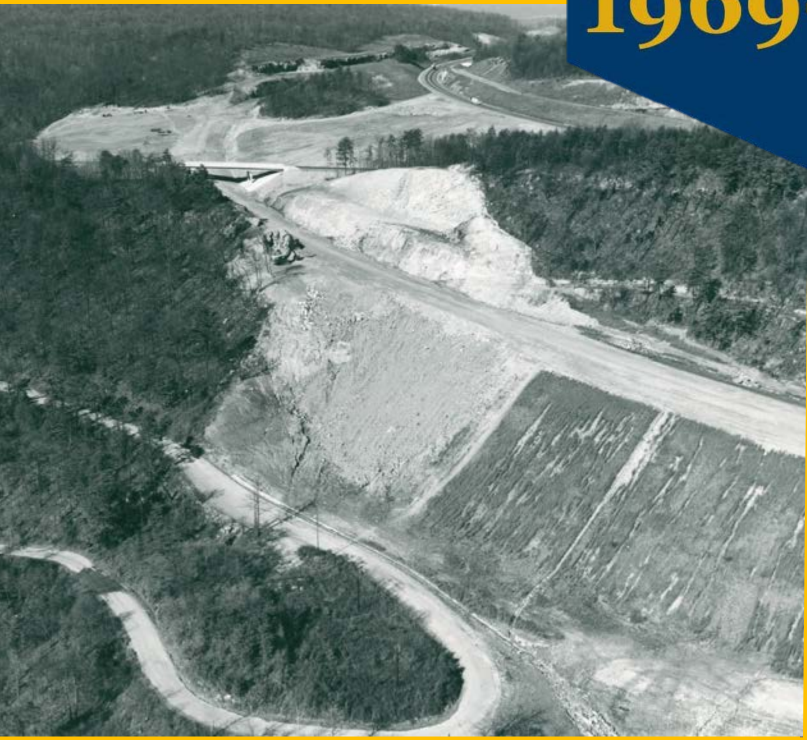
50th

STGEC

1969-2019



Hosted by

TN TDOT Department of Transportation

November 4 through November 7, 2019

Chattanooga Marriot Convention Center

Monday, November 4, 2019

10:00 - 10:00	**Registration - Outside Exhibitor's Area**
12:00 - 5:00	**Exhibitor Setup**
5:00 - 10:00	**Opening Reception in Exhibitor's Area**

Tuesday, November 5, 2019

Time:	Presenter(s)	Topic
8:00 - 8:35	Robert Jowers, PE / TDOT	TDOT Counters Landslides Triggered by February, 2019 Floods
8:35 - 9:10	Derek Hodnet, PE, PG / KSWA Brett Watkins / HDR Engineering	TDOT Rockfall Management Program Update
9:10 - 9:45	Mathew Morris, PG / Gannet Fleming Joseph Krupansky, PG / Gannet Fleming	Best Practices in Planning and Developing Rock Slope Stabilization Mitigation Projects

9:45-10:00 Morning Break - Exhibitor's Area

10:00 - 10:35	John D. Godfrey, Jr., PE / ECS Southeast	Comparisons of Rock Slope Catchment Area Design by State
10:35 - 11:10	Gary Brill, PE / Schnabel Engineering Johanna Simon, PE / Schnabel Engineering	Yeager Airport Safety Area Rebuilt with Unique Retaining Wall Construction
11:10 - 11:45	Clinton M. Wood, PhD, PE	Subsurface Mapping for a Slope Stability Slide along I40 near Ozark, Arkansas using Noninvasive Geophysical Techniques

11:45 - 12:45 Lunch Break - Exhibitor's Area

12:45 - 1:20	Ginger Bennett, MS, EI / TDOT Sam Sternberg III, PE, D.GE / Dan Brown and Associates	Challenge Accepted: A Project Review of I-24 Interchange at Broad and Market St.
1:20 - 1:55	Lila Leon, PE, PhD / HDR Engineering	The Importance of Site Class Determination in Seismic Design
1:55 - 2:30	Robert C. Bachus, PhD, PE, D.GE / Geosyntec Consultants Glenn J. Rix, PhD, PE / Geosyntec Consultants	Manual on Subsurface Investigations AASHTO Update

2:30 - 2:45 Afternoon Break - Exhibitor's Area

2:45 - 3:20	FHWA	A-GaMe with Panel Discussion
3:20 - 3:55		
3:55 - 4:30		

Wednesday, November 6, 2019

Time:	Presenter(s)	Topic
8:00 - 8:35	Andy Derenski, PE / URETEK USA	Polyurethane Grout Techniques for Ground Improvement in Transportation Applications
8:35 - 9:10	David Graham, PE / Dan Brown and Associates	Case History: Comparison of CSL Results to Physical Observations
9:10 - 9:45	Thomas Hyatt, PE / GRL Engineers	Deep Foundations and Quality Assurance

9:45-10:00 Morning Break - Exhibitor's Area

10:00 - 10:35	David Arellano, PhD, PE / The University of Memphis	Lightweight Fill Applications & Considerations
10:35 - 11:10	Ashraf Elsayed, Ph.D, PE, D.GE / Geotechnology	Memfix 4: I-240 Bridge Replacement (A CM/GC Project)
11:10 - 11:45	Lance Kitchens, PE / Russo Corporation	Innovative Use of Micropiles at the CBD in Birmingham

11:45 - 12:45 Lunch Break - Exhibitor's Area

12:45 - 1:20	Jessie Anne Boone	Full Depth Reclamation
1:20 - 1:55	Lake Carter, PE, M. ASCE - Ingios Geotechnics David J. White, PhD, PE, M. ASCE - Ingios Geotechnics Pavana Vennapusa, PhD, PE, M. ASCE - Ingios Geotechnics	Implementation of Validated Intelligent Compaction for Real-Time Mapping of Pavement Foundation Modulus
1:55 - 2:30	Mike Batten, PE / HDR Engineering	Evaluation and Acceptance of Non-Conforming Piles on Major Bridge Projects

2:30 - 2:45 Afternoon Break - Exhibitor's Area

2:45 - 3:20	Kyle Peters, PE / ECS Southeast Mark Luskin, PE, PG / ECS Southeast	Alternative Geotechnical Exploration Procedures Within 3P Projects
3:20 - 3:55	Roger A. Failmezger, PE, F.ASCE, D.GE / In-Situ Soil Testing	Financial Failure—The High Cost of Not Knowing
3:55 - 4:30	Bon Lien, PE, Ph.D / Wood Environment & Infrastructure Solutions	Modeling Traffic and Construction Equipment Surcharges for Geotechnical Global Stability Analysis
5:00 - 6:00	**Steering Committee Meeting**	
6:00 - 9:00	**Banquet - Exhibitor's Area**	

Thursday, November 7, 2019

Time:	Presenter(s)	Topic
8:00 - 8:35	Eric Cross, PG /Pyramid Geophysics	The Use of Seismic Shear Wave Testing to Supplement Geotechnical Drilling – Analysis of Rock Depth and Integrity Along the Proposed Durham Orange Light Ra
8:35 - 9:10	Johanna Vaughan, PG / Draper Aden Associates	Integration of Non-invasive Geophysical Methods with Invasive Geotechnical Sampling for Optimized Karst Characterization
9:10 - 9:45	Kevin D. Hon, PG / S&ME Inc.	Our Aging Infrastructure - Case Study Examples in Tennessee for Using Geophysics to Complement Traditional Exploration
9:45 - 10:15	**Break**	
10:15 - 10:30	**Field Trip Details**	
10:30 - 11:30	**Load Buses Leave for Field Trip**	

WELCOME LETTER

Dear 2019 STGEC Attendees,

The Tennessee Department of Transportation, Geotechnical Engineering Section. is pleased to host the 50th Annual Southeastern Transportation Geotechnical Engineering Conference (STGEC) in Chattanooga, TN. We hope this experience will be both enjoyable and beneficial to each of you. We encourage you to take advantage of this opportunity and spend time with each other to discover different perspectives on our profession.

