention center facility in Kansas City, a deep, soft clay deposit posed challenges for both the building foundation design and the site development. Based on the building loads, the soft clay would have necessitated either deep foundations or a robust ground modification system. To avoid this costly project impact, the design team developed a surcharge program to pre-consolidate the clay and increase the allowable bearing capacity. Due to the thickness and the low permeability of the clay deposit, this surcharge program had the potential to cause extensive project delays. The use of prefabricated vertical drains (wick drains) substantially accelerated the waiting period. In addition, wick drains were installed outside the building in the paved portions of the site, where planned grade raises also posed long-term settlement risk. This presentation will include an overview of the design and construction of the project, as well as a summary of the settlement monitoring data collected on site.

Learning Objectives

1. Basic understanding of wick drain design.
2. Benefits of surcharging compared to deep foundations.
3. Benefits of wick drains for shallow embankments without a surcharge.

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