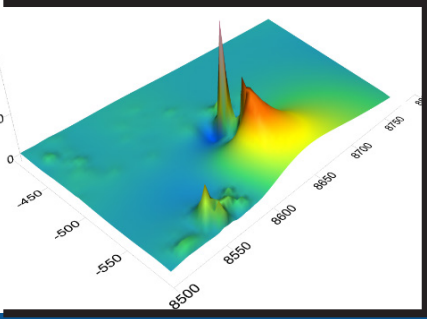
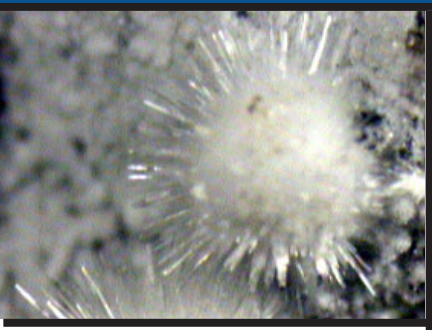


GeoVirginia 2019

Lessons Learned in Geotechnical Engineering



Smithfield Center
Smithfield, Virginia

September 23 to September 25, 2019

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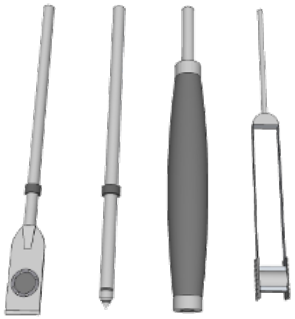

In-Situ Soil Testing, L.C.

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INNOVATIONS IN GEOTECHNICAL CONTRACTING

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GeoVirginia 2019

MONDAY / SEPTEMBER 23, 2019

TIME	GOLF OUTING Cypress Creek Golfers Club 600 Cypress Creek Parkway Smithfield, VA 23430	FREE BOAT RIDES ON PAGAN RIVER Smithfield Station Lighthouse	PLANE RIDES Starting at Smithfield Station Every 1/2 hour 2 people/ride for $75/person	FREE KAYAKING / SUP'ING Windsor Castle Park	FREE SMITHFIELD ONE-HOUR GUIDED WALKING TOUR
8:00 AM					
9:00 AM					
10:00 AM		From 10:00 AM to 2:00 PM	From 10:00 AM to 6:00 PM		10:00 AM to 11:00 AM
11:00 AM	Shotgun Starts @ 9:00 AM Lunch & Raffles @ 2:00 PM				
12:00 PM				From 12:30 PM to 3:00 PM Drop in single, tandem and stand-up kayaks and paddle boards	
1:00 PM					1:00 PM to 2:00 PM
2:00 PM					
3:00 PM					
4:00 PM					
5:00 PM					
6:00 PM					
6:00 PM to 8:00 PM	EXHIBIT HALL RECEPTION				
8:00 PM to 10:00 PM	HOSPITALITY SUITES OPEN AT SMITHFIELD STATION (Desserts and After Dinner Drinks)				

TUESDAY / SEPTEMBER 24, 2019	
7:30 AM	BREAKFAST
8:30 AM	WELCOME REMARKS Jose N. Gómez, PE, MSCE, DGE, F ASCE Conference Chair ECS Florida, LLC
8:35 AM	THANKS TO THE EXHIBITORS Swapna Danda Exhibits Manager Universal Engineering Sciences
8:40 AM	Risk Management for Geotechnical Professionals: Lessons Learned from Litigation and Case Studies J. Kent Holland Attorney at Law Construction*Risk*, Counsel PLLC
9:30 AM	Dams and Reservoirs: Lessons Learned Ray E. Martin, PhD, PE, DGE Owner REM, LLC
10:30 AM	BREAK (Sponsored by ConeTec)
10:55 AM	Academy of Geotechnical Professionals Update Ray E. Martin, PhD, PE, DGE Owner REM, LLC
11:00 AM	Keynote Speaker (Sponsored by Terracon Consultants, Inc.)
	Discovery & Investigation of Negative Aging (-a) of the Foundation Sands Under the NASA Crawlerways John H. Schmertmann, PhD, PE (KEYNOTE SPEAKER) Emeritus Professor University of Florida
12:30 PM	LUNCH
1:30 PM	The Brumadinho Tailings Dam Failure and the Future of Waste Dam Construction Scott M. Olson, PhD, PE Professor, Department of Civil and Environmental Engineering University of Illinois at Urbana-Champaign
2:20 PM	Use and Measurement of Fully Softened Shear Strength in Engineering Practice Bernardo Castellanos, PhD, PE, PMP Research Scientist and Manager of the W.C. English Geotechnical Research Laboratory Virginia Tech, Department of Civil and Environmental Engineering
3:20 PM	BREAK (Sponsored by Steele Foundation) + (Cake Sponsored by GeoTesting Express)

TUESDAY / SEPTEMBER 24, 2019	
3:45 PM	Innovation in Geotechnical Instrumentation to Realize Performance Based Design Kenichi Soga, PhD Chancellor's Professor University of California, Berkeley
4:35 PM	Geotextile Tube Design for Slurry Waste Management: Lessons Learned Shobha Bhatia, PhD Meredith Professor, Civil & Environmental Engineering; WISE Co-Director Syracuse University
5:25 PM	EXHIBIT HALL OPEN
7:00 PM	DINNER
9:00 PM	HOSPITALITY SUITES OPEN AT SMITHFIELD STATION (Desserts and After Dinner Drinks)

