STGEC 2025

54th Southeastern Transportation Geotechnical Engineering Conference

Williamsburg, Virginia

September 15th-18th, 2025

Notes:

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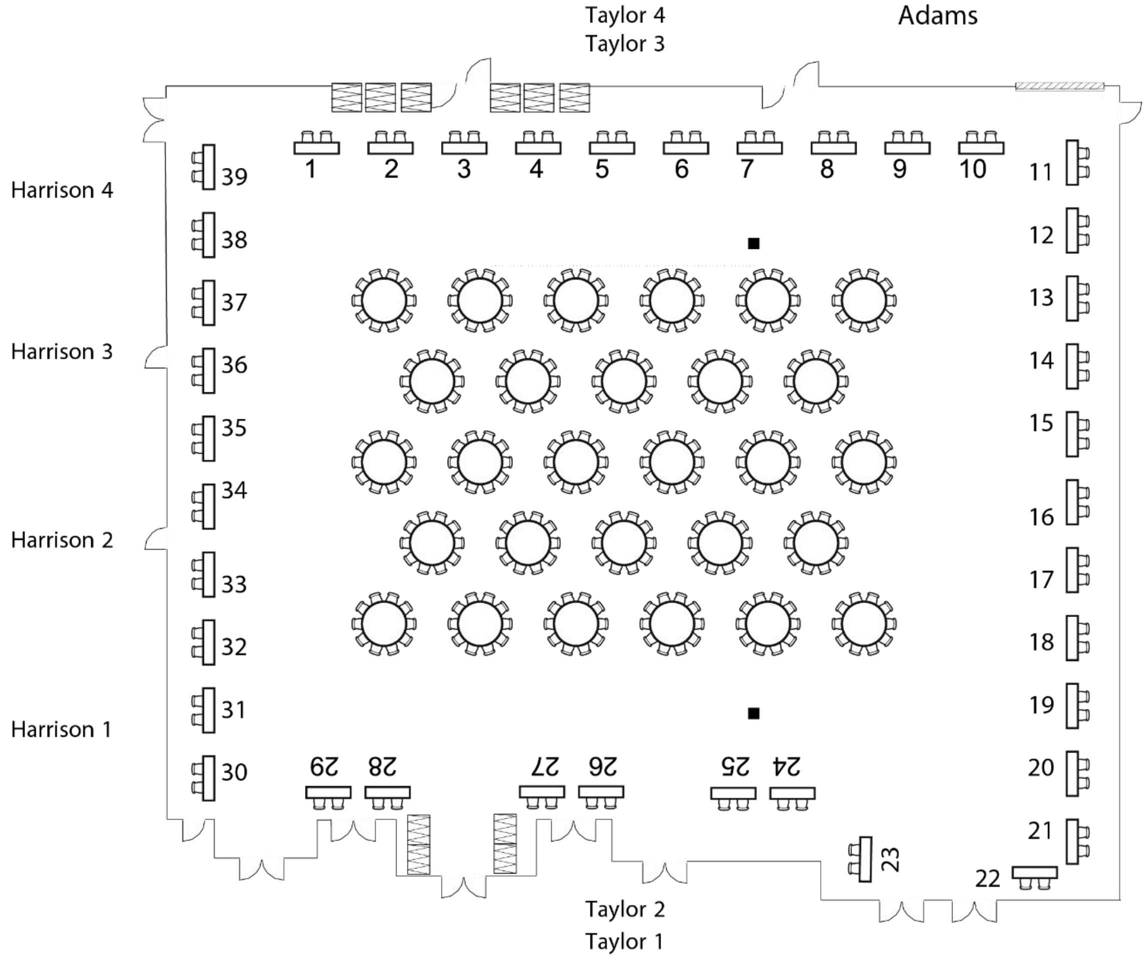
Virginia

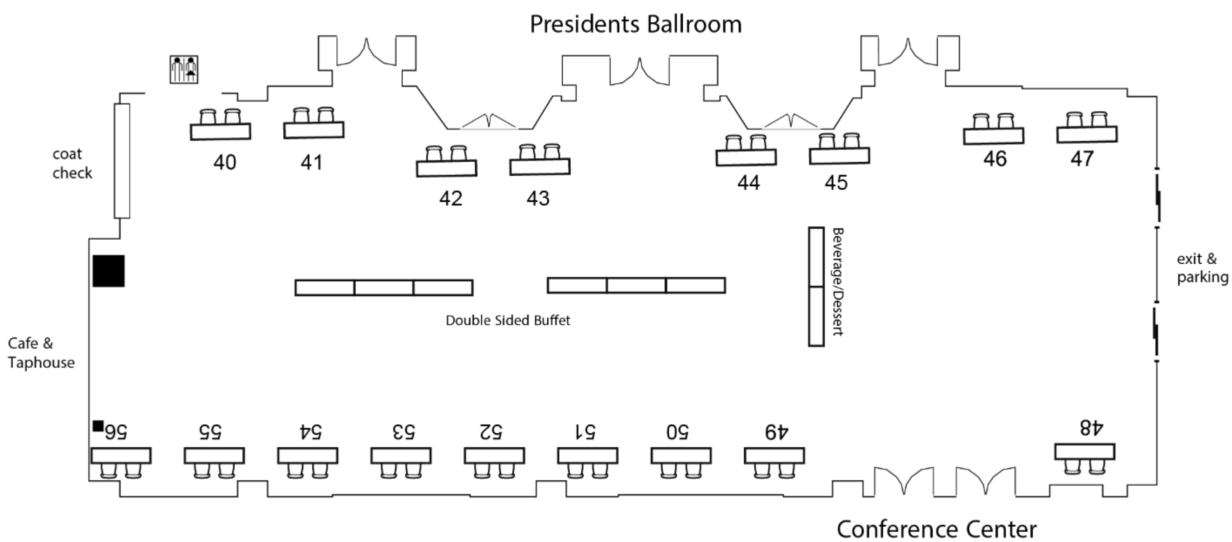
- Capital: Richmond
- Nickname: Old Dominion due to it's loyalty to Charles II of England during the Puritan Commonwealth
- State motto "Sic Semper Tyrannis" means "Thus Always to Tyrants"
- 35th Largest State by area spanning 42,774 square miles
- 12th Most Populus state with 8.6 million residents
- Birthplace of Eight U.S. Presidents
- Home of the Blue Ridge Mountains & Shenandoah Valley
- "Virginia is for Lovers" tourism slogan has been used since 1969
- Federal Government is the largest employer

VENUE AND EXHIBITOR LAYOUT

Presidents Ballroom



Ballroom Promenade



2025 STGEC EXHIBITOR BOOTHS

Booth	Exhibitor
1	Orica Digital Solutions
2	Keller
3	Williams Form Engineering Corp.
4	Pile Dynamics, Inc. / GRL Engineers, Inc.
5	ECS Southeast, LLC
6	CJGeo, Inc.
7	Goettle
8	Collier Geophysics LLC
9	Solmax
10	Insulfoam, a Carlisle Company
110	Southeast Cement Promotion Association
12	Dulles Geotechnical & Material Testing Services,
13	Geobrugg
14	Concrete Canvas US, Inc.
15	The Loren Group
16	Cell-Crete Corporation
17	Acker Drill Company
18	STV, Inc.
19	Central Mine Equipment Company
20	Geoquest
21	Menard USA
22	Arcosa Lightweight
23	Earth Wall Products
24	Breccia Construction, LLC
25	Aerix Industries
26	Foundation Technologies, Inc.
27	Ischebeck USA Inc.
28	A H Beck Foundation Company
29	Legacy Foundations
30	Elastizell Corp. of America
31	Schnabel Engineering, LLC
32	Simco Drilling Equipment, Inc.
33	Willmer Engineering, Inc.
34	Rocscience
35	Aero Aggregates
36	S&ME
37	GeoStabilization International
38	Platipus Anchors, Inc.
39	CATLIN Engineers and Scientists
40	Applied Foundation Testing
41	Hinkle Environmental Services LLC
42	Dataforensics, LLC
43	Geocomp
44	GeoSpecialties
45	RyanGeo
46	Ameritech Slope Constructors, Inc.
47	Geo-Institute of ASCE
48	
49	ESP Associates, Inc.
50	Geopier
51	
52	DGSI
53	
54	Mobile Drill Intl.