This year's conference will offer approximately thirty presentations on topics ranging from subsurface explorations to deep foundations. In addition to our presentations, we hope that you will attend our conference events. These include: Monday's Ice Breaker, Wednesday's Banquet and Thursday's field trip to Chickamauga Navigation Lock.

We would also like to express gratitude to the Kentucky Transportation Cabinet, Geotechnical Branch for providing a wonderful example of a conference last year.

I would like to personally thank the staff of our Geotechnical Engineering Section for working so hard in support of this effort.

Finally, we thank all of you for attending our conference. We hope your experience is both enjoyable and informative.

Sincerely,

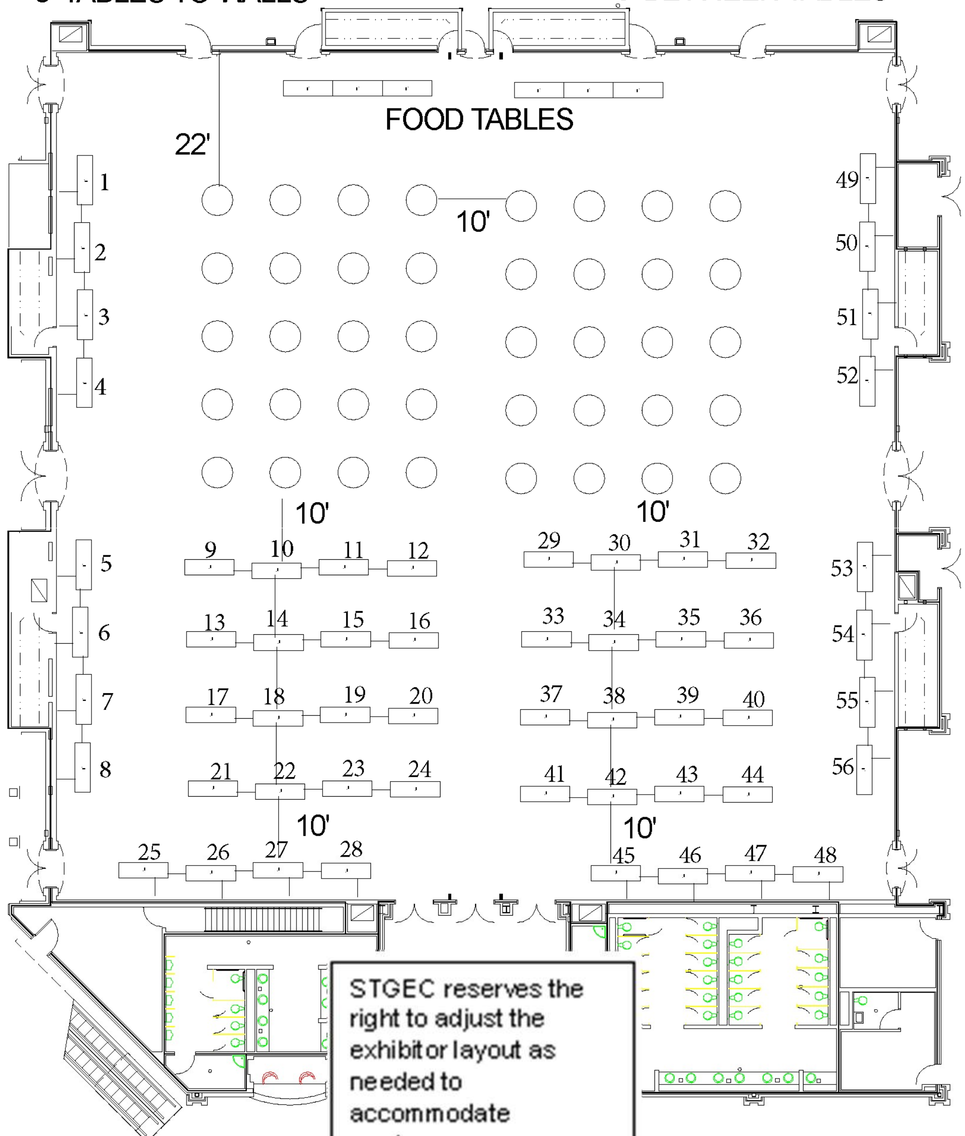
Travis W. Smith, PE
Materials & Tests Division
Geotechnical Engineering Section

EFGHIJ

56 - 8' TABLE TOPS
3' BETWEEN TABLES
3' TABLES TO WALLS

ROUNDS OF 8
TO MATCH GTD
6' BETWEEN TABLES

1 Atlas Tube
2 Ameritech Slope Constructors, Inc.
3 A H Beck Foundation Company, Inc.
4 Rocscience Inc.
5 Applied Foundation Testing
6 Richard Goettle, Inc.
7 Huesker Inc.
8 PFB Manufacturing LLC
9 Acker Drill Company
10 Gannett Fleming
11 Pile Dynamics, Inc
12 Mintek Resources
13 Southeast Cement Promotion Association
14 Geosyntec Consultants
15 Thompson Engineering, Inc.
16 Controls Group USA Inc
17 AERO AGGREGATES, LLC
18 Geotechnology, Inc.
19 Uretek usa
20 Cal-Cert Company
21 Mobile Drill Int.
22 Arcosa Lightweight
23 Infrastructure Consulting & Engineering
24 Reinforced Earth Company/Menard
25 Elastizell Corp. of America
26 KSWA
27 Golder Associates Inc.
28 Central Mine Equipment Company



STGEC reserves the right to adjust the exhibitor layout as needed to accommodate conference requirements.

29 Foundation Technologies, Inc.
30 Furgo Load Test
31 Williams Form Engineering
32 Geopier Foundation Company
33 CMEC
34 ECS Southeast, LLP
35 Durham Geo Slope Indicator
36 HDR Inc.
37 Pyramid Geophysical Services
38 Bacon Farmer Workman
39 Geobrugg North America
40 GeoStabilization International
41 Aerix Industries
42 SiteMix Pressure Grouting LLC
43 Diedrich Drill
44 Redi-Rock International
45 CJ Geo
46 Simco Drilling Equipment, Inc.
47 GEOSERVICES, LLC
48 DYWIDAG Systems International, USA, Inc
49 Hayward Baker & Case Foundation Company
50 Humboldt MFG. Co.
51 Russo Corporation
52 ESP Associates, Inc.
53 Access Limited Construction
54 Carolina Stalite Co.
55 American Engineers
56 Wurster Engineering & Construction, Inc.

Exhibitors

A.H. Beck Foundation Company, INC
Scott Carroll, VP
9014 Green Rd
Converse, TX 78109
(210) 342-5261
Scott.carroll@ahbeck.com

Archie Filshill
AeroAggregates, LLC
1500 Chester Pike
Eddystone, PA 19022
(833) 261-8499
https://aeroaggregates.com/

Simon Boone, PG
1102 Pike Lane
Oceano, California 93445
Office: 805-592-2230
Cell: 540-420-2678
www.accesslimitedconstruction.com

American Engineers, INC
Dusty Barrett, PE, PMP
65 Aberdeen Dr.
Glasgow, KY 42141
Phone: 270-651-7220
Cell 270-834-0203

Acker Drill Company
Michael DiCindio
P.O. Box 830
Scranton, PA 18501
(800) 752-2537

Ameritech Slope Constructors, Inc.
Roger Moore
PO Box 2702
Asheville, NC 28802
828-633-6352
http://www.ameritech.pro/

Aerix Industries
Nico Sutmoller
7020 Snowdrift Rd
Allentown, PA 18106
484-223-0279
nusttmoller@aerixindustries.com

Applied Foundation Testing
Don Robertson
4035 J. Louis Street
Green Cove Springs, Fl 32043
(904) 284-1337
https://www.testpile.com/

Exhibitors

Arcosa Lightweight
Jeffrey Speck
14885 South Interstate 45
Streetman, Texas 75859
(800) 870-3397
arcosalightweight.com

Carolina Stalite Company
Jody Wall, PE General Mgr
Chuck Friedrich, RLA, Div. Mgr.
PO Box 1037
Salisbury, NC 28145