WEDNESDAY / SEPTEMBER 25, 2019	
7:30 AM	BREAKFAST
8:30 AM	Lessons Taught by Excess Pore Water Pressure & Pyritic Sulfur George C. Webb, PE, LEED AP, M.ASCE Senior Principal Terracon Consultants, Inc.
9:20 AM	Advances in Site Response Analysis to Improve Predictions for Design-Level Ground Motions Ellen M. Rathje, PhD, PE, F.ASCE Professor, Janet S. Cockrell Centennial Chair in Engineering University of Texas at Austin
10:10 AM	BREAK
10:35 AM	Digging Deep: History of Shoring in the DC Area - 1960 to Present Ronald W. Steele, PE Founding Managing Member Steele Foundation, LLC
11:25 AM	Geotechnical Lessons Learned from Construction of a Tire Plant in Karst Robert L. Goehring, PE, DGE, F.ASCE Executive Vice President, Chief Engineer ECS Southeast, LLP
12:15 PM	A Foundation Engineering Trip Down the Mississippi Dan Brown, PhD President Dan Brown and Associates
1:05 PM	CLOSING REMARKS Roger Failmezger, PE, DGE, F ASCE Conference Co-Chair In-Situ Soil Testing LC

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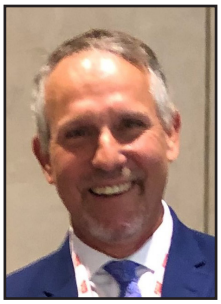

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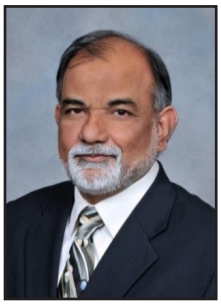

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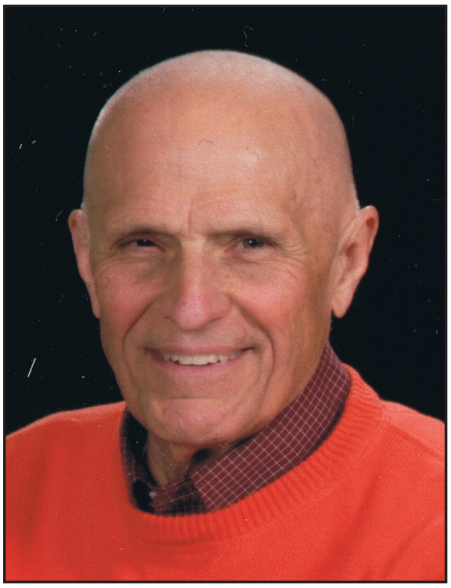
RISK MANAGEMENT FOR GEOTECHNICAL PROFESSIONALS: LESSONS LEARNED FROM LITIGATION AND CASE STUDIES

J. Kent Holland
Attorney at Law
ConstructionRisk Counsel, PLLC

This session presents a discussion of lessons learned from litigation and claims against design professionals and geotechnical professionals. The cases covered address issues concerning standard of care, warranties, indemnification, limitation of liability, ownership and copyright of documents, incorporation by reference of the prime agreement, third party beneficiaries, storm water retention and runoff claims, slope design claims, claims arising out of reliance by the Geoprofessional on manufactured products, claims based on foundation, soil compaction, and other ground condition issues.

J. Kent Holland, J.D. is a construction lawyer located in Tysons Corner, Virginia, (formerly with Wickwire Gavin, P.C.). He represents design professionals, contractors, and project owners. He is also founder and president of a risk management consulting firm, ConstructionRisk Counsel, PLLC, providing risk management consulting services to design professionals, design-builders, and insurance carriers on construction projects. This includes assistance with contract drafting, review, and negotiation; change order and claims analysis (preparation or defense); and risk management counseling. ConstructionRisk Counsel, PLLC reviews, redlines, and provides advice on well over 1,000 design professional contracts per year.

DAMS AND RESERVOIRS: LESSONS LEARNED



Ray E. Martin, PhD, PE, DGE
Owner
REM, LLC

This presentation will focus on a series of dam and reservoir projects where problems occurred because the site geology, and its impact on the geotechnical engineering design, was not carefully considered. Four problem areas are highlighted: excavations in reservoirs, differing foundation stiffness, internal erosion, and karst.

Excavations in reservoirs are usually related to the need for borrow material. But problems occurred in the projects presented when the excavated material increased seepage into the subsurface. This resulted in near failure due to piping under a dam in one case and a failure in the reservoir in another case. A third case is presented where seepage into the reservoir could lead to environmental issues in the future because the reservoir was filled with mine tailings. Concrete dams are generally designed and constructed on rock because the stiffness of the foundation is relatively uniform, and this reduces the potential for differential settlement. When a concrete dam was founded partially on rock and partially on alluvium and was subjected to earthquake shaking, differential settlement occurred. Potential erosion of a massive landslide dam downstream of this concrete dam also caused concerns about future erosion of the alluvium supporting a portion of the dam. Internal erosion is the number two cause of dam failures and a series of examples are presented that highlight this problem. Internal erosion caused failure of two dams, one small and one fairly large. In another case, a tailings reservoir in an excavated pit failed when rim seepage and piping was not considered. Finally, the issue of karst, and the many negative impacts that resulted on the performance of a small hydropower project is considered. The surprising issue is that it was not recognized as a problem during design.