Notes:

AGENDA

Monday – September 15, 2025		
5:00 PM to 7:00 PM	Welcome Reception/Registration (Exhibits Open)	
Tuesday – September 16, 2025		
7:00 AM-8:00 AM	Breakfast	
Welcome		
8:00 AM-8:05 AM	Welcome	Will Bassett, Geotechnical Program Manager, Structure & Bridge Division, VDOT
8:05 AM – 8:25 AM	Opening Address	Shane Mann Deputy Chief Engineer, VDOT
Session 1 – Hampton Roads Bridge-Tunnel Expansion Project		
8:25 AM-9:10 AM	Overview of the Hampton Roads Bridge-Tunnel Expansion Project	Brad Weidenhammer HRBT Operations Manager, VDOT
9:10 AM-9:35 AM	Geotechnical Considerations for Tunneling in the HRBT Expansion Project	Ramesh Neupane VDOT
9:35 AM-9:45 AM – Break		
Session 2		
9:45 AM-10:10 AM	Unscrambling the Facts and Fiction Surrounding Civil Engineering Board Certification (CECASCEAGPBCGE)	Jerry DiMaggio HNTB
10:10 AM-10:35 AM	Subsurface Exploration for I-40 Reconstruction in the Pigeon River Gorge Post Hurricane Helene	Chris Ramsey & Jason Holland Schnabel
10:35 AM-10:45 AM – Break		
Session 3		
10:45 AM-11:10 AM	Delineation of Buried Municipal Waste Affecting Highway Performance	Ned Billington ESP Associates
11:10 AM-11:35 AM	Terrestrial and Unmanned Laser Scanning for Measuring Rock Slope Deformation and Discontinuity Orientation	Ricardo Romero Ramirez & Maria Elena Arroyo Caraballo PRHTA
11:35 AM-12:00 PM	Downdrag Effects on Rigid Inclusions Supporting MSE Wall - A Case Study	Guoming Lin Terracon
12:00 PM-1:00 PM – Conference Lunch		
Session 4		
1:00 PM-1:25 PM	An Overview of NCHRP 10-121 - Performance-Based Specification for the Application of Ground Modification Methods for Bridges, Retaining Structures, and Associated Geotechnical Features.	Allen Cadden Schnabel

1:25 PM-1:50 PM	Dynamic Soil Testing of Cooper Marl: Bridging the Gap in Seismic Design Data	Sufal Biswas SCDOT
1:50 PM-2:15 PM	Case Studies in Non-Cementitious Grouting for Water and Soil Control	Kirk Roberts & Brian Bucek CJGeo
2:15 PM-2:35 PM – Break		
Session 5		
2:35 PM-3:00 PM	Historic Rock-Soil Wall Stabilization Case Study	John Godfrey Jr. ECS Southeast
3:00 PM-3:25 PM	Visualizing Subsurface Complexity with Seismic Surface Wave Methods	Adam Gostic S&ME
3:25 PM-3:50 PM	Vetiver Grass Stabilizing Highway Slope Failure in Mississippi	Ian LaCour MDOT
3:50 PM-4:10 PM - Break		
Session 6		
4:10 PM-4:35 PM	Nature Based Solutions for Streambank Armoring - VA Rail Trail Case Study	Adam Pierce Solmax Geosynthetics
4:35 PM-5:00 PM	Resilience-Based Geotechnical Asset Management	Ahmad Alhasan HNTB
5:30 PM-8:00 PM	**Drinks & Banquet (Dinner @ 6pm)**	
Wednesday – September 17, 2025		
7:00 AM-8:00 AM	Breakfast	
Session 7		
8:00 AM-8:25 AM	Engineering Considerations for the Proper Evaluation and Effective Use of Pile Static and Dynamic Testing Results - Lessons Learned from Case Studies	Mohamad Hussein GRL Engineers
8:25 AM-8:50 AM	Update to the Alligator River Project	Nick Tuttle, Andrew Drda, Tom Santee NCDOT
8:50 AM-9:15 AM	Drilled Shaft Anomaly Repair	Zak Peterson Legacy Foundations
9:15 AM-9:40 AM	Natural Bridge, VA: Integrated Remote Data Collection	Brian Bruckno & Skip Watts VDOT & Radford Univ.
9:40 AM-10:00 AM - Break		
Session 8		
10:00 AM-10:25 AM	LRFD Design of Piles Using RSPile Software	Ahmed Mufty Rocscience
10:25 AM-10:50 AM	State Route 92 over Staunton River Drilled Shafts	Will Bassett VDOT
10:50 AM-11:15 AM	Reimagining Resilient Infrastructure: Low-Density Cellular Concrete and the Road to Carbon Neutrality	Nico Sutmoller Aerix Industries

11:15 AM-11:40 AM	A Deep Dive into Geotechnical Aspects for I-75 Interchange at I-24, TDOT Design Build Project DB2101	Atefeh Asoudeh RK&K
11:40 AM-12:40 PM – Conference Lunch		
Session 9		
12:40 PM-1:05 PM	AI-Driven Approach in Digitizing and Managing Historical Subsurface Data	Scott Deaton Dataforensics
1:05 PM-1:30 PM	Bridging the Gap Between Field and Lab: How Connected Platforms Improve Subsurface Confidence	Simon Hardham TabLogs
1:30 PM-1:45 PM - Break		
Session 10		
1:45 PM-2:10 PM	LA-1 Relocated: Two Decades and Still Going	Jesse Rauser LADOTD
2:10 PM-2:35 PM	A Software-Agnostic Approach to Geotechnical Data Management Supporting Design and Construction	Xin Peng Geosyntec
2:35 PM-3:00 PM	New Workflow for Advanced Data Sharing Between Organizations on a Project-by-Project Basis	Louis Aaron BoreDM
3:00 PM-3:15 PM – Break		
Session 11		
3:15 PM-3:40 PM	Route 58 Lovers Leap	Greg Koepping Whitman, Reqardt & Assoc.
3:40 PM-4:05 PM	Using High Resolution Digital Elevation Models (DEMs) and Street Level Imagery for Rock Cut Slope Inventory and Rockfall Hazard Rating	Yonathan Admassu JMU
4:05 PM-4:30 PM	Excavation Support and Micropile Base Shear Stabilization at the Teton Pass Landslide, Wyoming	Tony Sak Keller North America
4:30 PM-4:55 PM	I-95 Neabsco Creek	David Shiells & Carlin Hall VDOT NOVA District
5:10 PM-6:10 PM	*Steering Committee Meeting* *(By Invitation Only)*	*Steering Committee Members/Proxy Representatives*
Thursday – September 18, 2025		
7:00 AM-8:00 AM	**Breakfast**	
Session 12		
8:00 AM-8:25 AM	GCCMs - A 21st Century Technology for Erosion Control and Water Conveyance Applications	Nathan Ivy Concrete Canvas USA
8:25 AM-8:50 AM	Recent Advances in Remote and Difficult Site Access Exploration	Aaron Goldberg & Jarod Ford S&ME

8:50 AM-9:15 AM	Performance Evaluation of the Deepest Precast Box Culvert in the U.S.: Lessons from Poplar Creek, VA	Eric Jacques VA Tech
9:15 AM-9:40 AM	Evaluation of Box Culvert Differential Settlements Subject to Highway Embankment Load	Naim Muhammad WSP
9:40 AM-10:05 AM	Two Part Presentation: 1) Measurement While Drilling (MWD); 2) Can You DIGG It?	Desirae Carlton & Stephanie Wynn ALDOT
10:05 AM-10:20 AM - Break		
10:20 AM-10:45 AM	Slope Failure Monitoring in Central Georgia Kaolin Country	Tom Tye CERM
10:45 AM-11:10 AM	Supporting Rail Embankments on Soft Organic Soils with Controlled Modulus Columns (CMCs): A Jacksonville Case Study	Venkata Muppana MenardUSA
11:10 AM-11:35 AM	Geotechnical Asset Management Approaches from Various State DOTs	Darren Beckstrand Landslide Technology
11:35 AM-12:00 PM	Collaboration & Stabilization: Achieving Stability through Effective Communication and Lime Stabilization	Phil Belcastro Mintek
12:00 PM - Adjourn		

Notes:

PRESENTATIONS

Overview of the Hampton Roads Bridge-Tunnel Expansion Project

Brad Weidenhammer – HRBT Operations Manager

Geotechnical Considerations for Tunneling in the HRBT Expansion Project

Ramesh Neupane, P.E., Ph.D., PMP, DBIA – Geotechnical Engineering Program Manager, Materials Division, VDOT
Md Touhidul Islam, P.E. – Senior Geotechnical Engineer, Materials Division, VDOT
Todd Grifika, P.E. – HRBT Expansion Project – Resident Engineer (Consultant), WSP

The Hampton Roads Bridge-Tunnel (HRBT) crossing serves as a critical transportation infrastructure in southeastern Virginia, facilitating vehicular connectivity between the cities of Hampton and Norfolk through I-64. The HRBT spans about 3.5 miles and was the first bridge-tunnel water crossing constructed utilizing the artificial islands. It originally opened with two lanes in 1957 and was expanded to four lanes in 1976. The existing tunnels were constructed between two man-made islands, serving as the transition between the trestle and the tunnels. Both tunnels were constructed using the Immersed Tube Tunnel method with each spanning approximately 1.5 miles. Traffic at HRBT exceeds 100,000 vehicles per day during peak summer months, making it one of the most congested corridors in the region.