Camille Grayson
Marketing Manager
Zekelman Industries
227 West Monroe, Suite 2600
Chicago, IL 60606
(312) 275-1648
camille.grayson@zekelman.com

Central Mine Equipment Company Senior
Rick Spillers, Sales Manager
4215 Rider Trail North
Earth City, MO 63045-1106
800-325-8827; 314-291-7700
www.cmeco.com
info@cmeco.com

Bacon Farmer Workman
Chris Farmer, P.E.
500 South 17th Street
Paducah, KY 42003
270.443.1995
https://www.bfwengineers.com/

Nathan Hackney
CJGeo
3402 Acorn Street #202
Williamsburg, VA 23188
800-428-5690
http://cjgeo.com/

Cal-Cert Company
Brian Lins
6709 SE Lake Road
Milwaukie, OR 97222
470-253-9668 office
www.cal-cert.com

CMEC
Dave Savage
Director of Accreditation
2779 Apopka Blvd.
Apopka, FL 32703
davesavage@cmec.org
www.cmec.org

Exhibitors

Steve White
Southeastern Technical Sales Engineer
218 Eastwood Dr.
Montgomery, AL 36109
stephen.white@controls-group.com

3050 Barry Dr.
Portland, TN 37148
(800)643-1206

Mac McKinney
Regional Sales Representative- Southern US
Diedrich Drill
5 Fisher Street
La Porte, IN 46350
Office: 219.326.7788 Mobile: 219-344-3005
Mac.mckinney@diedrichdrill.com

ECS Southeast, LLP
Mark Luskin, PE, PG
Vice President / Branch Manager
318 Seaboard Lane, Suite 208
Franklin, Tennessee 37067
615-885-4983
mluskin@ecslimited.com

Durham Geo Slope Indicator
David L. Richardson, PE
Southeast Sales Manager
Product and Technical Services Manager
2175 West Park Court
Stone Mountain, GA 30087
(770) 465-7557
drichardson@dgeslope.com

Elastizell Corporation of America
Trevor Towery
P.O. Box 1462
Ann Arbor, MI 48106
(734) 761-6900
http://elastizell.com/

DYWIDAG-Systems International
Lucian Bogdan, P.E.
Chief Engineer | Geotechnical Global Business Unit
2154 E South Street, Long Beach, CA 90805
562.295.3907
562.577.0311
lucian.bogdan@dsiamerica.com
www.dsiamerica.com

ESP Associates, Inc.
Edward Billington
3475 Lakemont Blvd
Fort Mill, SC 29708
(803) 802-2440
https://www.espassociates.com/

Exhibitors

Foundation Technologies, Inc.
ShaftSpacer Systems
1400 Progress Industrial Blvd.
Lawrenceville, GA 30043
678.407.4640
800.733.2368
Nick Milligan, Division Vice President
nick@foundationtechnologies.com

Matthew Dorsey, P.E.
Regional Engineer
612 River Oaks
Marion, AR 72364
(870) 394-1041
mdorsey@geopier.com

Brian Haney, P.E.
Project Manager
2631- D NW 41st
Gainesville, FL 32606
(352)-339-7700
b.haney@loadtest.com

GEOServices, LLC.
2561 Willow Point Way
Knoxville, Tennessee 37931
(865) 539-8242
info@geoservicesllc.com

Paul Lewis, PE, ENV SP
Gannett Fleming, Inc.
P.O. Box 67100
Harrisburg, PA 17106

Jamey Dotson, PE
Geosyntec Consultants
835 Georgia Ave, Suite 500
Chattanooga, TN 37402

Geobrugg North America
Bob Lyne
8004 Windspray Drive
Summerfield NC 27358
336 337 0945
https://www.geobrugg.com/

Reid Bailey, PE
GeoStabilization International
602 Tucker Street
Chattanooga, TN 37405
423-619-8576
reid@gsi.us

Exhibitors

GEOTECHNOLOGY INC
FROM THE GROUND UP

Ashraf Elsayed, Ph.D., P.E., D.GE, M.ASCE
Chief Engineer
3312 Winbrook Road
Memphis, Tennessee 38116
Ph: 901-353-1981
Fax: 901-353-2248

HAYWARD BAKER
A KELLER COMPANY
CASE FOUNDATION
A KELLER COMPANY

Simonne Hall
Marketing Coordinator
Keller Foundations, LLC
7550 Teague Rd, Suite 300
Hanover, MD 21076
410-551-1938

GOLDER

Randy Sullivan, PE
5170 Peachtree Road, Building 100
Suite 300
Atlanta, Georgia, USA 30341
770.496.1893

HUESKER
Ideas. Engineers. Innovations.

Huesker Inc.
Mike Clements
3701 Arco Corporate Drive
Suite 525
Charlotte NC 28273
(800) 942-9418
https://www.huesker.com/

HDR

HDR, Inc.
Devin Chittenden
Geotechnical Section Manager
4645 Village Square Drive, Suite F
Paducah, KY 42001
Phone: (270) 444-9691
audrey.stoerger@hdrinc.com

Testing Equipment For Construction Materials
HUMBOLDT

Humboldt Mfg. Co.
875 Tollgate Road
Elgin, IL 60123
1.800.544.7220
hmc@humboldtmfg.com
www.humboldtmfg.com

Exhibitors

Infrastructure Consulting & Engineering
Susanne Bender
1021 Briargate Circle
Columbia, SC 29210
803.822.0333
https://ice-eng.com/

PFB Manufacturing LLC
Robert Conrad
2725 Henkle Drive
Lebanon Ohio 45036
(888) 446-5377
www.plastifab.com

Julie Oliphant, PE
Managing Principal
52 Lindsley Ave., Ste. 101
Nashville 37210
P: 615.255.9702
C: 615.775.4423
joliphant@kswarellc.com
www.kswarellc.com

Pile Dynamics, Inc.
Tom Tutolo
30725 Aurora Rd
Cleveland, OH 44139 USA
(216) 831-6131
https://www.pile.com/

Lauren Allen
Marketing Manager
3725 Pentagon Blvd, STE 100
Beavercreek, OH 45431
937-431-0218

Pyramid Geophysical Services
Eric Cross
503 Industrial Avenue
Greensboro, NC 27406
(336) 335-3174
https://pyramidgeophysics.com/

John Walker
Mobile Drill Int.
3807 Madison Ave
Indianapolis, IN 46227
(800) 766-3745
https://mobiledrill.net/

Jason Hewatt
SE Regional Business Consultant
Redi-Rock International
2940 Parkview Dr
Petoskey, MI 49770
423-364-7008

Exhibitors

REINFORCED EARTH
23 Technology Parkway South
Suite 100
Norcross, GA 30092

Simco Drillling Equipment, Inc.
Brandee Tully
641-342-2166
tully@simcodrill.com

Richard Goettle, Inc.
Mike Abruzzo
12071 Hamilton Ave
Cincinnati, OH 45231
(513) 825-8100
https://www.goettle.com/

SiteMix Pressure Grouting, LLC
John Knieper
2310 Perimeter Park Drive
Atlanta, GA 30341
770-452-0390
john@sitemixgrouting.com

Jeff Lam
Rocscience Inc.
54 Saint Patrick St.
Toronto, ON M5T 1V1
416-698-8217
https://www.rocscience.com/

SOUTHEAST CEMENT PROMOTION ASSOCIATION
3235 Satellite Boulevard, Suite 103
Duluth, GA 30096
Jessie Boone
Pavement Applications Director- TN
615-427-3213
jboone@secement.org
Dwane Lewis
Soil Cement Specialist
229-567-0027
dlewis@secement.org

Mary Carolyn Martin
Russo Corporation
1421 Mims Ave SW
Birmingham, AL 35216
(205)-923-4434
https://russocorporation.wpcomstaging.com/

Saieb Haddad
Thompson Engineering, Inc.
510 Union Avenue
Knoxville, TN 37902
(251) 666-2443
http://thompsonengineering.com/

Exhibitors

Andy Derenski, PE
13900 Humble Rd.
Tomball, TX 77375
(800)240-7868
https://uretekusa.com/

William Form Engineering Corp.
8165 Graphic Dr.
Belmont, MI 49306
Phone: (616) 866-0815
Fax: (616) 866-1890
williams@williamsform.com
www.williamsform.com

Doug Chappell
Wurster Engineering & Construction, Inc.
34 Carrie Dr
Greenville, SC 29615
(864) 627-7751
http://www.wursterinc.com/

DR. JERRY PUNCH- ABSTRACT

Physician - Broadcaster - Hero and Father. These are just some of the many words one can use to describe Dr. Jerry Punch. Whether he is saving lives, commentating on races and college football, or enjoying time with his family, Dr. Jerry Punch gives it his all. As evidenced by his impressive resume, he is someone who takes pride in his actions-and it shows.