Dr. Martin holds BS and MS degrees in Civil Engineering from Virginia Tech and a PhD in Civil Engineering from West Virginia University. He served as a President, CEO and Chairman of Schnabel Engineering Associates, a 300-person firm, prior to his retirement in July 2002. Since retirement, he has provided individual consulting geotechnical engineering services related to dam and levee projects throughout the US and in foreign countries. Dr. Martin was named Distinguished Alumus of the Virginia Tech College of Engineering in 2003 and was inducted into the College of Engineering Academy of Engineering Excellence. He is a former member of the Geotechnical Engineering Committee of the National Research Council and a former adjunct faculty member at the University of Virginia.

DISCOVERY & INVESTIGATION OF NEGATIVE AGING (-A) OF THE FOUNDATION SANDS UNDER THE NASA CRAWLERWAYS

John H. Schmertmann, PhD, PE (KEYNOTE SPEAKER)
Emeritus Professor
University of Florida

NASA's rocket launch facilities in Florida include a huge, crawling transporter, "CT", that carries the heaviest rockets from their assembly in the VAB to their launchpads 39A and 39B. The special roadway to support the CT+rocket, known as the crawlerway, or "CW", has two parts, CWA and CWB with a total length of about 6 miles. The USACE built the CWs from 1963 to 1966. The first attempts to transport a rocket in 1967, with a CT+rocket load of 17 Mips, almost produced a CW failure because of weak shelly sand and silt foundation conditions, as described by Dr. Ralph Peck in his 1969 Ranking Lecture. CT+rocket design loads have now increased to the 26 Mips planned for the Mars rockets. However, CPT and DMT soundings made in 2016-17 show that the CW foundation soils have decreased in strength compared to previous, similar soundings made in 2008-9. Increasing loads with decreasing strength seems ominous.

About 1/3 of the lecture describes the construction, use and modeling of the CWs, 1/3 the discovery of the "negative ageing", and 1/3 the possible causes of this unusual behavior. The lecturer believes that acid rain, reinforced by rocket exhausts, and the resulting solution of shells in the foundation sands and silts, caused most of the negative ageing. But the cause or causes remain unresolved at present

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Professor John Schmertmann is perhaps most widely known to students of geotechnical engineering around the world for his method to estimate settlements of shallow foundations. He is professor emeritus of the University of Florida. Earlier, he was a principal with Schmertmann & Crapps, Inc. and a director at LOADTEST, Inc. He has received numerous honors and awards, including: ASCE's: Collingworth Prize, the Norman Medal, State-of-the art Award, the Middlebrooks Award, and the Terzaghi Lecture. In 2008, ASCE published Special Geotechnical Publication No. 180 – From Research to Practice in Geotechnical Engineering – to honor his contributions to civil engineering. He was elected to the National Academy of Engineering in 1984. In 2012 the Norwegian Geotechnical Institute (NGI) and Dr. Schmertmann inaugurated a research addition to NGI's larger laboratory. In his honor it is named as the Schmertmann Research Laboratory (SRL).

Over his more than 60-year long and distinguished career, Professor Schmertmann has contributed immensely in furthering the theoretical and practical knowledge in geotechnical engineering in such varied areas as consolidation testing, settlement analysis methods, seepage and piping, shear strength of soils, insitu testing, and soil ageing.

Professor Schmertmann received his undergraduate degree in Civil Engineering from MIT, and MS and PhD degrees from Northwestern University.

THE BRUMADINHO TAILINGS DAM FAILURE AND THE FUTURE OF WASTE DAM CONSTRUCTION

Scott M. Olson, PhD, PE
Professor, Department of Civil and Environmental Engineering
University of Illinois at Urbana-Champaign

The January 25, 2019 failure of tailings dam B-1 at the Feijao mine near Brumadinho, Brazil was the second major tailings dam failure in Brazil since November 2015, and one of over 20 documented major tailings dam failures worldwide in the past five years. At the time of failure, Dam B-1 was 87m high but was not actively receiving tailings. The failure caused over 250 fatalities (and there are still dozens of people missing) and extensive environmental and economic damage. In this presentation, Dr. Olson will provide a brief overview of tailings and tailings storage facilities, a review of failures mechanisms for many tailings dams, comments on what may have occurred to trigger the failure of dam B-1, and will discuss how the lessons from these recent failures have already affected and will continue to impact the future of tailings dams and other waste storage facilities in the United States and worldwide.

Scott M. Olson, PhD, PE is an associate professor in the CEE Department at the University of Illinois, where he joined the faculty in 2004. Prior to joining the faculty at Illinois, Scott worked in practice for seven years for Woodward-Clyde Consultants and URS Corporation. Prof. Olson has researched static and seismic liquefaction for over 20 years, and has been involved in dozens of research and consulting projects involving geotechnical engineering, geotechnical earthquake engineering, and tailings dam engineering. His other research interests include paleoliquefaction; laboratory, centrifuge, and insitu testing; and soil-foundation-structure interaction. From these activities, Scott has published scores of journal papers, conference articles, and reports, and has received numerous awards for his research and teaching, including the ASCE Arthur Casagrande Professional Development Award and Walter L. Huber Civil Engineering Research Prize, and the Canadian Geotechnical Society's R.M. Quigley Award. Scott serves in various capacities for the Geo-Institute, United States Universities Council on Geotechnical Education and Research (USUCGER), and the Transportation Research Board (TRB), and remains active in consulting with clients in the civil infrastructure, power, transportation, and mining industries. He is a licensed professional engineer in Missouri.