To address growing traffic volumes and congestion, the HRBT expansion project was initiated. The major expansion includes the construction of twin two-lane bored tunnels, each approximately 1.5 miles in length, increasing the corridor's capacity from four lanes to eight lanes. The project utilizes one of the largest Tunnel Boring Machines (TBM) in North America, with a cutterhead diameter of about 46.5 feet. The TBM is specifically designed to navigate the region's complex subsurface conditions. The project is in the Coastal Plain geological province of Virginia. The subsurface conditions at the proposed tunnel locations mainly consisted of man-made fill, alluvial marine deposits, and Yorktown formations. The north island is underlain by granular soil and has not posed significant concerns in the past, whereas the South Island is underlain by highly compressible clay, which has led to notable settlements previously. To address the geotechnical challenges historically posed by these ground conditions, various ground improvement techniques have been applied in the South Island to ensure safe and stable tunneling operations. The TBM excavation started in April 2023 and is currently in progress. Approximately 75% of the work has been completed so far. Both tunneling works are expected to be completed by fall 2025

Unscrambling the Facts and Fiction Surrounding Civil Engineering Board Certification (CECASCEAGPBCGE)

Jerry DiMaggio – HNTB

If you are wondering what each of these letters mean; you are not alone, I will do my best to explain them in this presentation.

As a recognized GeoLegend, past Board Member of the Geo-Institute (GI), Immediate Past President and current Board Member of the Academy of Geotechnical Professionals (AGP) and current Member of the Civil Engineering Certification (CEC) Board I am confident that I can remove any confusion you may have around what these acronyms (and their related programs) should mean to you as a Civil Engineering Professional. If you're unfamiliar with some of the acronyms have no fear, I will explain what they are, their differences and unique objectives, **and most importantly, articulate how their value-added benefits can impact your career and professional growth."**

SUBSURFACE EXPLORATION FOR I-40 RECONSTRUCTION IN THE PIGEON RIVER GORGE POST HURRICANE HELENE

Christopher J. Ramsey, PE – Schnabel Engineering
Jason Holland, PG – Schnabel Engineering

Following devastation caused by Hurricane Helene throughout the western North Carolina region in September 2024, North Carolina Department of Transportation (NCDOT) reached out to the engineering community for the rebuilding process under an emergency condition. As part of the RK&K design team for the reconstruction of Interstate 40 (I-40), Schnabel Engineering developed an expedited and comprehensive investigation program for the first 5-miles (8 km) in North Carolina. I-40 experienced numerous failures along the five-mile corridor which is adjacent to the Pigeon River. In order develop repair concepts and ultimately to design the permanent repairs, a subsurface exploration program was established that included desktop review of historic geotechnical data, rock probes by air track drilling, rock probes by soil nail drilling, rock core sampling with standard coring methods, optical televiewer logging, and geophysical investigations using MASW methods. A suite of laboratory testing was performed to characterize engineering properties of the subsurface soils and rock.

A large amount of data was gathered, and the need was recognized to keep the records in an organized fashion to streamline data review and meet the needs of an emergency response project where the design team and contractor's team under an alternative delivery contract are working in unison. An internally developed database system (Mortar) that integrates different applications and services was deployed. Using Mortar, data mapping and integration is possible, facilitating a more informed design process.

DELINEATION OF BURIED MUNICIPAL WASTE AFFECTING HIGHWAY PERFORMANCE

Edward D. (Ned) Billington, PG – ESP Associates
C. Ryan Pastrana, PG – ESP Associates
Cody W. Allen, GIT – ESP Associates

A portion of the All American Freeway in Cumberland County, North Carolina was constructed over a closed municipal landfill that operated in 1970 to 1975. Differential settlement has affected the freeway leading to various investigations and several episodes of repaving. The NCDOT contracted with Infrastructure Consulting & Engineering, PLLC (ICE) to perform a settlement investigation and provide repair recommendations. ESP Associates, Inc. (ESP) was subcontracted by ICE to provide geophysical services to help identify the lateral and vertical extents of the buried waste. The geophysical work included ground-penetrating radar (GPR), electromagnetic induction (EM), and 2D electrical resistivity imaging/induced potential (ERI/IP). The geophysical data were correlated with boring data to determine the approximate boundaries of the waste.

Terrestrial and Unmanned Laser Scanning for Measuring Rock Slope Deformation and Discontinuity Orientation

Ricardo J. Romero-Ramírez – PRHTA
María E. Arroyo-Caraballo – PRHTA

Rock and soil slope movements cost departments of transportation millions of dollars annually and can lead to property damage and, in severe cases, loss of life. Traditionally, engineers have relied on conventional methods to detect slope movements. While effective for small-scale applications, these methods may not be practical or cost-efficient for larger spatial areas.

Remote sensing technologies, such as terrestrial laser scanning (TLS) and unmanned laser scanning (ULS), offer wide spatial coverage and, when paired with appropriate post-processing software, can achieve millimeter-scale sensitivity in deformation measurements. This study compares slope movement and rock discontinuity orientation measurements obtained via TLS and ULS with those collected using traditional geotechnical methods.

The methodology includes three components: (1) construction of a rock displacement simulator (RDS) to evaluate the accuracy of TLS and ULS derived displacement measurements; (2) multi-campaign field data collection on rock slopes to detect real-world displacements; and (3) comparison of discontinuity orientation measurements taken with a geological compass to those derived from TLS and ULS data.

Preliminary findings suggest that TLS and ULS, combined with advanced post-processing software, can reliably detect millimeter-scale rock displacements and accurately determine discontinuity orientations. Moreover, the decreasing cost, size, and complexity of these laser scanning systems make them increasingly viable tools for rock slope monitoring and characterization in highway infrastructure projects, particularly when time, budget, and public safety are critical concerns.

Downdrag Effects on Rigid Inclusions Supporting MSE Walls – A Case Study

Guoming Lin, Ph.D., G.E., BC.GE. – Terracon

Mechanically stabilized earth (MSE) walls are widely used in transportation infrastructure. However, when constructed over soft soils, ground improvement techniques are often necessary to enhance bearing capacity and mitigate settlement. Among these techniques, rigid inclusions (RIs) have gained popularity. Like piles, RIs must be designed to account for downdrag effects, but different methodologies exist for this consideration.

The traditional approach, following AASHTO bridge design standards, treats downdrag as an additional load, often resulting in conservative designs. Alternatively, the neutral plane method, as outlined in FHWA guidelines, does not treat downdrag as an extra load but instead requires a performance-based assessment of settlements. This discrepancy in approaches has led to confusion in current practice. Additionally, ground improvement with rigid inclusions is often delivered as a design-build contract, further complicating accountability. Notably, reported cases of foundation failures due to pile downdrag remain rare, leading to a tendency to overlook this effect in design and construction.

A significant case study highlighting the impact of downdrag on RIs involves the Kinder Morgan Elba Island LNG terminal, located in the Savannah River. The facility includes five large liquefied natural gas (LNG) storage tanks, each required by federal regulations to have a containment system to prevent spills. The latest containment system, completed in 2010 for Tank D5, incorporated a 15-foot-tall, 15-foot-wide MSE wall.

The site's challenging subsurface conditions included a 30-foot-thick layer of very soft clay, underlain by loose to medium-dense sands susceptible to liquefaction during seismic events. To support the MSE containment wall, ground improvement using RIs was implemented, with design verification through advanced finite element analysis and multiple load tests. Construction was carried out by nationally recognized contractors under strict quality control measures.

Despite these efforts, significant settlements occurred immediately after construction, with total settlements exceeding 12 inches and continuing for over a decade. This prolonged and large settlement led to wall panel distortions and a reduction in containment volume.

This presentation will provide a detailed case history of down drag-induced RI failure, including an overview of subsurface conditions, MSE wall and ground improvement design, load testing,

construction details, and long-term performance monitoring. The causes of excessive settlement will be analyzed, offering valuable lessons for future ground improvement projects involving MSE walls and other structures over soft soils.

An Overview of NCHRP 10-121 - Performance-Based Specification for the Application of Ground Modification Methods for Bridges, Retaining Structures, and Associated Geotechnical Features.

Allen W. Cadden, PE, D.GE – Schnabel Engineering

Dynamic Soil Testing of Cooper Marl: Bridging the Gap in Seismic Design Data

Sufal Biswas, P.E. – South Carolina Department of Transportation
Inthuorn Sasanakul, Ph.D., P.E. – University of South Carolina

Nearly all deep foundations in the Lowcountry region of South Carolina, particularly in the greater Charleston area, rely on a bearing stratum commonly known as the Cooper Marl. Within the geotechnical engineering community, this formation is widely regarded as a non-liquefiable bearing layer, an assumption that is generally accepted during foundation design. However, because the region is seismically active, site-specific analyses for extreme event design are frequently conducted. These analyses—whether using equivalent-linear or non-linear methods—require shear modulus reduction curves (G/G_{max}) and damping ratio curves, which illustrate how shear modulus decreases and damping increases with the magnitude of cyclic shear strain. A correlation developed by Andrus et al. (2003), based on a modified hyperbolic model, is currently used to generate these curves for the Cooper Marl formation in South Carolina. Nevertheless, the coefficients necessary to apply this model are often uncertain or unavailable for Cooper Marl, as the correlation was based on limited data (SCDOT Geotechnical Design Manual, 2022). To date, no known laboratory testing has been conducted to directly characterize the G/G_{max} and damping behavior of Cooper Marl. This study addresses that gap by collecting relatively undisturbed samples from the Sawmill Branch area in Summerville, SC. Resonant column and torsional shear tests, along with index tests, were performed to evaluate the dynamic properties of the Cooper Marl deposit. The index test results are consistent with previously published characterizations of Cooper Marl (Camp et al., 2004). The results from the resonant column and torsional shear testing provide previously unavailable data on the dynamic properties of Cooper Marl—specifically shear modulus, shear wave velocity, and damping across a wide strain range. These findings will also help determine whether the observed behavior aligns with predictions made using existing correlations or generic curves for sands and clays.