Dr. Jerry Punch began his career in 1971 at North Carolina State University where he majored in pre-med and graduated Magna Cum Laude. Not limited to academic success, Dr. Jerry Punch also was a walk-on quarterback for Coach Lou Holtz.

Following his graduation from North Carolina, Dr. Jerry Punch attended medical school at Wake Forest from 1975 until 1979. He then went on to become an emergency room doctor from 1982 until 1986, before taking on even greater responsibility by forming LL. Punch & Associates. From 1986 until 1992, Dr. Jerry Punch and his staff of 14 ER physicians worked to treat the patients of Central Florida.

Dr. Jerry PunchDr. Jerry Punch is a man of many talents. While working as a skilled emergency physician, Dr. Jerry Punch found time to become a well-known face in auto racing as an accomplished broadcaster. After eight years of national radio broadcasts, Dr. Jerry Punch began working selected motorsports events on "ABC's Wide World of Sports" in 1987. He has served as both pit commentator and expert booth analyst alongside veteran host Keith Jackson. In 1989, Dr. Jerry Punch became a regular member of the Emmy Award winning ABC Sports team providing coverage for the Indianapolis "500." As a physician/pit commentator, he has provided valuable insight into both mechanical and medical strategies as they unfold relative to the driver and crew members during the telecast.

As a television commentator, Dr. Jerry Punch is known for his thorough preparation and his broad-based knowledge concerning most aspects of racing.

In addition to his ABC Sports duties, as well as operating his own company, Dr. Jerry Punch serves as both play-by-play and pit analyst on ESPN. A full-time member of ESPN's ACE Award-winning broadcast team since 1987, Dr. Jerry Punch appears on more than 60 (ESPN) telecasts a year.

Not limited to auto racing, Dr. Jerry Punch can also be found at some of the best college football match-ups in the country. He usually is seen roaming the sidelines updating fans on injuries, predicting plays, and discussing locker room strategies. Recently, he has handled play-by-play chores for select college football games on ESPN and ESPN2.

Most notably, Dr. Jerry Punch is revered for his participation in saving two drivers from certain death in 1988. While preparing for a telecast of the Busch 500 for ESPN, Dr. Jerry Punch witnessed a crash of the car driven by Rusty Wallace. When he reached the vehicle, Wallace was not breathing. Jerry Punch revived Wallace and assisted the emergency crew in removing the injured driver from the wreck. Later that year while on another television assignment (ARCA race in Atlanta), Dr. Jerry Punch helped to save driver Don Marmor after a tremendous impact flipped his car three times. Marmor had no pulse, but Dr. Punch assisted raceway emergency crews in their attempt to stabilize him on the scene until arrival of the Lifeline helicopter. When Marmor was airlifted from the track, he had a strong pulse, stable blood pressure, and spontaneous breathing. Miraculously, Marmor survived the incident; but has yet to return to motorsports competition.

Dr. Jerry Punch currently resides in Knoxville, TN with his wife Joni and two children, Jessica and Logan.

COMPARISONS OF ROCK SLOPE CATCHMENT AREA DESIGN BY STATE INCLUDING THE COUP DE GRAS OF ROCK SLOPE CATCHMENT DESIGN

John D. Godfrey, Jr., P.E.

ECS Southeast, LLP

318 Seaboard Lane, Suite #208

Franklin, Tennessee 37067

Tel: 615-885-4983

C: 615-218-3135

jgodfrey@ecslimited.com

ABSTRACT

This presentation will discuss the many different design approaches by different States and the importance of rock catchment areas at the base of rock slopes. Rockfall catchment is defined as the area between the edge of a pavement and the base of the rock slope, which also may coincide with a drainage ditch at the base of a rock cut. This design is generally a function of the rock cut height and the calculated distance a rock will bounce and travel upon hitting the ground surface. Sometimes due to easement or other slope construction issues, this catchment width may not be enough and catchment fences or barriers or required to prevent rock fall from reaching the highway surface. Some States also require information on the rock lithology to determine catchment zone widths. Many States require use of the CRSP (Colorado Rockfall Simulation Program) computer program, which allows the user to evaluate the rockfall behavior of a slope with user-defined slope geometry and clast characteristics. Such models allow the evaluation of a hypothetical rockfall but do not allow any evaluation of the probability of such an event happening. The probability of rockfall events is controlled by the structure and lithology of the rock slope. This presentation will also discuss and compare the *coup de gras* of rockfall catchment design, the “Rockfall Catchment Area Design Guide” Final Report, which was published by the Oregon Department of Transportation Research Group and FHWA. The “Rockfall Catchment Area Design Guide” is a current state-of-the-practice reference for sizing rockfall catchment areas for 40- to 80-foot (12- to 24-meter) high cut slopes.

Subsurface Mapping for a Slope Stability Slide along I40 near Ozark, Arkansas using Noninvasive Geophysical Techniques

Clinton M. Wood[1], Salman Rahimi[2], Vanessa Lebow[3], and Michelle Barry[4]

[1]University of Arkansas, Assistant Professor, Dept of Civil Eng., 4190 Bell Engineering Center Fayetteville, AR 72701, USA, cmwood@email.uark.edu, 479-575-6084
[2]University of Arkansas, Graduate Research Assistant, Dept of Civil Eng., 4190 Bell Engineering Center Fayetteville, AR 72701, USA, srahimi@email.uark.edu
[3]University of Arkansas, Graduate Research Assistant, Dept of Civil Eng., 4190 Bell Engineering Center Fayetteville, AR 72701, USA, vaburges@email.uark.edu
[4]University of Arkansas, Assistant Professor, Dept of Civil Eng., 4190 Bell Engineering Center Fayetteville, AR 72701, USA, mlbernha@uark.edu

ABSTRACT

In this study, a section of Interstate 40 near Ozark Arkansas, which has had significant slope stability issues for several decade was investigated using four different geophysical methods as part of Arkansas Department of Transportation (ARDOT) research project TRC1803. This section of I40 had been repaired in 2018 using a rock anchor system consisting of 100 anchors placed along a 450 ft section of the highway. The previous design was based on approximately 20 borings including several inclinometers throughout the slide area. Despite the anchor system, the slope has continued to move causing additional stress on the roadway system. A geophysical investigation was undertaken in 2019 to better understand the subsurface conditions which are contributing to the slide. The geophysical methods used in the study include Multichannel Analysis of Surface Waves (MASW), P-wave refraction, single station Horizontal to Vertical Spectra Ratio (HVSR), and Electrical Resistivity Tomography (ERT). From these methods 2D and 3D subsurface maps were created of the soil condition along with bedrock elevation. Moreover, the location of the saturated clay soils were also mapped across the site. From the geophysical results, depth to bedrock is generally consistent parallel with the slope at the top and the middle of the slope. However, several humps/bowls in the bedrock elevation were observed at the bottom of the slope. These humps/bowls in the bedrock were shown to be trapping water at the bottom of the slope leading to saturation of the clay soils at the site. The humps in the bedrock elevation are believed to contribute to the slope movements, particularly during or shortly after heavy rainfall events. This information is currently being utilized in slope stability models of the area to develop a solution which will prevent further movement of the slope. This study demonstrates the ability of geophysical methods to provide critical information regarding the subsurface conditions including soil conditions, rock conditions, and s