USE AND MEASUREMENT OF FULLY SOFTENED SHEAR STRENGTH IN ENGINEERING PRACTICE

Bernardo A. Castellanos, PhD, PE, PMP
Research Scientist & Manager, W.C. English Geotechnical Research Laboratory
Virginia Tech, Department of Civil and Environmental Engineering

The fully softened shear strength was defined by Sir A. Skempton as the shear strength of a clay in its normally consolidated state. Although this definition is very simple, the application of this concept in engineering practice is not that simple. The fully softened shear strength idea, although has been around since the 70s, has not been completely adopted in engineering practice. Specific guidelines on the use and measurement of fully softened shear strength are not readily available to practitioners and most codes have not addressed the concept. This lack of guidance on the types of soils and structures that should be considered for fully softened shear strength, the pore pressures to be used in the analysis, the factor of safety that should be used, among other small details, are preventing this concept from being widely used in practice.

Another issue surrounding the idea of fully softened shear strength is the lack of detailed guidelines on proper way to measure it in the laboratory. In the early work done by Skempton and his colleagues at Imperial College in London, and Prof. Steve Wright and his colleagues at University of Texas at Austin, the direct shear and triaxial devices were used for this purpose. These two devices are accepted in practice and have historically been used to measure the peak shear strength of soils. In recent years, the Bromhead ring shear device has also come into play for this purpose. This device has historically been used to measure the residual shear strength of soils and does not have a proven record in industry for properly characterizing the peak shear strength of soils. Also, different sample processing techniques and test specimen preparation methods have been used in the past without knowing the effect on the shear strength measured. All this adds another layer of unknowns and complexity to properly use this concept that makes it harder to be adopted consistently in practice.

This presentation aims to provide some insights on how the fully softened shear strength should be applied to projects normally encountered in practice and details on how it should be measured in the laboratory. These insights are based on an extensive research that has been conducted at Virginia Tech in the last nine years. This research includes an exhaustive study of the previous research conducted on the subject as well as a large and detailed laboratory-testing program.

Dr. Castellanos received his undergraduate degree in Civil Engineering from the Instituto Tecnológico de Santo Domingo (INTEC); master's degree in Geotechnical Engineering from Utah State University; and PhD in Geotechnical Engineering from Virginia Tech. He has about six years of experience working on consulting projects both in the United States working for CH2M Hill, now Jacobs, and in the Dominican Republic. Currently, he has been working since 2015 as a research scientist at Virginia Tech where he is involved in research on a variety of projects, as well as performing laboratory tests for high profile projects.

INNOVATION IN GEOTECHNICAL INSTRUMENTATION TO REALIZE PERFORMANCE BASED DESIGN

Kenichi Soga, PhD
Chancellor's Professor
University of California, Berkley

Design, construction, maintenance, and upgrading of geotechnical infrastructure requires fresh thinking to minimize use of materials, energy, and labor. This can only be achieved by understanding the actual performance of the infrastructure, both during its construction and throughout its design life. Recent advances in ultra-low power-high performance microprocessors, fast speed electronics, digital signal processing, energy harvesting, and low-power wireless communication can radically change the quality and quantity of information we can get from geotechnical infrastructure. In this talk, three case studies using distributed fiber-optics sensors, computer vision, and wireless sensor networks to understand the actual performance of piles, diaphragm walls, and tunnels in London, UK are presented. The value of the dense spatial and temporal data obtained from these sensor systems will be discussed.

Kenichi Soga is the Donald H. McLaughlin Professor of Mineral Engineering and a Chancellor's Professor at the University of California, Berkeley. He obtained his BEng and MEng from Kyoto University in Japan, and PhD from the University of California at Berkeley. He was Professor of Civil Engineering at the University of Cambridge before joining UC Berkeley in 2016. He has published more than 400 journal and conference papers and is the co-author of "Fundamentals of Soil Behavior, 3rd edition" with Professor James K Mitchell. His current research activities are Infrastructure sensing, Performance based design and maintenance of underground structures, Energy geotechnics, and Geotechnics from micro to macro. He is a Fellow of the UK Royal Academy of Engineering and a Fellow of the Institution of Civil Engineers. He is the recipient of awards including George Stephenson Medal and Telford Gold Medal from the Institution of Civil Engineers and Walter L. Huber Civil Engineering Research Prize from the American Society of Civil Engineers.

GEOTEXTILE TUBE DESIGN FOR SLURRY WASTE MANAGEMENT: LESSONS LEARNED

Shobha K. Bhatia, PhD
Meredith Professor, Civil & Environmental Engineering; WISE Co-Director
Syracuse University

Geotextile tubes have been used in dewatering and containment applications over many decades for a variety of slurries, sediments, and wastes.With the increased use of geotextile tubes for dewatering in recent years, the desire to maximize both the dewatering and retention rates have led to the use of chemical coagulants and flocculants, which has become a standard practice in geotextile dewatering projects.

A variety of small-scale, medium-scale, and pilot-scale test methods and models are currently used to predict geotextile tube dewatering performance in the field. In addition, analytical models have been developed using a pilot-scale test and a Pressurized 2-Dimensional Dewatering Test (P2DT) to predict the dewatering behavior in the field and in the lab. These analytical models can be used to predict the dewatering behavior under alternative conditions, including changes in pumping rates, solids concentration of the slurry, number of dewatering cycles, dewatering duration, final solids concentration of a filter cake, and in the cumulative volume of a slurry. Analyzing the alternative dewatering scenarios using analytical models prior to full-scale implementation, without conducting too many dewatering performance tests, is a great benefit in terms of time and money.