Case Studies in Non-Cementitious Grouting for Water & Soil Control

Kirk Roberts – CJGeo
Brian Bucek, PE – CJGeo

Cementitious grouts are widely known for their high compressive strength and used in highway and sinkhole remediation due to DOT familiarity and custom practice. However, in situations where time, constructability, or environmental factors limit feasibility, non-cementitious alternatives such as acrylic grouts and geotechnical polyurethanes offer a superior alternative for underground soil and water control. This session presents three Virginia-based case studies illustrating how chemical grouts can outperform cementitious solutions in high-risk transportation environments.

The first case examines the recovery of a stalled tunneling machine during a bridge-tunnel expansion in Virginia Beach, Virginia, where rapid ground stabilization was critical to project progress. Acrylate grout was selected for its low viscosity, adjustable set time, and excavatable properties. Through sonic drilling and Tube a Manchette (TAM) wells ranging from 25 to 75 feet deep, over 105,000 gallons of grout were placed in 23 days to facilitate a hyperbaric intervention.

The second case highlights a safety-critical rehabilitation along I-195 in Richmond, Virginia, where settlement of multiple bridge approaches posed traffic hazards. With no feasible detour options and heavily patched pavement, deep polyurethane compaction grouting - up to 25 feet below grade - was paired with an asphalt wedge to restore ride quality, safety and stability.

The final case involves severe water infiltration into an underground mine in Blacksburg, Virginia, where sinkholes in a stream under public infrastructure caused mine losses of up to 8 vertical feet per day. Environmental restrictions prohibited cementitious grouts and required potable-grade material. Polyurethane grouting was completed from aerial platforms, sealing active and developing sinkholes, restoring dewatering control, and stabilizing a bridge which experienced movement due to sinkhole activity. Upon completion, attendees will have a clearer understanding of the practical applications of non-cementitious grouting for water and soil control in transportation environments. They will gain familiarity with various grout types—including acrylic grouts, colloidal silica, and polyurethanes—along with their relative costs, excavatability, material properties, installation methods, selection criteria, and ideal soil conditions for use.

HISTORIC ROCK / SOIL WALL STABILIZATION CASE STUDY – TENNESSEE CAPITAL HILL, NASHVILLE, TN

John D. Godfrey, Jr., P.E. – ECS Southeast

The project consisted of providing geotechnical engineering design and repair monitoring services for repairs of a historic retaining wall at the Tennessee State Capital property. The retaining wall repairs were for an approximate 440 foot existing 4- to 5-foot-high limestone block gravity wall and a distressed rock boulder/soil wall extending to a maximum height of approximately 15- to 20-foot. The limestone block gravity wall was constructed of Tennessee limestone cut during the construction of the Tennessee State Capital building between 1845 and 1859 and the boulder soil wall was also constructed sometime during this time frame. The wall stabilization included a design utilizing soil/rock anchors with a wire mesh facing to allow for landscaping to include clinging vines. Stabilization concerns with the repair began as soon as the notice-to-proceed was given. This included work limited to nighttime only, presence of utilities behind the wall, providing care of the removal of the historic limestone blocks, a slope failure dislodging and loosening a portion of the boulders in the wall, a leaking storm sewer line causing soil erosion within the wall, unknown boulder thicknesses, unknown voids behind the boulders, boulder and anchor spacing not aligning, multiple re-designs, etc. This presentation will be a case study of the trials and tribulations of stabilizing an historic wall, lessons learned, and the resulting finished product; Is this what the State had in mind?

Visualizing Subsurface Complexity with Seismic Surface Wave Methods

Adam Gostic, P.G. – S&ME

Geotechnical challenges associated with transportation infrastructure are often compounded by complex subsurface conditions: variations in soil layering, weathered rock profiles, and undocumented fill. To better understand and manage these conditions, geophysical methods such as 2D Multichannel Analysis of Surface Waves (MASW) can be integrated into site characterization workflows. We discuss and showcase the use of MASW for developing 2D shear wave velocity (V_S) profiles and the value these models bring to geotechnical investigations supporting roadway and other transportation infrastructure projects.

We explore how 2D MASW testing is performed and highlight how it can define laterally variable subsurface conditions, identify hidden geologic features, and contribute to stiffness-based interpretations of subsurface materials. Particular attention will be given to the role of V_S models in supplementing traditional geotechnical testing, improving the spatial resolution of geotechnical models with profiles that are accessible and engaging. We also explain the requirements for and limitations of a 2D MASW survey.

We will provide practical guidance on how MASW can be effectively deployed on transportation projects in the Southeast, especially in regions where variable soil conditions complicate traditional investigations. Discussion will include equipment and survey design considerations and integration of MASW data into geotechnical decision-making processes. By leveraging these capabilities, agencies can reduce uncertainty, optimize design, and better anticipate construction risks.

Vetiver Grass in Stabilizing Highway Slope Failures in Mississippi

Ian LaCour, PE – Mississippi Department of Transportation
S. Khan, Ph.D. – Jackson State University
F. Rahman – Jackson State University

Vetiver grass is a perennial plant known for its dense and extensive root system. It has great potential in slope stability and erosion control applications. Its ability to thrive in harsh weather and without high maintenance makes Vetiver an effective solution for landslide repair under changing climatic conditions. The Mississippi Department of Transportation, in collaboration with Jackson State University, has implemented the Vetiver system in four highway slopes in Mississippi for slope repair and erosion control measures in different soil conditions. The current study aims to evaluate the performance of Vetiver grass in mitigating landslides on highway slopes built on expansive soil. The slopes were strategically selected to assess slope performance across Mississippi. The first site, along the I-20E exit towards Terry Road, had a section repaired with Vetiver. The failed slope along US 49 near Mount Olive was also repaired using 5000 Vetiver grass plants, which are also helping to address the slope's drainage issues. The slope along the MS 145 highway experienced creeping failure over time and the entire slope section was repaired with 4500 Vetiver grass in October 2023. The fourth highway slope, located near Grenada along Interstate I-55S, has a failure area of 50 by 40 feet and has significant erosion problems. To address both the failure and erosion, 5000 Vetiver grass plants were installed on the slope in June 2024. Regular monitoring using Electrical Resistivity Imaging (ERI), Drone and Light Detection and Ranging (LiDAR) surveys was performed to assess the subsurface soil condition. These non-destructive tests help detect perched conditions beneath the slope surface, hotspots or weak zones for failure and slope movements with time. ERI assessments before the plantation indicated the presence of perched conditions on those slopes. Subsequent assessments after the Vetiver plantation exhibited significant improvements in the perched zone and soil moisture content over time. No significant movement was detected in the slope section, which has been stabilized using the Vetiver technique. The results highlight Vetiver grass's effectiveness in providing stability to the slope on different soils, as well as Yazoo clay which are expansive in nature. This nature-based solution offers a cost-effective and climate-adaptive approach to landslide repair.

Nature Based Solutions for Streambank Armoring

Adam Pierce, CPESC – Soilmax

Adding resilience to earthen channels and streambanks is critical to mitigating the impacts of storms and natural disasters. Integrating engineered erosion control systems and nature-based infrastructure can increase resiliency at a lower cost. This presentation will highlight the Jackson River Trail project, located in Hot Springs, VA. This Virginia Department of Transportation (VDOT) sponsored Rail-to-Trail project used a system incorporating an Engineered Vegetated Wall along with a High Performance Turf Reinforcement Mat (HPTRM) and Engineered Earth Anchors to reinforce vegetation and, provide long-term streambank stabilization and erosion control.

The U.S. Army Corps of Engineers (USACE) has also used these technologies to armor miles of channels, ponds and levees in various locations across the country. The USACE has conducted intensive research to determine the hydraulic performance thresholds, cost effectiveness, and long-term durability of HPTRM reinforced vegetation. Emerging research also indicates HPTRM reinforced vegetation provides improved performance and produces significantly less carbon emissions when compared to traditional hard armor solutions, such as rock riprap and concrete. This presentation includes field and laboratory data in combination with the USACE's research to establish guidance on the use of HPTRM technology to increase the resiliency and reduce the carbon footprint of streambank armoring.