Title: **Challenge Accepted: A Project Review of I-24 Interchange at Broad and Market St.**

Authors: Ginger Bennett, M.S., E.I. (TDOT Materials and Tests Division/Geotechnical Engineering Section)

Building A, 1st Floor

6601 Centennial Blvd., Nashville, TN 37243-03604

Ginger.bennett@tn.gov

615-350-4140

Sam Sternberg III, P.E. (Dan Brown and Associates,PC)

11590 Wentwood Ct., Daphne, AL 36526

ssternberg@dba.world

251-509-7786

Abstract:

The I-24 Interchange project in Chattanooga, Tennessee represents a continued effort to increase efficiency in traffic flow and accessibility near US 27, Broad Street and Market Street. The intersection improvements consist of constructing an off ramp from I-24 Eastbound to a newly constructed Frontage Road connecting Broad Street and Market Street. The proposed project also involve improvements for I-24 Eastbound on-ramp, US 27 Southbound Off ramp, US 27 Northbound on-ramp, and Williams Street. Associated with the new roadway improvements, required structures include seven retaining walls and two bridges.

The proposed widening and new EB Exit Ramp and Frontage Road, located along the western portion of the project, is to be constructed over an abandoned manufacturing facility which was underlain with uncontrolled fill and foundry sand. The design required embankment heights up to 35 feet in height and a required 26 ft tall retaining wall in this area. Additional complications included an inactive fault near the center of the bridge in this area near the abutment for the proposed bridge, alluvial soils, existing pedestrian Riverwalk trail, and railroad.

This presentation will include an overview of the project, significant challenges throughout the design process, design considerations based on the encountered subsurface soils/geology, and the design of the retaining wall, bridge and fill areas along the western section of the project.

Title: **Lightweight Fill Applications & Considerations**

Presented by David Arellano, Ph.D., P.E.
Associate Professor
Department of Civil Engineering
The University of Memphis
104 Engineering Science
Building Memphis, TN 38152
901-678-3272
darellan@memphis.edu

ABSTRACT: Lightweight fill is a type of ground modification technology that alters the project earth structure by decreasing the imposed load of the earth structure on the site foundation. Lightweight fill materials that have been utilized in civil engineering applications include various types of aggregates such as pumice, scoria, expanded shale/clay, slag, foamed glass; cellular concrete; fly ash; geofoam; shredded tire; and wood fiber. Lightweight fill applications include embankments over soft ground, slope stabilization & repair, bridge approaches, compensating foundations, backfill for earth retention systems & buried structures. The presentation will include a summary of various types of lightweight fills, applications, and design considerations.

BIO:

Dr. David Arellano, Ph.D., P.E., has over 20 years of experience with expanded-polystyrene geofoam as a lightweight fill material. Key projects have included two National Cooperative Highway Research Program projects titled "Guidelines for Geofoam Applications in Embankment Projects" and "Guidelines for Geofoam Applications in Slope Stability Projects". Dr. David Arellano has been an assistant and associate professor in the Department of Civil Engineering at the University of Memphis since August 2005. Previously, he worked in private practice for nearly 10 years for several geotechnical engineering consulting firms and was an officer in the Corps of Engineers in the U.S. Army Reserve for 22 years and retired at the rank of Major. During his 22 years of military reserve service, he was involved in construction projects in various countries such as American Samoa, Panama, Jordan, Kenya, and Germany. He was deployed to Kuwait for 1 year as part of Operation Iraqi Freedom from 2003 to 2004.

THE IMPORTANCE OF SITE CLASS DETERMINATION IN SEISMIC DESIGN

Lila Leon, PE, PhD
Senior Geotechnical Engineer
HDR Engineering, Inc.
1122 Lady Street
Suite 1100, Columbia SC 29201
Phone: 803.509.6590
Email:Lila.Leon@hdrinc.com

Seismic site classifications are used to represent local site effects for the seismic design of new structures or the assessment of the performance of existing structures during a seismic event. Determination of the seismic site class is based on the concept of amplification or deamplification of earthquake ground motions as they propagate from the bedrock to the ground surface. In reality, amplification of a ground motion, is a site dependent parameter based on soil profile, bedrock depth, contrast in stiffness and density between bedrock and the overlying soil, and frequency content of input earthquake motions. While also admitting the importance of the other factors, modern seismic code practices use a single site proxy for capturing the physics of site amplification and determining the site class. Such site proxy is based on measuring the stiffness and in-situ shear strength of subsurface soils in the form of standard penetration test values (SPT-N) from drilled boreholes or shear wave velocities (Vs) from geophysical testing. According to the recommendations of the National Earthquake Hazards Reduction Program (NEHRP) or the International Building Code (IBC), seismic site classifications have generally been performed using the average SPT-N or Vs values in the upper 100 ft. (30 m) of the profile. The code's site classification options include Site Class A through F, with A and F requiring the least and most robust seismic designs, respectively. Where the soil properties are not known in sufficient detail to determine the Site Class, Site Class D is permitted to be used as the default, unless the geotechnical design professional determines that Site Class E (more than 10 feet of soft clay) or F (liquefiable or collapsible) soils are present at the site. Following the Site Class designation, the seismic demand on structures is quantified by obtaining reference rock accelerations from the national hazard maps and adjusting them for local conditions by the generic site factors correlated to the Site Class. Due to the higher cost associated with the higher site classifications, the development of site-specific site factors from refined analysis, in lieu of the generic factors, is implemented in the current application of the national seismic codes in an effort to lower the seismic demand and construction costs, although performing a site-specific response analysis could result in an increase in the seismic demand.

This presentation will focus on the requirements of the site classification system in the national seismic codes, their applicability to regions different than those where the classifications scheme was originated, and those determinations where engineering judgment is allowed to be implemented. Factors that play a major role in the accurate determination of the site classification, including those that introduce potential uncertainties, will also be discussed.

Manual on Subsurface Investigations
AASHTO Update

Robert C. Bachus, PhD., P.E., D.GE and Glenn J. Rix, Ph.D., P.E.

ABSTRACT

The (AASHTO Manual) was published by the American Association of State Highways Transportation Officials (AASHTO) in 1988 and since that time has been the “go-to” reference guide regarding the standard of practice for subsurface investigations, particularly those investigations focused on the transportation community. Over the past 30 years, subsurface geotechnical conditions may not have changed dramatically, but the techniques used by transportation agencies and their consultants for geotechnical investigation and interpretation have advanced significantly, due to improvements and reliance upon technology advancements. In response to this, AASHTO in cooperation with the Federal Highway Administration (FHWA) commissioned a revision to the AASHTO Manual (1988) by the National Cooperative Highway Research Program within the Transportation Research Board of the National Academies of Science, Engineering, and Medicine (National Academies). Geosyntec Consultants (Geosyntec) was commissioned by the National Academies to prepare the revised guidance document. The revised document maintains the same title (i.e., *Manual on Subsurface Investigations)* and is now available from the National Academies at no charge. Importantly, the revised document is slated for balloting by AASHTO in the coming months, in anticipation of its being adopted and released officially by AASHTO.

The revised AASHTO Manual complements other notable historic documents, specifically the 2001 manual prepared by the United States Army Corps of Engineers (USACE) *Engineering Manual No. 1110-1-1804, Geotechnical Investigations*, as well as the recent 2017 document prepared by FHWA titled *Geotechnical Engineering Circular No. 5, Geotechnical Site Characterization*. The purpose of this presentation is to walk-through the revised AASHTO Manual and highlight the significant changes and advances incorporated in the revised document.