Two geotextile dewatering projects, residential and glue industry sediment ponds will be discussed. Multiple lab and field tests were conducted for these projects and an analytical model was used to evaluate the dewatering performance of the Geotextile Demonstration Tests (GDT) in the field. The presentation will demonstrate not only the design steps undertaken for the projects, but also the lessons learned.

Shobha Bhatia is a Meredith Professor in the Department of Civil and Environmental Engineering at Syracuse University. Dr. Bhatia's research experiences include soil liquefaction, soil erosion, soil filtration, and the use of geosynthetics in these applications. More recently, Dr. Bhatia has focused her research efforts on the application of geosynthetics and natural materials to waste and sediment processing, fly ash containment, and soil erosion control. Her recent work on Geotextile Tube Dewatering: Sustainable Design has been funded by the NSF and supported by many geosynthetic manufacturers. She has published more than 90 papers in journals and conference proceedings. She is an active member of several committees of ASCE Geo Institute, ASTM, and is a former board member of NAGS. She has also served on the Committee of Geological and Geotechnical Engineering, National Academies of Sciences, Engineering, and Medicine. She received her undergraduate and MS degrees in civil engineering from Indian Institute of Technology (IIT) Roorkee, India and her PhD in civil engineering from the University of British Columbia, Canada.

LESSONS TAUGHT BY EXCESS PORE WATER PRESSURE & PYRITIC SULFUR

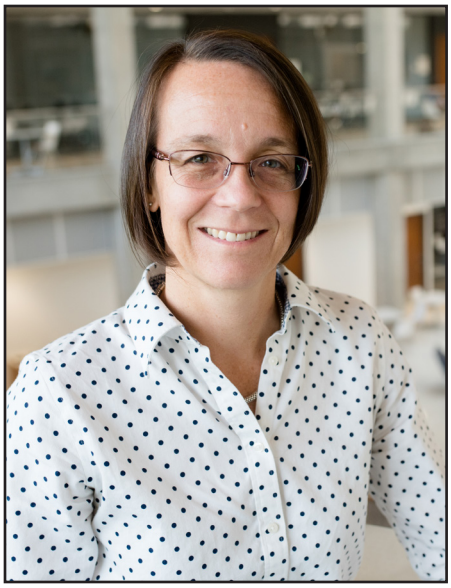
George C. Webb, PE, LEED AP, M.ASCE
Senior Principal
Terracon Consultants, Inc.

This presentation will address two issues which can cause major problems for a project, if they are not recognized prior to construction. This includes the dramatic influence excess pore water pressures can have on global slope stability and the heaving potential due to secondary mineral growth of certain slag materials.

The impact of excess pore water pressures is presented through the example of the Anderson Township Park-N-Ride earthen embankment in Cincinnati, Ohio. Slope failure occurred in this 55 ft high embankment due to the presence of high moisture cohesive soils in the lower lifts of this controlled fill. The fill embankment was constructed quickly and the excess pore water pressures could not dissipate, resulting in a massive landslide. The lesson learned is to emphasize the importance of holding firm on maintaining the specified moisture content range of the fill soil and to avoid using unconfined compression tests to determine the suitability of a controlled fill.

The second point of discussion includes a “Green” case history where granular on-site surface paving materials were unknowingly recycled by the project plumbing contractor for use as trench backfill. The granular material was a slag which contained pyritic sulfur. The paper describes conditions, the cause of heave, and presents solutions which were considered for repair. The lesson learned is to never use slag inside of a building.

George C. Webb is a Senior Geotechnical Engineer with Terracon Consultants, Inc. where he has been employed for the past 41 years. George received his MSCE from the University of Cincinnati in 1976, specializing in Geotechnical Engineering. He is a registered professional engineer in seven states and a LEED Accredited Professional. He has served as the Geotechnical Engineer of record for many projects in the Midwest, as well as providing geotechnical consultation for projects in Taiwan, China, Brazil, Australia, Africa, and the Netherlands. He has spoken on technical topics at ASCE, ORVSS, and DFI sponsored conferences, and has provided technical training for OSHA, the University of Cincinnati, and Cincinnati State. He has served as Chairman of the Cincinnati ASCE Geotechnical Group; President of the ASCE Cincinnati Section; and as Chair of the University of Cincinnati Civil Engineering Advisory Board.



ADVANCES IN SITE RESPONSE ANALYSIS TO IMPROVE PREDICTIONS FOR DESIGN-LEVEL GROUND MOTIONS

Ellen M. Rathje, PhD, PE, F.ASCE
Professor, Janet S. Cockrell Centennial Chair in Engineering
University of Texas at Austin

One dimensional (1D) site response analysis is one of the most commonly performed types of analysis in geotechnical earthquake engineering, yet some recent studies have suggested that surprisingly few sites are modeled well by 1D analysis. This presentation will describe recent research that utilizes ground motions from a large number of downhole arrays to evaluate the accuracy of 1D site response analysis over a wide range of ground motion levels. First, low intensity motions will be utilized to assess the accuracy of 1D analysis at small-strains, and an approach will be outlined that incorporates the horizontal to vertical spectral ratio (HVSR) to identify, apriori, sites that can be modeled well by 1D analysis. Next, moderate to large intensity motions will be used to assess 1D site response analysis at the larger strain levels that are often associated with design ground motions. The potential for overdamping of high frequencies in these cases will be demonstrated, and solutions that can correct for this effect will be outlined. Finally, the unique capabilities of the Strata site response program will be introduced, with particular emphasis on the functionalities that improve site response predictions at large strains.