Resilience-Based Geotechnical Asset Management

Ahmad A. Alhasan, Ph.D. – HNTB
Jerry DiMaggio, P.E., BC.GE – HNTB

Geotechnical Asset Management (GAM) has been gaining traction at the national level as an effective approach to manage geotechnical assets and support the transportation network to perform effectively. This study will discuss the role of GAM within transportation asset management practice (TAM) and the potential role GAM plays in breaking the silos and improve resilience. The presentation will discuss the findings from an ongoing study in to develop and implement a risk-based GAM program as an integral part of the agencies TAM and long-range planning activity. The program includes a new risk-based tiered data collection, which is used to estimate the return on investment (ROI) of data collection in GAM. Following the data collection and data management activities, the program included a quantitative risk management approach to evaluate the probabilistic performance of multiple geotechnical assets including cut slopes, earth retaining structures, and embankments. The probabilistic performance models were then used to prioritize the management of these geotechnical assets and estimate the impacts on other TAM programs.

Following the discussion on the GAM program components and workflow, the paper discusses the role of GAM in improving transportation networks resilience. This extent and variability of geotechnical assets type (e.g., walls, slopes and structural foundations) makes them the most critical and challenging assets to design under the changing surrounding and loading conditions. Moreover, geotechnical assets are vulnerable because of the number of internal asset variables and their susceptibility to accelerated moisture, erosion, and environment-related changes, which directly or indirectly impact the asset performance and the other assets they support or surround. In this section of the presentation, we will discuss the workflow and components of a recently developed geotechnical resilience-based design and management (GRBDM) framework. This approach considers the collective behavior of the transportation system consisting of multiple asset families under different normal and rapidly changing extreme conditions. One of the major aspects in the GRBDM is to model the impact of extreme events and changing conditions in accumulating damage and accelerate the deterioration of the asset leading to progressive serviceability or strength failure. These progressive failures have a critical impact on the overall performance of the network. Moreover, the philosophy behind GRBDM is to design and manage geotechnical assets as flexible assets that can be maintained and improved by corrective actions.

Engineering Considerations for the Proper Evaluation and Effective Use of Pile Static and Dynamic Testing Results – Lessons Learned from Case Studies

Mohamad Hussein, P.E., L.M. ASCE – GRL Engineers

Driven piles are commonly used as deep foundations to support bridges in varied geotechnical conditions. They are designed and installed to structurally and geotechnically resist combinations of loads to limit settlement; also, to resist pile driving stresses. Testing is an integral part of the design process and construction work for verification, quality control, quality assurance, and foundation certification. This presentation covers static and dynamic pile testing methods for assessments of geotechnical load bearing capacity and structural integrity. It discusses the basic principles, practical applications, capabilities, and limitations of the commonly used testing methods (conventional full-scale static loading, and high-strain dynamic testing) with emphasis on engineering consideration for proper data evaluation and effective use of testing results. Case histories from actual projects will be examined as case studies for lessons learned covering situations of surprising static loading test result that was due to improper practice of load test system construction procedure, need to use superposition of initial drive and restrike dynamic testing data where soil setup time effects and limited hammer energy would otherwise produce incorrect results and wrong conclusions regarding the foundation load bearing capacity, detailed analyses of structural integrity and soil resistance skin friction and end bearing distributions for the purpose of assessing the in-place adequacy of a damaged pile, and other cases demonstrating high pile elastic rebound, and assessing long-term pile load bearing capacity incorporating anticipated soil resistance setup effects.

Update to the Alligator River Project

Nick Tuttle, PE – North Carolina Department of Transportation
Andrew Drda, PE – North Carolina Department of Transportation
Tom Santee, PE – North Carolina Department of Transportation

The Alligator River Bridge replacement is an ongoing NCDOT project utilizing the CMGC procurement methodology. Located approximately 20 miles east of Manteo, North Carolina on US 64, the approximately 3.3-mile-long bridge includes a 0.75-mile high-rise portion. Soil stratum below the mudline (elevation -10 feet) along the bridge length includes approximately 40 feet of loose/soft sands/silts underlain by approximately 30 to 50 feet of very dense sands. Below the very dense sands a soft (based on SPT N-values) clay layer extends to approximately elevation -150 feet. The soft clay created concerns regarding settlement of the bridge for piles tipped in the very dense sand just above the clay.

Last year, an extensive subsurface exploration program and a design phase test pile program were completed. Shelby tube samples collected in the clay layer during the exploration were sent off for consolidation testing and consolidated undrained triaxial testing. SHANSEP methodology was implemented for triaxial testing to predict over consolidation ratios. The results of this testing, along with the results from the test pile program, lead to the decision to tip the piles in the very dense sand.

This presentation will provide an update on the project, discussing the final foundation design decisions and the construction progress thus far. Driving methods and testing data for production piles will be shared. Embankment monitoring instrumentation will be discussed.

Drilled Shaft Anomaly Repair

Zak Peterson – Legacy Foundations

Legacy Foundations is pleased to present an in-depth explanation of the drilled shaft anomaly repair process, in line with the ADSC standard mitigation plan adopted by the Federal Highway Administration. This presentation is to educate on the means and methods of the mitigation process, emphasizing on the milestones involved in repairing anomalies.

The presentation begins with an overview of the Mitigation Plan. Which can include proposed core hole locations and a detailed anomaly layout sheet, often referred to as a “roadmap.” Investigative coring is used to confirm the locations of the anomalies, ensuring an informed approach to the repair.

The second milestone focuses on the hydro-blasting process. Following the ADSC guidelines, this stage involves the application of high-pressure water to the detected anomaly, extending an additional 1 to 2 feet above and below the area of concern. Throughout the hydro-blasting procedure, foot-by-foot documentation in maintained, providing insight into the effectiveness of the operation.

Once hydro-blasting is completed, the presentation will cover the secondary clean-out process, which is the use of high-volume, low-pressure water, combined with air to remove any remaining material. A downhole camera will verify the repair to this point, and recordings from these inspections are shared to illustrate the thoroughness of the process.

The presentation will then discuss the water infiltration test, conducted to determine the appropriate grout type and mix required.

The final milestone of the repair process is pressure grouting, which consists of three phases: the tremie phase, pressure phase, and refusal phase. Documentation will be kept throughout the grouting and will be used in a post-mitigation report. The post-mitigation report recounts the entire repair process, including details of the materials removed, along with dates, times, and even quantities of grout placed.

Through this presentation, Legacy Foundations aims to provide valuable insights into the anomaly repair process, leading to a more effective and efficient understanding of drilled shaft remediation.

Natural Bridge, Virginia: Integrated Remote Data Collection

Brian Bruckno, Ph.D., P.G. – Virginia Department of Transportation
Skip Watts, Ph.D., P.G. – Radford University

Natural Bridge, in Rockbridge County, Virginia, is a naturally-formed rock arch. The arch, which spans Mill Creek and carries US Route 11, is approximately 240 feet high and 100 feet wide, with a maximum thickness of 50 feet. The area has significant historical and cultural importance. Until the mid-2010s, the arch and the area below were privately owned and operated as a park, with only the pavement structure held as a Virginia Department of Transportation asset. Currently, the arch and area below are Virginia Department of Conservation and Recreation assets, operated as a new state park, transferring liability to the Commonwealth of Virginia. The arch had never been subject to a thorough geological study. As part of the Commonwealth's due diligence and to ensure that the arch is preserved for future generations, the Department of Transportation, in cooperation with Radford University, completed a comprehensive geological investigation in the fall and winter of 2017/18. The requirement that no drilling or other invasive or destructive testing be performed created a significant obstacle. The family of methods included electrical resistivity imaging, seismic refraction, multichannel analysis of surface waves, ground penetrating radar, unmanned aerial systems photography, videography, and remote discontinuity mapping, Gigapan imaging, terrestrial LIDAR, manual discontinuity mapping, and vibration monitoring. This presentation discusses the benefits and detriments of integrated data collection, and how these methods may be integrated into a comprehensive, non-invasive geotechnical investigation.

Using High Resolution Digital Elevation Models (DEMs) and Street Level Imagery for Rock Cut Slope Inventory and Rockfall Hazard Rating

Yonathan Admassu, Ph.D. – James Madison University

Proactive management of geotechnical assets such as rock cut slopes along highways includes performing inventory and evaluating rockfall hazard ratings. Both efforts are aimed at helping transportation agencies to proactively monitor and maintain problematic slopes. Slope inventory involves locating rock slopes and collecting preliminary geometric/geologic attributes that may contribute to slope failure. Rockfall hazard rating provides a detailed analysis of the presence of rockfall hazard risk factors. The risk factors include geometric and geologic factors that are traditionally collected in the field requiring intensive time and money investment. An alternative method is the use of remotely acquired data such as the use of LiDAR and photogrammetry to measure geologic parameters on the desktop. This research project is a pilot test to investigate the use of high-resolution LiDAR-derived digital elevation models (DEMs) and street level imagery from (www.Mapillary.com) to collect geometric and geologic data on the desktop. The proposed automated/semi-automated method will save time and money required for both rock slope inventory and rockfall hazard rating. The accuracy of automated soil/rock slope detection using DEMs and street level imagery was found to be 86 %. Identifying rock cut slopes was successful at 94 %. Measurements of rockfall hazard parameters were also in close agreement to those measured in the field. The proposed method will not completely discard field visits but attempts to put forward a streamlined desktop process to help infrastructure agencies to become more efficient in managing their rock slope assets.