Robert C. Bachus
Senior Principal
Geosyntec Consultants
1255 Roberts Blvd NW, Suite 200
Kennesaw, GA 30144
rbachus@geosyntec.com
(678) 202-9556 (office)

Glenn J. Rix
Senior Principal
Geosyntec Consultants
1255 Roberts Blvd NW, Suite 200
Kennesaw, GA 30144
grix@geosyntec.com
(678) 202-9546 (office)

Yeager Airport Safety Area Rebuilt with Unique Retaining Wall Construction

Gary T. Brill, PE

Johanna M. Simon, PE

The sudden and devastating failure of the Runway Safety Area (RSA) at the Yeager Airport in Charleston, West Virginia was previously presented at the 2016 STGEC conference. The presentation detailed the slope failure and measures taken to stabilize the dangerous slope remnants and remove the enormous debris field. Now, three years later, the Yeager Airport RSA has been rebuilt with an 85 feet high retaining wall. The presentation will cover the design and construction of the wall including a conventional rock-socketed soldier pile and rock anchor segment (lower 30 feet) and a unique post and panel segment (upper SS feet) backfilled with lightweight Geofoam fill blocks and deadman anchors.

Gary T. Brill, PE

Schnabel Engineering, LLC

3502 Overlook Circle

Knoxville, TN 37909

brill@schnabel -eng.com

Johanna M. Simon, PE

Schnabel Engineering, LLC

3 Dickinson Drive, Ste. 200

Chadds Ford, PA 19317

jsimon@ schnabel-eng.com

Modeling Traffic and Construction Equipment Surcharges for Geotechnical Global Stability Analysis

Bon Lien, Ph.D., P.E.

Address for Contact:
Bon Lien, Ph.D., P.E. / Principal Engineer – Geotechnical
Wood Environment & Infrastructure Solutions, Inc.
4021 Stirrup Creek Drive, Suite
100 Durham, North Carolina
27703 Phone number (919) 768-
6233
Email Address: bon.lien@woodplc.com

ABSTRACT

The AASHTO LRFD Bridge Design Specifications, Article 11.10.10.2 states: "Traffic loads shall be treated as uniform surcharge loads in accordance with the criteria outlined in Article
3.11.6.2. The live load surcharge pressure shall not be less than 2.0 ft of earth." Conventionally, for roadway embankment slope global stability analysis, surcharge of traffic (live) load or construction equipment load is assumed to be a uniform infinite strip load of 250 psf. Although such a methodology has been commonly adopted in practice, it does not reasonably reflect the actual 3-dimensional loading conditions; with high concentrated track/tire contact pressures over limited footprint areas. In cases of heavy-duty construction equipment, such as articulated dump trucks heavier than HS20-44 or tracked/tired cranes operated along the top of the embankment, consideration of the corresponding surcharge conditions for the use of conventional 2- dimensional slope stability analysis could be subject a certain degree of conservatism and engineering judgement.

Specific topics presented will include: 1) Background of different methodologies for determining traffic and construction equipment surcharges; 2) Comparisons of 2-D and 3-D surcharge effects in global stability analyses, and 3) A simplified methodology proposed for modeling and evaluation of heavy-duty traffic and construction equipment surcharges in 2-dimensional global stability analysis.

DEEP FOUNDATIONS AND QUALITY ASSURANCE

Thomas Hyatt, P.E., GRL Engineers Inc., Cumming, GA, U.S.A, 678-371-491, thyatt@grlengineers.com

ABSTRACT

Quality assurance of driven piles or drilled shafts is essential to the successful installation of deep foundations. As deep foundations are designed to transfer higher loads to the subsurface it becomes critical to ensure that the foundations can safely transfer with an acceptable settlement. There are many different ways to check and ensure that deep foundations are constructed as designed, as well as to load test the foundation element to the ultimate geotechnical capacity. This presentation will go over a variety of different testing methods for both driven piles and drilled shafts, to ensure the quality of construction as well as to verify the design and capabilities of the foundation element in question. Methods such as Cross- Hole Sonic Logging, Thermal Integrity Profiling, Low Strain Dynamic Testing, Shaft Quantitative Inspection Device, and Shaft Area Profile Evaluator will be discussed. Methods for determining the ultimate geotechnical capacity of the foundations such as top down static load testing, High Strain Dynamic Load Testing, and Bi-Directional Load Testing will also be discussed in this presentation.

TDOT Counters Landslides Triggered by February, 2019 Floods

Robert Jowers, PE, Tennessee Department of Transportation (TDOT)
Contact Email: robert.jowers@tn.gov

Tennessee Department of Transportation
Materials & Tests Division-Geotechnical Engineering Section
6601 Centennial Blvd.
Nashville, TN 37215
(615) 350-4133

Abstract

Over ninety-five emergency landslides will be mitigated in middle and east Tennessee as a result of the 2019 February flooding event. The event created and continues to create tremendous strain on the Department's customers, staff, and construction equipment resources; all this while programmed transportation improvements must continue to be rolled out. Seeking inspiration, the author used guidance based on papers developed for previous highway geology \ transportation geotechnical engineering conferences, such as a paper that discussed the flood events of 1973 in Tennessee.

This paper and presentation will discuss landslide types that typically occur in the Tennessee geological terrain, an overview of the different types of stabilization methods typically employed, and discuss the collaborative effort that occurred between the different stakeholders. Measures being put in place to better manage TDOT's geotechnical assets following flooding events will also be addressed.

Drilled Shaft Bottom Inspection

- DID and the latest applications

John Z. Ding, P.E.[1] and Richard M. Simon, P.E., Ph.D., D.GE[2]

[1]Principal Engineer, DMY Inc., Midlothian, VA 23113, jding@dmy-inc.com
[2]Senior Principal Engineer, DMY Inc., Midlothian, VA 23113, rsimon@dmy-inc.com

ABSTRACT: The sediment thickness at the bottom of a drilled shaft prior to the placement of concrete plays a significant role in the development of drilled shaft bearing capacity and settlement, especially for an end-bearing shaft where side shear resistance is limited and only end-bearing resistance is considered significant. Load tests have demonstrated that conscientious bottom cleaning is necessary to achieve suitable load transfer in end-bearing. Inspection and measurement of the bottom sediment thickness prior to concreting is challenging, expensive, and often time consuming for contractors and inspectors~~,~~ when direct visual inspection is not possible, as for shafts drilled through slurry or water.

Developed by John Z. Ding, the Ding Inspection Device (DID) has been recognized by several states as a reliable and convenient tool for measuring the sediment thickness at the bottom of a drilled shaft. This paper summarizes the latest DID's applications for Florida Department of Transportation (FDOT), Virginia Department of Transportation (VDOT), and a joint research program led by for University of Missouri and University of California supported by California Department of Transportation (Caltrans)

KEYWORDS: Drilled shaft, sediment, inspection, field testing.

Integration of Non-invasive Geophysical Methods with Invasive Geotechnical Sampling for Optimized Karst Characterization

Johanna Vaughan, P.G.
Draper Aden Associates
2206 South Main Street, Blacksburg, Virginia, 24060
jovaughan@daa.com
(540) 808-3405 – cell
(540) 552-0444 – office

The karst environment can be challenging to characterize, and often resolves a moderate to high degree of variability within the subsurface. Karst hazards encountered during site exploration can result in increased costs for removing undiscovered rock pinnacles, or sinkhole mitigation. Invasive geotechnical sampling is beneficial for retrieving a physical sample representing subsurface conditions at a precise location but can be costly when increasing the density of sampling locations. Additionally, site constraints such as steep slopes, waterbody crossings, impact to sensitive areas, and confined or unusual spaces can limit site accessibility for invasive sampling. Non-invasive geophysical methods can access places where drilling equipment cannot, allowing for versatile testing coverage. As a result, the combined use of non-invasive geophysical methods with invasive geotechnical sampling has become prominent in exploring the karst environment. Specifically, the use of electrical resistivity imaging combined with invasive drilling results in a comprehensive understanding of subsurface conditions.

Electrical resistivity imaging can rapidly acquire data related to the distribution of physical properties within the subsurface, such as the soil-bedrock interface in karst environments. Electrical resistivity imaging acquires data as cross-sectional profiles, with adjustable depths of data acquisition. When several profiles are obtained across a site, the data can be combined into a three-dimensional data set of which interpreted bedrock elevations can be extracted and rendered into georeferenced surfaces for calibration and integration with geotechnical drilling data.