Dr. Ellen M. Rathje is the Janet S. Cockrell Centennial Chair in Engineering in the Department of Civil, Architectural, and Environmental Engineering at the University of Texas at Austin (UT), and Senior Research Scientist at the UT Bureau of Economic Geology. She has expertise in the areas of geotechnical earthquake engineering, engineering seismology, induced seismicity, field reconnaissance after earthquakes, and remote sensing. Dr. Rathje is the Principal Investigator for the DesignSafe-ci.org cyberinfrastructure for the NSF-funded Natural Hazards Engineering Research Infrastructure (NHERI) and co-PI for the Center for Integrated Seismicity Research (CISR) at the Bureau of Economic Geology. She is a founding member and current Steering Committee member of the Geotechnical Extreme Events Reconnaissance (GEER) Association. She has been honored with various research awards, including the 2018 William B. Joyner Lecture Award from the Seismological Society of America and the 2010 Huber Research Prize from the American Society of Civil Engineers. She was elected Fellow of the American Society of Civil Engineers in 2016.

DIGGING DEEP: HISTORY OF SHORING IN THE DC AREA - 1960 TO PRESENT

Ronald W. Steele, PE
Founding Managing Member
Steele Foundation, LLC

Foundation engineering has always relied on empiricism and judgment to provide reliable predictions about foundation performance. Is the Art of Foundation Engineering lost? Over the past 60 years, the art of foundation engineering is being lost due to multiple reasons.

On the other hand, the practice of shoring has advanced over the past half-century due to advances in geotechnical engineering, equipment evolution, developments in design, industry changes in management and labor, and requirements in contracts and insurance.

Lessons learned from many notable projects (and failures) in the D.C. Area will be shared during the presentation.

For nearly 70 years, similar techniques are still being used, but it is still the same steel, concrete, and wood – just the work management has changed. Failures do occur but are typically related to construction issues and not design. Sheeting, shoring, and underpinning is a risky business and requires detail oriented, dedicated engineers and craftsmen to remain successful.

Ronald W. Steele has directed field operations for Steele Foundation since 1968, as well as assuming responsibility for all firm operations after the retirement of his partner in 1993. He has more than 50 years in the design and construction of excavation support systems, facade preservation, and structural modification shoring systems.

After learning the foundation business working for a concrete contractor and Schnabel Foundation (he was their first engineer), Mr. Steele partnered with Ned Moroney of Spencer, White & Prentis and in 1968 they started their own firm. Steele and Moroney, Inc., quickly became known as experts in shoring systems and excavation and had the distinction of being one of the first construction contractors hired by the Washington Metropolitan Area Transit Authority (WMATA).

In the ensuing years, Mr. Steele has become one of the nation's leading authorities on the economical and efficient design-construct approach to engineered foundation construction. A registered Professional Engineer in the District of Columbia, Maryland, and Virginia, he has served the industry as a committee member of the Post-Tensioning Institute's Prestressed Rock and Soil Anchor Committee. In addition, he was a member of ASCE's Earth Retention Committee.

Mr. Steele graduated with a Bachelor of Science degree in Civil Engineering from Purdue University in 1960.

GEOTECHNICAL LESSONS LEARNED FROM CONSTRUCTION OF A TIRE PLANT IN KARST

Robert L. Goehring, PE, DGE, F.ASCE
Executive Vice President, Chief Engineer
ECS Southeast, LLP

This is a case history for three major additions to a tire manufacturing plant in north Georgia. The presentation covers extensive geotechnical study undertaken and discusses the impact of highly variable Karst (sinkhole) geology on both foundation design and construction.

For Phases 1 and 2, after unsuccessfully trying to install drilled shafts under a critical mixing tower with 2,000 kip loads, foundations were switched mid-construction to micro-piles drilled into rock at depths of 150 to 200+ feet. This change caused significant delays and cost overruns.

For Phase 3, various foundation alternatives were considered to support another heavily loaded mixing tower. Ultimately, a non-traditional approach of using auger cast-in-place (ACIP) piles was adopted. To satisfy a risk-adverse Japanese owner, a robust pile load testing program including strain gauges was conducted. Piles 12 to 98 feet long were drilled to end bearing in highly variable pinnacled limestone known to contain voids. One test pile was cored full depth to demonstrate that pile tips could effectively bear on steeply inclined rock.

For Phase 4, similar methodology was used at the critical mixing tower structure. However, lightly loaded equipment pits were designed on shallow foundations. During construction at the pits, heavy rainfall triggered ground relaxations which ultimately required grouting to stabilize Karst conditions. The exploratory grouting program and ER testing will be discussed.

In Phase 5 construction, both the mixing tower and equipment pits were supported on auger cast piles. After successful pile installation a sinkhole opened up between two equipment pits. Remedial grouting was performed. Development on a tight site also required construction of a R&D building over a 96-inch diameter reinforced concrete storm sewer installed in an earlier phase.