Laterally Loaded Helical Piles and Driven Piles

Naim Muhammad, P.E., Ph.D. – WSP USA
Bon Lien, P.E., Ph.D. – WSP USA

A deep foundation system was recommended to support a steel framework that carries a pipeline for an underwater (in-river) diffuser system. Due to the unconsolidated and loose nature of the riverbed soils, WSP initially proposed the use of helical anchor piles (also referred to as helical piers or screw piles) as the foundation solution. The LPile software (licensed by Ensoft, Inc.) was employed to analyze the stress distribution and deformation behavior of the helical piles under combined lateral (shear) loads and bending moments. These loads resulted from wind, seismic activity, and dead/live loads acting on the diffuser pipeline and its supporting steel framework.

Given the subsurface conditions consisting of loose clayey to silty sand materials extending to a depth of approximately 10 to 12 feet below the riverbed, with Standard Penetration Test (SPT) blow counts ranging from zero to less than four. Our analyses resulted in unacceptable deflection at the top of the helical pile. As a result, a driven pipe pile foundation system was adopted as an alternative solution.

The helical pier system was determined to be inadequate in controlling deflection primarily due to several key factors: (1) the slender geometry of the shaft, (2) limited passive earth pressure resulting from minimal surface area for the surrounding soil to mobilize lateral resistance, and (3) increased susceptibility to buckling, particularly in weak soils lacking sufficient lateral confinement. Additional concerns included the absence of axial and lateral load testing under submerged conditions, potential disturbance of marginally stiff to dense soils during installation, and the group effect associated with closely spaced piles. Collectively, these issues contributed to excessive deflections exceeding allowable limits.

Driven steel pipe piles of varying sizes and thicknesses foundation system was recommended to control the deflection within allowable limits set by the structural integrity of the steel frame superstructure to support the diffuser pipeline.

Reimagining Resilient Infrastructure: Low-Density Cellular Concrete and the Road to Carbon Neutrality

Nico Sutmoller – Aerix Industries

In a landmark Policy Statement, the American Society of Civil Engineers (ASCE) affirms that true sustainability is a dynamic balance—an intricate dance between economic vitality, environmental stewardship, and social well-being. To achieve this “Triple Bottom Line,” the infrastructure of tomorrow must be more than just functional—it must be resilient, cost-effective, and built to last. And that calls for bold innovation in how we design and construct, starting with the materials we choose.

Enter low-density cellular concrete (LDCC)—a modern marvel that’s changing the game in sustainable construction. This versatile material, made from portland cement, water, and preformed foam, offers a unique combination of strength, lightness, and environmental responsibility. With a dry density of 50 lb/ft^3 (800 kg/m^3) or less, LDCC can be engineered with recycled content, supplementary cementitious materials like fly ash and slag, and tailored chemical admixtures to enhance both performance and sustainability. The result? A smart solution for reducing carbon emissions without compromising on durability or design flexibility.

This presentation will also spotlight the rise of Limestone Cement—its influence on modern construction and why a deep understanding of project specifications is more crucial than ever.

Through a series of real-world case studies from across the United States, we’ll explore how LDCC is already contributing to sustainable infrastructure and edging us closer to a carbon-neutral future. We’ll delve into emerging technologies, evolving industry practices, and how LDCC is being reimagined to meet the complex challenges of contemporary geotechnical projects.

An in-depth look at how LDCC is not only supporting the present—but actively shaping the concrete industry’s path to carbon neutrality by 2050.

A Deep Dive into Geotechnical Aspects for I-75 Interchange at I-24, TDOT Design Build Project DB2101

Atefeh Asoudeh, PE, PhD, PMP, DBIA – RK&K

In this presentation, the I-75/I-24 Interchange Improvement Design-Build Project, awarded by the Tennessee Department of Transportation (TDOT) to the Wright Brothers/RK&K team in October 2022 will be discussed. This project involved widening I-75 and I-24, modifying their interchange, replacing multiple bridges, and incorporating combined noise wall/retaining wall structures. As the lead designer, RK&K provided full design services, including construction plans, permitting, and construction support. The RK&K geotechnical team was responsible for coordinating subsurface explorations, designing foundations for bridges, retaining walls, noise walls, and roadway subgrades, as well as developing landslide mitigation measures and both temporary and permanent pavement designs. We also collaborated with a specialty contractor for the detailed design of soil nail walls and anchored soldier pile walls.

AI-Driven Approach in Digitizing and Managing Historical Subsurface Data

Vahidreza Mahmoudabadi, Ph.D., P.E. – Dataforensics
Scott L. Deaton, Ph.D. – Dataforensics

The management and utilization of historical subsurface geotechnical data are crucial for modern transportation infrastructure projects, especially as these projects become larger, more complex, and constrained by limited resources. While advancements in geotechnical data collection and management have led to the development of cloud-based platforms, a significant portion of historical data remains trapped in non-digital formats such as PDFs and images. These static formats hinder the efficient reuse of valuable legacy data, preventing Departments of Transportation (DOTs) and engineering professionals from leveraging decades of accumulated geotechnical knowledge.

To address this challenge, Dataforensics has developed an AI-driven process to automate the digitization and management of historical subsurface data. This approach integrates mature technologies like Optical Character Recognition (OCR), Machine Vision (MV), and Large Language Models (LLMs) alongside with probabilistic algorithms to extract meaningful data from image-based geotechnical logs, tables, and graphs. By focusing on both the spatial positioning and morphological attributes of geotechnical data within these documents, the proposed system facilitates accurate and automated conversion of archived reports into DIGGS (Data Interchange for Geotechnical and GeoEnvironmental Specialists) compliant databases.

The AI-driven system enables efficient processing and organization of historical geotechnical information, transforming it into reusable, structured datasets. This transformation supports the creation of dynamic 3D models, improves predictive modeling, and enhances decision-making for infrastructure projects. Furthermore, by reducing the need for manual data re-entry and minimizing data loss, this approach streamlines workflows for DOT personnel, consultants, and contractors. The solution not only unlocks the potential of historical geotechnical data but also fosters a data-driven culture that improves project outcomes related to constructability, sustainability, durability, and resilience to climate change and geohazards.

The implementation of AI-driven digitization offers a scalable and cost-effective solution to harness the untapped potential of historical geotechnical archives. It ensures that valuable subsurface data can continue to provide critical insights, improving infrastructure planning, design, and maintenance for years to come.

Bridging the Gap Between Field and Lab: How Connected Platforms Improve Subsurface Confidence

Simon Hardham - TabLogs

The geotechnical sector is evolving rapidly, with growing expectations around the speed, traceability, and quality of subsurface investigations, especially in transportation projects where delays and uncertainty can have major design consequences. Historically, field logs and lab testing have existed in siloed workflows, resulting in data loss, duplication, and reduced confidence in the models used to inform deep foundations, ground improvements, and pavement design. Today, connected digital platforms are reimagining this relationship, offering an integrated approach that spans from site to lab and ultimately to design.

This abstract explores the growing role of connected field and laboratory platforms in closing the critical gap between borehole logging and soil testing, with an emphasis on how these innovations are transforming project delivery and subsurface decision-making.

LA-1 Relocated: Two Decades and Still Going

Jesse Rauser, PE – Louisiana Department of Transportation and Development

The LA-1 Relocated project consists of approximately 16 miles of elevated highway and a high-level bridge connecting Port Fourchon, LA to Golden Meadow, LA. The existing LA-1 route is especially susceptible to the effects of hurricanes and storm surge, but is a vital corridor for much of the nation’s oil supply from the Gulf. LADOTD initiated geotechnical explorations for the project in 2003 and began construction on Phase 1 in 2005. Phase 2 is currently being constructed and is expected to continue for several more years. This presentation will provide a broad overview of the project as well as some of the interesting insights gained over the course of design and construction.

A Software-Agnostic Approach to Geotechnical Data Management Supporting Design and Construction

Xin Peng, Ph.D., P.E. – Geosyntec Consultants

As the geotechnical industry embraces increasingly data-rich technologies, the need to efficiently manage and integrate diverse datasets has become essential. These datasets include not only traditional soil borings but also cone penetration tests (CPTs), geophysical surveys, measurement while drilling (MWD), instrumentation monitoring, LiDAR, and more. With the retirement of gINT—

the dominant platform for geotechnical data management and boring log production—new alternatives have emerged to advance data management practices across the industry.

Despite the availability of capable replacements, some professionals and organizations remain hesitant to adopt new solutions. Transitioning to a new platform requires the significant effort to establish new workflows, conduct extensive training, and manage the risk of unsatisfactory outcome.

This presentation introduces a software-agnostic approach developed by the Louisiana Department of Transportation and Development's Geotechnical Design Section (LADOTD-GDS). This strategy shifts the focus from merely managing data and boring logs to leveraging geotechnical data for design and construction decisions on active projects. By decoupling workflows from specific commercial software, LADOTD-GDS can respond more proactively to future changes in data management software and technology with reduced risk.