Combining electrical resistivity imaging and drilling data with high precision Global Positioning Systems (GPS) precisely identifies the locations of structures or anomalous conditions. The data can be incorporated into industry standard programs such as AutoCAD, ArcGIS, and Google Earth. The combined analysis of non-invasive geophysical methods with invasive geotechnical sampling is an effective and powerful tool for characterizing karst environments. Case studies exploring the advancements of this combined analysis illustrate the benefits.

Best Practices in Planning and Developing Rock Slope Stabilization Mitigation Projects

Matthew B. Morris, P.G.[1] and Joseph T. Krupansky, P.G.[2]

Projects involving potentially unstable rock slopes are widely recognized in infrastructure engineering as very challenging as a result of the complexities associated with investigation, evaluation, and ultimately mitigation. Execution of these mitigation projects must include a sufficient level of effort to collect the data required to adequately evaluate the geohazard issues and develop a comprehensive slope stabilization strategy. In addition to the stabilization design, mitigative schemes must account for non-geological project constraints such as right-of-way limitations, construction access, environmental sensitivities, and protection of the public and stakeholder property. Ultimately the designer of a rock slope stabilization project needs to develop drawings and specifications that provide the contractor clear guidance as to the goal of the stabilization efforts and how to deal with changes that may be required during construction due to unforeseen conditions. Several case histories will be used as examples to illustrate best practices with respect to investigation and evaluation of steep slopes, preparation of design plans construction specifications, and constructability considerations. Best practices are constantly evolving as a result of innovations in investigative methods and technologies, advances in analytical and visualization software, and progressive construction techniques. This presentation is based on knowledge gained and lessons learned over two decades of investigating, evaluating, and constructing slope stabilization projects throughout North America for a variety of clients.

[1]Gannett Fleming, Inc.; 730 Holiday Drive, Pittsburgh, PA. mmorris@gfnet.com; 412-922-5575

[2]Gannett Fleming, Inc.; 1010 Adams Avenue, Audubon, PA. jkrupansky@gfnet.com; 412-922-5575

ALTERNATIVE GEOTECHNICAL EXPLORATION PROCEDURES WITHIN 3P PROJECTS

Kyle M. Peters, P.E.
Mark D. Luskin, P.E., P.G.
ECS Southeast, LLP
318 Seaboard Lane, Suite #208
Franklin, Tennessee 37067
Tel: 615-885-4983
kpeters1@ecslimited.com
mluskin@ecslimited.com

ABSTRACT

With the rise of construction costs and with state and local governments looking to maximize their money for capital projects, the use of 3P (Public, Private Partnership) projects have become more prominent throughout the country. In Tennessee, this is no different. Tennessee is a “pay as you go” state, and by having private developers engage in the process of paying for the development of plans for new roadway projects, multiple advantages have been realized. These include quicker development of bid documents, the potential for accelerated construction, ability to utilize alternative exploratory methods, and ultimately spur economic development within the project corridor. TDOT has had several projects that have used this alternate delivery method. A notable example that is currently under construction is the new diverging diamond interchange at Exit 62, Hickory Hollow Parkway along I-24 in Davidson County. ECS Southeast, LLP was able to utilize traditional drilling and sampling methods for the development of the geotechnical report, but also engage in utilizing geophysical techniques to determine the depth of rock for the proposed retaining walls. These walls had electrical resistivity surveys performed, which allowed the designer and the owner to more accurately identify the rock depth and amount of rock cut that would be required as well as to reduce the potential for costly overruns due to undercut and replacing the material with unquantified graded solid rock fill. In a known karst environment, this also provided an added level of exploration for potential sinkholes along critical structures. This presentation will discuss the use of alternate methods, paired with traditional exploration techniques, for the development of geotechnical plans and how the use of improved technologies can better assist design engineers and owners in the quantification of materials for roadway and other public and private projects.

Implementation of Validated Intelligent Compaction for Real-Time Mapping of Pavement Foundation Modulus

Lake Carter, P.E., M. ASCE[1], David J. White, Ph.D., P.E., M. ASCE[2], Pavana Vennapusa, Ph.D., P.E., M. ASCE[3],

[1]Project Engineer, Ingios Geotechnics, Inc., Charlotte, NC; e-mail: lake.carter@ingios.com
[2]President and Chief Engineer, Ingios Geotechnics, Inc., P.O. Box 101, Northfield, MN, 55057; e-mail: david.white@ingios.com
[3]Lead Engineer, Ingios Geotechnics, Inc., P.O. Box 1141, Little Elm, TX, 75068; e-mail: pavana.vennapusa@ingios.com

ABSTRACT

Validated intelligent compaction (VIC) technique is a new method that involves site specific calibration of the roller sensor measurements with in-situ design moduli values (e.g., resilient modulus [M_r] or modulus of subgrade reaction [k]). The VIC method has been successfully used recently on pavement foundation construction projects in IL, MN, and CO with real-time geospatial mapping of design moduli values. Field calibrations demonstrate that the VIC method results in coefficient of determination (R^2) values > 0.9 compared to independent plate load tests. Because of the high R^2 values and the associated low measurement errors resulting from the calibration process, the VIC moduli values (M_r or k) can be reliably used for field verification of design inputs.

In this paper, results of VIC field calibration efforts to measure stress-dependent M_r and k-values from the Interstate 25 (I25) Express Lanes project in CO, O'Hare Tollway project in IL, and MnROAD low volume test track project in MN are presented. A vibratory smooth drum roller was calibrated to stress-dependent M_r and k-values determined using cyclic and static automated plate load testing on layered embankment and pavement foundation layers. Use of VIC presents along with geospatial modulus mapping greatly enhances traditional QC/QA, can be used for pavement design optimization, and is generates a data record for future performance monitoring.

Title: Polyurethane Grout Techniques for Ground Improvement in Transportation Applications

Author/Presenter: Andy Derenski, P.E.
URETEK USA
aderenski@uretekusa.com
(865) 773-6642

The technical presentation will introduce the basic material properties of polyurethane grout and how those properties can be advantageous when performing soil improvement grouting and/or structural lifting. The material is fast setting (supports traffic in 15 minutes after injection), hydro-insensitive, and light weight. The expansive nature of the material also makes it very versatile and it can act like a compaction grout or permeation grout depending on the soil conditions.

The presentation will teach the two primary injection techniques that are used in polyurethane grouting, including:

- Shallow injections to fill voids below slabs, restore load transfer from slabs to subgrade, and lift/align faulted slab joints.
- Deep injections to densify, strengthen, and stiffen the deeper supporting soils. This type of injection fills deeper subsurface voids, increases the bearing capacity of soils and mitigates settlement issues.

The presentation will share case studies for the shallow injections, and emphasize case studies for the deep injection techniques. The deep injection case studies will include road bed soil improvements, bridge approaches, and box culvert repairs.

The bulk of the presentation and case studies will be focused on roads and bridges. It will also touch on other transportation applications for polyurethane grout such as runways, rail, and ports. We will also have a slide discussing how polyurethane grout can be used to seal manholes, storm lines, culverts, etc. that are often the source of road subsidence issues.

The presentation will be designed to be completed in 20 minutes and wrap up with 5 minutes for questions and answers.