Bob Goehring has a BSCE and a Master's Degree in Structural/Geotechnical Engineering from Iowa State University. Bob is a certified expert witness in Local, State, and Federal court in geotechnical and construction engineering. He has served on numerous cases involving sinkholes, foundation settlement, retaining walls/steep soil slopes, lake liners, pavement design and construction, differing soil conditions, and other construction related damages.

Bob's projects have received numerous awards including: Engineering Excellence Grand Award from FICE/ACEC for "Roadway Ramp Across Lake Bonnet"; Engineering Excellence Honor Award from FICE/ACEC for the "Raleigh Street Embankment"; 2002 Georgia Civil Engineer of the Year by ASCE; and 2003 Engineer of the Year by the Georgia Engineering Alliance. He was made a Fellow in ASCE in 2005 and was awarded Diplomate of Geotechnical Engineering recognition in 2015.

A FOUNDATION ENGINEERING TRIP DOWN THE MISSISSIPPI

Dan Brown, PhD
President
Dan Brown and Associates

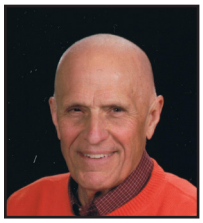
Like the engineering version of the legendary Huckleberry Finn adventure, this presentation provides a virtual journey down the Mississippi River to explore the foundation engineering solutions for the many bridge crossings of America's water highway. From the earliest major crossing built by James Eads in 1874 to the new Stan Musial Veterans Memorial Bridge nearby, foundation engineers have struggled for 150 years with the challenges of constructing stable supports for long span bridges in this challenging environment. The presentation will describe case histories from Minnesota to Louisiana where engineers and constructors have overcome fast moving water with fluctuating depth, deep scour, artesian groundwater, and demands from high loading including vessel collision and seismic force effects. These foundations support some of our nations iconic bridge structures and the case histories provide lessons for engineers faced with constructability challenges.

Dr. Dan Brown is recognized as one of America's leading authorities on the construction and design of deep foundations. After completing his education and his early engineering career in Louisiana, he spent 22 years on the faculty at Auburn University, where he taught and conducted research on deep foundations. Dr. Brown remains active in deep foundation practice through his consulting firm, Dan Brown and Associates. His consulting work includes the foundation design of numerous large bridge projects as well as commercial structures. He remains active in teaching through short courses, including the National Highway Institute course on Drilled Shafts, and in organizing the ADSC Professor Training Workshops in Chattanooga, TN.

Dr. Brown has authored numerous technical papers and was lead author of the just released 2018 FHWA manual on design and construction of drilled shafts. He has been recognized with the Golden Beaver Award from the Beavers; the ASCE Huber Prize for research; the ASCE Martin Kapp Foundation Engineering Award; the Deep Foundations Institute Distinguished Service Award; and the ADSC Outstanding Service Award. He is current Past-President of the Deep Foundations Institute; a member of the Moles; honorary member of the Beavers; past chair of the Geo-Institute Deep Foundations Committee; and an honorary technical affiliate of both the ADSC: The International Association of Foundation Drilling and the Pile Driving Contractors Association.

Dan and his wife Barbara entertain their grandchildren and occasional wayward motorcyclists at their home in the Tennessee Mountains near Chattanooga.