A demonstration will showcase how LADOTD utilizes geotechnical data from its existing OpenGround Cloud database via API integration into a tailored web-based platform. This platform currently accesses over 2,700 soil borings with associated lab testing and lithology data, more than 1,100 CPTs, and approximately 800 locations for test, monitor, indicator piles, and instrumentation. The system supports advanced data analytics and visualization features tailored to LADOTD's needs and compliant with national and state geotechnical design standards. A case study of the LA-1 project will also be presented to illustrate the practical application of this approach.

New Workflow for Advanced Data Sharing Between Organizations on a Project-by-Project Basis

Louis Aaron – BoreDM

Route 58 Lovers Leap

Greg Koepping, PE – Whitman, Requardt & Associates (WRA)

The ongoing Route 58 Widening (Lovers Leap) project consists of major improvements to Route 58 from Lovers Leap to Stuart in Patrick County, Virginia. The project contains about 7 miles of roadway improvements. Over the length of the project, Route 58 drops about 1400 feet in elevation in 7 miles of roadway as it descends eastward out of the Blue Ridge Mountains and into the foothills of the Piedmont. The project widens Route 58 from two to four lanes which will facilitate traffic to and from the area, reduce congestion from uphill truck traffic, and improve roadway safety.

The roadway widening is a major earthwork effort requiring nearly 10 million cubic yards of earth moving. Cuts up to 300 feet embankment fills up to 250 feet span the project length with many cuts and fills exceeding 100 feet in height. Cut slope materials range from residual soil, to IGM and into competent rock. The project is a design-build project with WRA and Branch Civil with additional geotechnical support from ECS. Geotechnical investigations used multiple forms of testing including in-situ methods to assess the landscape during design. Geotechnical support has been constant throughout the project. Drone surveys are being used to successfully record and analyze as-built slopes that deviated from plan or have differing site conditions for that anticipated during design. The presentation will concentrate on slope assessments made during construction to validate design assumptions and how field observations combined with drone surveys are key to making timely slope stability assessments to enable construction to continue progressing.

LRFD Design of Piles Using RSPile Software

Ahmed Al-Mufty, Ph.D., P.E. – Rocscience

RSPile, as a popular software for piles analysis and design, may be applied for most of the DOTs requirements in USA regarding the LRFD approach for design. The presentation is a guide on how to do so following FHWA or CALTRAN methods of design. Supported with a couple of examples that will help the engineers to use the software efficiently.

A comparison with ASD approach is presented and the pros and cons of the two are summarized.

Excavation Support and Micropile Base Shear Stabilization at the Teton Pass Landslide, Wyoming

Tony Sak, P.E. – Keller North America

When heading west on 2-lane Highway 22 out of Jackson, Wyoming, towards Idaho, your route goes over the Teton Pass through the southern part of the Teton Range. A mudslide on June 7, 2024, had already closed the highway when a day later a landslide about 3-road miles to the Southeast took out the 100-foot-high embankment and the pavement with it. The normal 35-minute commute tripled for the those who traveled the highway, particularly affecting those who lived in Idaho and traveled to nearby the Jackson area for work. WYDOT was able to open the highway with a temporary bypass adjacent to the landslide area within an amazing three-week timeframe, keeping the closure from severely impacting commuters.

General contractor Ames Construction teamed with Keller North America to win the project. Keller hired Burns Cooley Dennis of Jackson, Mississippi, to design the required temporary shoring and installed soil nail earth retention to temporarily stabilize the landslide scarp. The permanent fix was designed for WYDOT by RJ Engineering out of Colorado. Once down to the base of excavation, Keller installed permanent micropile shear pins required by the final design for global stability. Keller completed the 2 scopes between mid-August and mid-October, normally considered autumn but not so at 7,500 feet. Horizontal drains were installed by Jensen Drilling at the base of the stabilized excavation. Ames then built a reinforced soil slope embankment, consisting of a 1.0(V):1.5(H) geogrid reinforced slope using recycled foamed glass aggregate to bring the roadway to the original grade. The completed section opened to traffic just over a year after the landslide.

I-95 at Neabsco Creek – The Importance of a Geotechnical Investigation

David P. Shiells, P.E. – Northern Virginia District Materials Engineer, VDOT
Carlin L. Hall, II, P.G. – Northern Virginia District Geologist, VDOT

Obtaining access to bridge substructure locations for geotechnical investigations can often be challenging and expensive. However, unexpected foundation conditions that require re-design can be more expensive and cause significant delays to the project schedule. Even worse, failure of a foundation can be disastrous. In 1996, during construction of the I-95 HOV bridge over Neabsco Creek in Prince William county, Virginia, an embankment slope failure occurred that required cutting the bridge deck and demolition/reconstruction of the southern abutment. In 2025, the replacement of the adjacent bridge for I-95 SB over Neabsco Creek is being designed. A massive precast arch structure that will eliminate the need for a bridge is being considered but this structure will have significant foundation loading. Scour is also an important consideration. This presentation describes the difficulties associated with the subsurface investigations for the previous failure investigation as well as the extreme measures taken to obtain rock core at the substructure locations for the current project. The characteristics and the variability of the graphitic slate bedrock encountered are also presented.

GCCMs - A 21st Century Technology for Erosion Control and Water Conveyance Applications

Nathan Ivy – Concrete Canvas USA

Geosynthetic Cementitious Composite Mats (GCCM) are a revolutionary new class of geosynthetics. While there are different varieties of GCCM's, there is only one industry recommended test standard – ASTM D8364 *Standard Specification for Geosynthetic Cementitious Composite Mat Materials* – which details the test methods, frequencies and minimum required values which all three types of GCCMs should meet or exceed. The ASTM definition of a GCCM is a *factory-assembled geosynthetic composite consisting of a cementitious material contained within layer or layers of geosynthetic materials that becomes hardened when hydrated.* Concrete Canvas GCCM contains a lower membrane layer comprised of PVC or LLDPE which increases the impermeability of the GCCM. This is particularly critical for erosion and storm water control. Instead of water being able to permeate through the plane of the GCCM, this backing protects the underlying soil from further erosion or undermining and prevents seepage in high flow or long contact applications. Concrete Canvas can be installed without any specialized equipment or personnel. It can replace other conventional solutions such as articulated concrete blocks, shotcrete, rip-rap and pour-in-place concrete – often at a lower cost and always a longer design life with less maintenance issues. This presentation discusses the successful historical use of GCCMs for use in projects ranging from slope protection and water conveyance to slope protection and culvert repair. Whether the application is for a ditch with heavy sediment build up over time, slope erosion from storm water runoff or merely diversion or containment of water or waste water flows, GCCMs provide an easy-to-use solution with a documented history of performance in a wide variety of applications. With a design life of more than 50 years, this product will provide a cost-effective, long-term solution to help stop erosion and preserve and protect water resources.

Recent Advances in Remote and Difficult Site Access Exploration

Jarod Ford – S&ME
Aaron D. Goldberg, PE, BC.GE – S&ME

More and more difficult access and remote site are being explored because easily developed sites already have transportation infrastructure. In addition, modern environmental regulations restrict some past road building practices and geotechnical information has become more critical to limit transportation infrastructure environmental impact in saltmarsh, river and other sensitive environmental areas. This presentation presents recent advances in remote and difficult site access for marine island access, marsh access, dredge material site access, over-water access and mountainous terrain access. Both soil and rock drilling, as well as in situ testing such as cone penetration testing techniques are addressed.

Performance Evaluation of the Deepest Precast Box Culvert in the U.S.: Lessons from Poplar Creek, VA

Sukrityranjan Samanta – Virginia Tech
George Tharakan – Virginia Tech
Ed Hoppe – Virginia Transportation Research Council
Ioannis Koutromanos – Virginia Tech
Alba Yerro Colom – Virginia Tech
Eric Jacques – Virginia Tech

This presentation shares preliminary findings on the structural adequacy and performance of the Poplar Creek precast box culverts, which are buried beneath up to 310 feet of shot rock fill. This culvert is believed to be the deepest such installation in the United States. Due to the unprecedented fill depth, the project encountered significant design uncertainty, particularly regarding the magnitude and distribution of soil stresses acting on the culverts and the resulting structural response. To address these challenges, the Virginia Department of Transportation (VDOT) initiated a comprehensive, retrospective evaluation of the culvert design.

The presentation will begin with a review of the national survey of Departments of Transportation and supporting literature that helped define the current state of practice and identify knowledge gaps for deep-fill precast structures. We will then discuss the field monitoring program implemented at Poplar Creek, including results from pressure cells and strain gauges embedded in the culvert system, as well as post-construction embankment deformation data obtained through satellite-based interferometric synthetic aperture radar (InSAR). These results offer a detailed view of culvert behavior as the embankment height increased.

We will also present the development and results of high-fidelity numerical models used to simulate soil-structure interaction and assess the correspondence between measured field data and predicted design behavior. Particular focus will be given to areas where the field data confirmed or contradicted design assumptions, and how model parameters influence predicted culvert response under extreme fill depths.

The findings offer valuable insights for practicing engineers and infrastructure stakeholders, informing the development of improved design approaches for future deep-fill applications. Ultimately, the research aims to reduce uncertainty in embankment design, refine detailing requirements, and contribute to the establishment of robust, nationally relevant design guidance for deeply buried precast structures.

Evaluation of Box Culvert Differential Settlements Subject to Highway Embankment Load

Bon Lien, P.E., Ph.D. – WSP USA
Chien-Ting Tang, P.E., Ph.D. – WSP USA
Justin Cook, P.E. – WSP USA

Box culvert buried under highway embankment fill will be subject to total and differential settlements due to factors such as non-uniform embankment slope loading, varied subsurface soil conditions, staged construction sequence, etc. Excessive settlements, particularly in cases with soft compressible foundation subgrades, may affect performance of the culvert, e.g., excessive total settlement may affect the hydraulic-required design invert elevation; differential settlement (particularly, angular distortion) may compromise structural integrity at culvert joint locations.

A case study of a buried fish passage box culvert (24 feet wide and 9 feet tall) design and construction, which is part of the ongoing WSDOT I-405 widening design-build project in Seattle, Washington, will be presented. The 335-LF cast-in-place reinforced concrete box culvert is installed using cut and cover construction method, buried approximately 17 feet below the existing ground surface (bgs) under the current I-405 roadway and up to 13 feet bgs within the proposed widening area. The proposed plan indicates up to 15 feet and 24 feet of grade raise on current I-405 and proposed widening area, respectively. The presentation will include the lessons learned and discuss the followings:

- General guidelines and measures recommended by State DOTs (such as NCDOT and FDOT) to mitigate effects of the potential culvert settlements.
- Design methodology by using Settle3D computer software for estimating total and differential settlements based on non-uniform soil profile and design soil parameters along the alignment of the culvert.
- Removal of unsuitable soils and replacement of properly selected compacted structural fill.
- Use of lightweight fill, such as Geofoam, for embankment construction to mitigate total and differential settlements.
- Interactions between geotechnical and structural engineers in finalizing culvert structural designs, under different LRFD limiting state, based on the estimated culvert settlement profile; particularly in addressing tolerable differential settlement/angular distortion and effects due to contractor’s staged construction sequence.

- Comparisons of the estimated and the observed settlement data from geotechnical instrumentation program implemented during construction.

Two Part Presentation: 1) Measurement While Drilling (MWD); 2) Can You DIGG It?

Desirae Carlton, P.E. – Alabama Department of Transportation
Stephanie Wynn, P.E. – Alabama Department of Transportation

Below is a brief synopsis of each topic presented:

Measurement While Drilling (MWD) By: Desirae Carlton P.E.-Assistant State Geotechnical Engineer

  - This presentation defines what Measuring While Drilling is while providing an overview of how the State of Alabama is implementing this new technology. The data produced by this new technology is covered while taking a look at the equipment used. We break down the schematic of a fully outfitted drill rig. The practical use behind MWD is covered along with who would be a good candidate for adding this method of drilling to their drilling fleet.

- **"Can You DIGG it" By: Stephanie Wynn, P.E.- Assistant State Geotechnical Engineer.**
  - This presentation defines DIGGS while discussing what DIGGS is and what DIGGS isn't. This presentation covers the practical use behind using a DIGGS compatible software along with a small look behind the DIGGS curtain. This presentation is appropriate for both consultant and state employees working in the Geotechnical and Geo-Environmental worlds. From borings to lab data, we have you covered. We hope to answer the questions of What and Why and at the end of the day know, DIGGS is not a database.

Slope Failure Monitoring in Central Georgia Kaolin Country

Thomas A. Tye, P.E. – CERM

Instrumentation of slope failures can provide very valuable information for analysis and design remedial measures. The nature of subsurface conditions is inherently variable and do change, especially in areas of new construction. There have been several slope failures along roadways in the central Georgia kaolin area with a variety of causes. The monitoring of the failures using manual and automated inclinometers has revealed the failure planes. However, the methods of interpreting the data were difficult, especially after a very large failure. This presentation will provide inclinometer data for three of these failures and a brief discussion of the data and analysis.

The discussion will include the value of automated instrumentation to allow for monitoring in near real time and alerted the owner and project managers of small changes before they became large and potentially damaging to the workers involved and performance of the slope(s) and project.

Supporting Rail Embankments on Soft Organic Soils with Controlled Modulus Columns (CMCs): A Jacksonville Case Study

Venkata Muppana, P.E. – Menard USA

Constructing a railroad embankment over soft organic soils requires addressing bearing capacity, stability, settlement control, and schedule constraints. At this site in Jacksonville, Florida, the rail alignment crossed wetlands, restricting the use of surcharge fills and making demucking impractical due to the thickness of the organic deposits. To meet railroad performance and schedule requirements, the embankment was supported using a T-WALL retaining system combined with ground improvement by Controlled Modulus Columns (CMCs), allowing construction to proceed without excess wetland encroachment.

The design was developed using 3D finite element analysis with PLAXIS to evaluate soil–structure interaction, load transfer between the CMCs and foundation soils, and the performance of the T-WALL under rail loading. Unlike conventional MSE walls, the T-WALL system produces stress concentrations at panel interfaces, requiring detailed analysis to confirm bearing capacity, settlement, and stability.

Field monitoring validated the numerical predictions, demonstrating that CMCs effectively controlled settlements and ensured stability. The project highlights the use of ground improvement with CMCs as a practical and environmentally compatible alternative to surcharging and demucking for rail infrastructure on organic soils in sensitive wetland environments.

Getting Started with Geotechnical Asset Management Approaches from Various State DOTs

Darren Beckstrand, C.E.G. – Landslide Technology

Collaboration & Stabilization: Achieving Stability through Effective Communication and Lime Stabilization

Phil Belcastro – Mintek Resources

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1.	1969	Atlanta, GA	Dec. 5-7	29.	1997	Chattanooga, TN	Oct. 27-31
2.	1970	Jackson, MS	Dec. 2-4	30.	1998	Louisville, KY	Oct. 13-16
3.	1971	New Orleans, LA	Dec. 7-9	31.	1999	Asheville, NC	Oct. 4-8
4.	1972	Montgomery, AL	Nov. 13-16	32.	2000	Little Rock, AR	Oct. 2-6
5.	1973	Orlando, FL	Nov. 26-30	33.	2001	Roanoke, VA	Oct. 16-19
6.	1974	Covington, KY	Sept. 16-19	34.	2002	Baton Rouge, LA	Oct. 7-11
7.	1975	Gatlinburg, TN	Sept. 22-25	35.	2003	Charleston, SC	Oct. 20-24
8.	1976	Raleigh, NC	Sept. 21-23	36.	2004	Biloxi, MS	Oct. 18-22
9.	1977	Hot Springs, AR	Oct. 25-28	37.	2005	Lake Lanier, GA	Oct. 31-Nov. 4
10.	1978	Wheeling, WV	Oct. 9-12	38.	2006	Florence, AL	Oct. 30-Nov. 3
11.	1979	Charleston, SC	Oct. 29-Nov.1	39.	2007	Bowling Green, KY	Oct. 8-12
12.	1980	Atlanta, GA	Nov. 3-6	40.	2008	Pigeon Forge, TN	Oct. 27-31
13.	1981	Virginia Beach, VA	Oct. 12-15	41.	2009	Wilmington, NC	Nov. 2-5
14.	1982	Jackson, MS	Oct. 18-21	42.	2010	Charleston, WV	Oct. 4-7
15.	1983	Montgomery, AL	Oct. 18-21	43.	2012	Richmond, VA	Oct. 22-25
16.	1984	Winter Park, FL	Oct. 2-5	44.	2013	Baton Rouge, LA	Dec. 2-5
17.	1985	Gatlinburg, TN	Sept.30-Oct.4	45.	2014	Mobile, AL	Oct. 27-30
18.	1986	Louisville, KY	Oct. 6-10	46.	2015	Greenville, SC	Oct. 19-23
19.	1987	Hot Springs, AR	Oct. 5-8	47.	2016	Biloxi, MS	Nov. 7-10
20.	1988	Raleigh, NC	Oct. 3-6	48.	2017	Savannah, GA	Dec. 11-15
21.	1989	Charleston, WV	Oct. 7-11	49.	2018	Louisville, KY	Oct. 8-11
22.	1990	New Orleans, LA	Oct.29-Nov.1	50.	2019	Chattanooga, TN	Nov. 4-7
23.	1991	Charleston, SC	Oct. 7-11		2020	Postponed (Covid)	
24.	1992	Williamsburg, VA	Nov. 9-13		2021	Postponed (Covid)	
25.	1993	Natchez, MS	Oct. 4-8	51.	2022	Daytona Beach, FL	Oct. 17-22
26.	1994	Atlanta, GA	Oct. 24-28	52.	2023	Charlotte, NC	Oct. 30-Nov. 2
27.	1995	Huntsville, AL	Oct. 23-27	53.	2024	Baton Rouge, LA	Nov. 18-21
28.	1996	Cocoa Beach, FL	Oct. 21-25	54.	2025	Williamsburg, VA	Sept. 15-18

Notes:

STGEC 2026

55th Southeastern Transportation Geotechnical Engineering Conference

Aug 31 to Sept 3, 2026

Beau Rivage, Resort & Casino Biloxi, Mississippi.