J. Kent Holland
Attorney at Law
ConstructionRisk Counsel, PLLC



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Dan Brown, PhD
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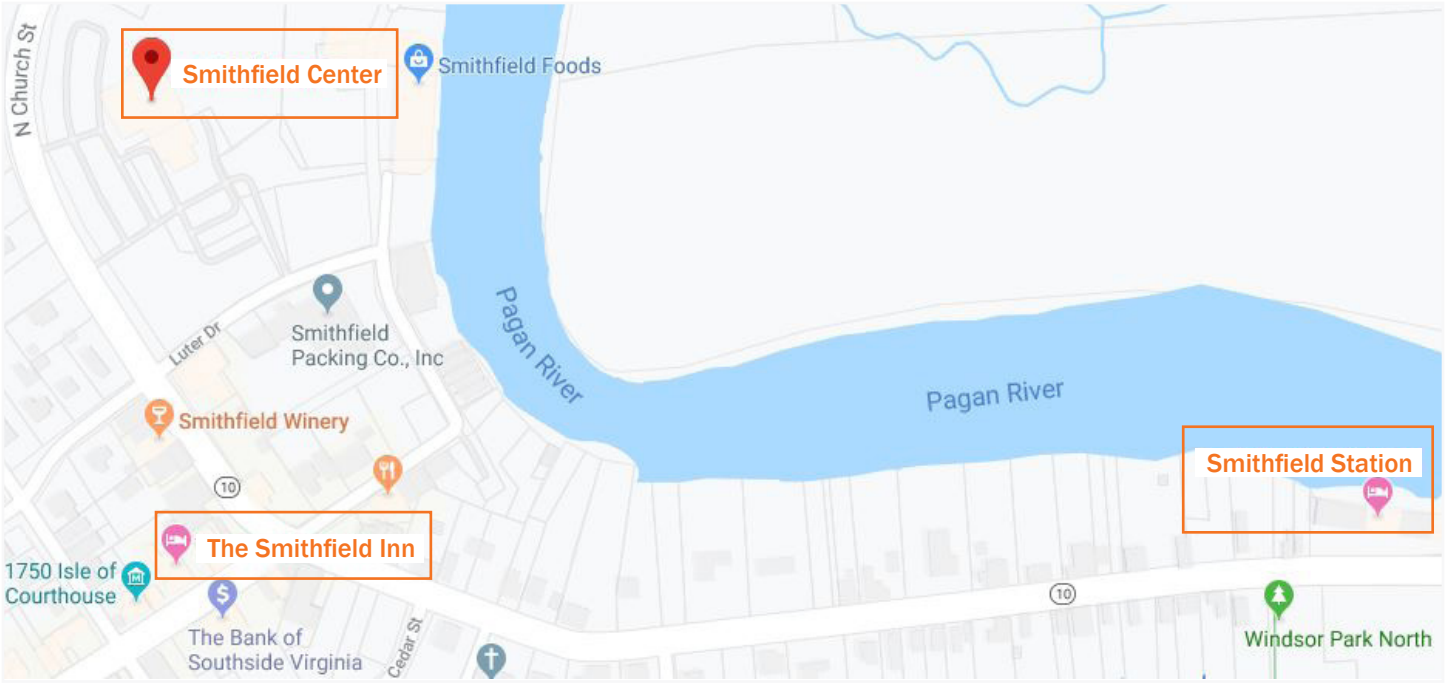
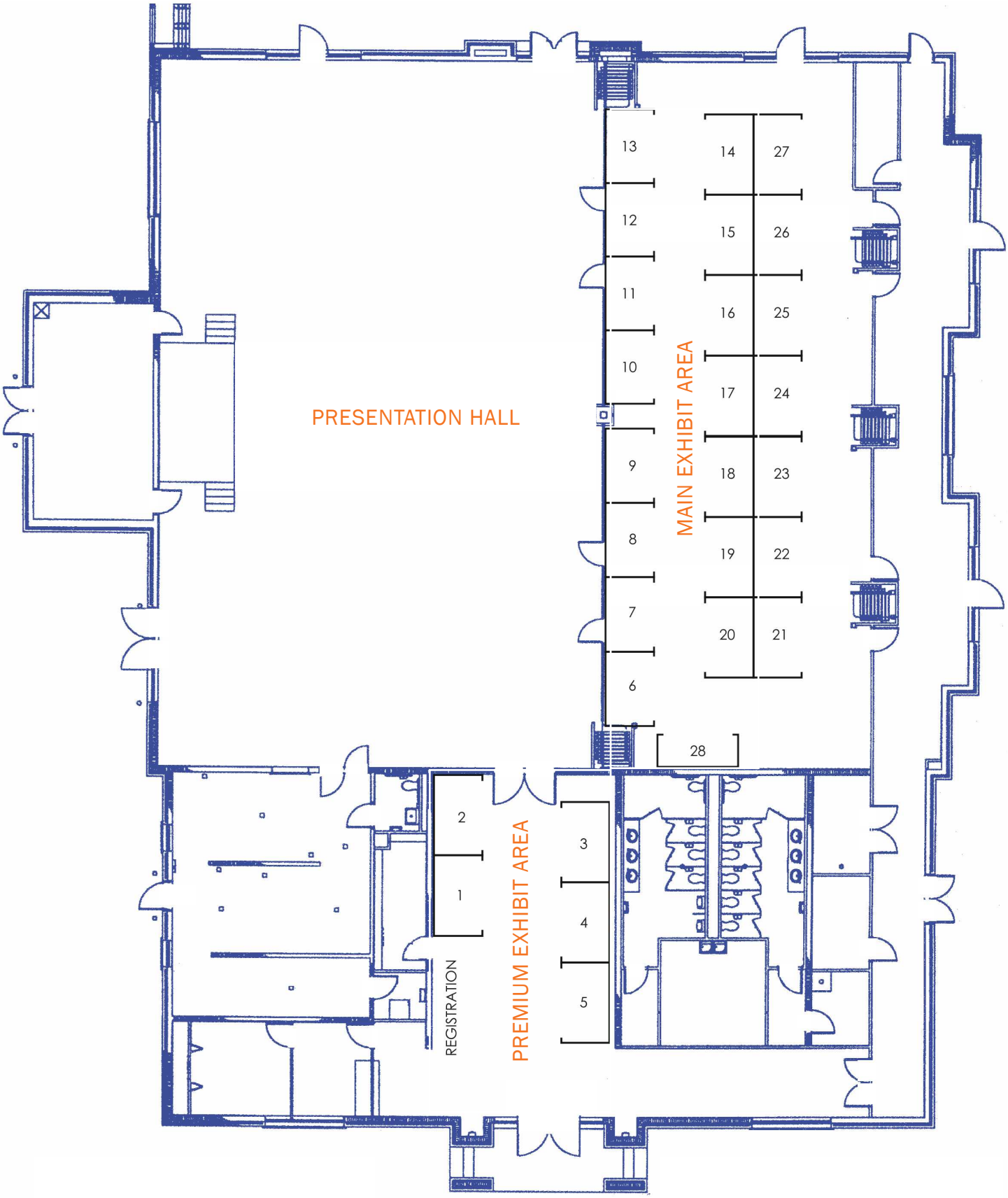
SMITHFIELD AREA MAP



SMITHFIELD CENTER EXHIBITOR LAYOUT



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6	GEO-Instruments	20	Schnabel Foundations
7	ASCE GeoInstitute	21	F & R
8	Subsurface Construction	22	Universal Engineering Sciences, Inc.
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