CASE HISTORY: COMPARISON OF CSL RESULTS TO PHYSICAL OBSERVATIONS

David S. Graham, P.E., Dan Brown and Associates, 205-427-0682, dgraham@dba.world

Paul J. Axtell, P.E., D.GE, Dan Brown and Associates, 913-744-4988, paxtell@dba.world

ABSTRACT

Crosshole Sonic Logging (CSL) non-destructive integrity testing identified anomalous readings near the base of a 6.5-foot diameter drilled shaft rock socket. The anomaly was confirmed to be a defect by subsequent coring and core hole camera inspection. A large void and exposed rebar were visually observed in one of the core hole camera inspections. The center of the shaft was then excavated initially with 3-foot diameter tooling and subsequently with 4-foot diameter tooling as part of the remedial actions to address the defect. While excavating with 3-foot diameter tooling, the shaft defect was not encountered. Excavation with 4-foot diameter tooling revealed the defect, a significant void around the majority of the shaft circumference. The void extended radially from the circumference of the 4-foot diameter excavation to beyond the reinforcement cage to the exposed wall of the rock socket around approximately 80 percent of the shaft circumference. CSL results and observations made during remedial shaft investigation and excavation are in good agreement. The shaft defect, located primarily outside of the reinforcement cage, was effectively identified by CSL testing. Although the defect was confirmed by investigative coring, the remedial excavation demonstrates how the investigative coring could have easily missed the defect. This paper shows how CSL results compare to physical observations made during a rare opportunity to characterize the full extent and nature of a drilled shaft defect originally identified as an anomaly by CSL testing.

Title: Financial Failure—The High Cost of Not Knowing

Presenter: Roger A. Failmezger, P.E., F. ASCE, D GE

President of In-Situ Soil Testing, L.C.

2762 White Chapel Road

Lancaster, Virginia 22503

703-627-0451 (cell)

www.insitusoil.com

email: raf@insitusoil.com

Abstract: Geotechnical engineers essentially predict the outcome of their design. However, they often use tests and methods that do not accurately predict the outcome. The uncertainty for design should always come from the variability of the soil's properties and not an incorrectly chosen test. When the tests do not measure the soil properties needed for accurate design and rely on correlations that have high uncertainty and high standard deviations, financial failure occurs. Inaccurate measurements mislead the engineer into believing that the site is highly variable. As a result, his/her design tends to be too safe, overly conservative, and costly to the owner. The owner pays for foundation systems that are not needed. Beta probability distribution curves illustrate financial failure. To avoid financial failure, the best in-situ tests for predicting the outcome of different geotechnical design needs are presented.

The Use of Seismic Shear Wave Testing to Supplement Geotechnical Drilling – Analysis of Rock Depth and Integrity Along the Proposed Durham Orange Light Rail Alignment

Eric Cross, P.G.
Pyramid Geophysical Services
503 Industrial Avenue
Greensboro, NC 27406
(336) 335-3174, eric@pyramienvironmental.com

The Triassic Basin soil and rock formations in the Durham, North Carolina, region provide challenges for geotechnical design and construction. These formations consist of highly heterogenous stratigraphy including sands, silts and clays overlying a weathered rock unit that can contain boulders, fractures and an inconsistent competent bedrock surface. A proposed light rail system was under design to extend through downtown Durham, and a geotechnical investigation was performed to better understand the behavior of the rock formation and its integrity. Pyramid Geophysical Services was contracted to perform a Multi-Channel Analysis of Surface Waves (MASW) seismic survey across specific portions of the proposed rail alignment where geotechnical borings either could not be performed, or where significant variability in the depth of competent rock was observed. The goal of the seismic survey was to “connect the dots” between the geotechnical borings and provide a more comprehensive understanding of bedrock behavior along the alignment. Pyramid performed a total of 542 separate MASW shots resulting in 20 individual 2-Dimensional cross sections of velocity that were used to analyze the overburden, weathered rock thickness and depth to competent rock across the site. The results of the seismic testing were combined with geotechnical boring data to generate plan-view contour maps of competent bedrock depths across the site. Correlations between the geophysical interpretations and boring data were exceptionally high, and the resultant data set provided engineers with a clear understanding of geologic conditions with which to finalize design plans. This presentation will provide an overview of the MASW testing, the cross section results, correlations to geotechnical borings and the final plan-view bedrock contours that were used for geotechnical design.

Finite Element Parametric Study on the Performance of Geosynthetic Reinforced Soil–Integrated Bridge System (GRS-IBS)

Murad Abu-Farsakh[1] and Allam Ardah[2]

[1] Research Professor, Louisiana Transportation Research Center, Louisiana State University, Baton Rouge, LA 70808.

[2] Former Ph.D. Student, Department of Civil and Environmental Engineering, Louisiana State University, Baton Rouge, LA 70803.

Abstract

This presentation will cover a numerical investigation of the performance of geosynthetic reinforced soil integrated bridge system (GRS-IBS). The numerical simulations were conducted using two-dimensional (2D) PLAXIS 2016 FE program. The hardening soil model proposed by Schanz et al. (1999) was used to simulate the behavior of the backfill material; the interface between the backfill materials and the reinforcement was simulated using the Mohr-Coulomb frictional model, and the reinforcement and facing block were simulated using the linear elastic model. A FE parametric study was conducted to evaluate the effect of internal friction angle, ϕ, width of reinforcement soil footing (RSF), BRSF, secondary reinforcement (bearing bed reinforcement), and setback distance, ab, on the performance of the GRS-IBS in terms of lateral facing displacement, maximum strain along the reinforcement, and maximum strain envelope. The FE results indicates that the internal friction angle and both the setback distance and width of strip footing have siginficant and medium impact, respectively, on the performance of the GRS-IBS in terms of strain distribution along the reinforcemnt. However, it was found that width of RSF and the length of reinforcement have no impact on the performance of GRS-IBS in terms of strain distribution and lateral facing deformation. Finally, based on the parametric study, the potential failure envelope of the GRS-IBS abutment was found to be a combination of punching shear failure envelope (top) and Rankine failure envelope (bottom), in which the failure envelope is developed under the inner edge of the footing and extending vertically downward to intersect with the Rankine active failure envelope.

Keywords: Geosynthetics, Geosynthetic Reinforced Soil (GRS), Integrated Bridge System (IBS), Finite element analysis, Bridge abutment, Parametric study.

MEMFIX 4: I-240 BRIDGE REPLACEMENT (A CM/GC PROJECT)

Lessons Learned

BY: ASHRAF ELSAYED, Ph.D., P.E, D.GE

Geotechnology, Inc.

3312 Winbrook, Memphis TN 38116

Ph. (901) 353-1981/ Fax (901) 353-2248

aelsayed@geotechnology.com

ABSTRACT

CM/GC (Construction Manager/ General Contractor) is a delivery method that involves selecting a contractor that works side-by-side with the design team during the design phase; the contractor then provides a construction fee to be approved by the owner. It is being used for bridge replacement project over Interstate I-240, which contains three to four lanes in each direction. A previous widening project of I-240 included a plan to have four lanes in each direction and a collector/distributer (CD) road within the Poplar Avenue interchange. During construction, excavation of the slope in front of stub abutments revealed short driven piles counter to what was specified in the original construction plans. The purpose of this CM/GC project was to provide eight lanes for the I-240 mainline by completing the widening and improving the vertical and horizontal clearance at the bridge crossings. This required a full replacement of the Poplar Avenue and NS bridges and seismic rehabilitation of the Park Avenue Bridge. The design team faced several geotechnical and structural challenges during exploration and design phases. These included physical constraints during the exploration phase, demanding seismic requirements per AASHTO specifications, designing around recently constructed elements, limited accessibility and other constructability challenges. These challenges created opportunities for innovation. The geotechnical team combined conventional drilling and Cone Penetration Testing (CPT) and performed a site-specific seismic study to develop design response spectra. The structural team minimized construction impacts to the traveling public and NS by utilizing accelerated bridge construction (ABC). Retrofitting existing substructures under traffic in a high seismic region required innovative approaches such as the utilization of ASTM A706 reinforcing steel and micropiles. The project is complete and there were several lessons learned; application of the CM/GC delivery method allowed collaboration between the design team, TDOT, and the contractor, provided value to the project and met with the satisfaction of TDOT. New construction techniques were successfully implemented. The project was completed several months ahead of schedule.

Full Depth Reclamation on asphalt pavements using Cement

Full Depth Reclamation (FDR) using Portland cement on asphalt pavements is quickly growing in popularity in the state of Tennessee. Although the process of pulverizing soil and adding cement in road projects has been around for 80+ years, advances in technologies and processes in the early 90s helped FDR gain real traction. In modern reclamation projects, high-power reclaimer units are typically seen on FDR sites instead of the old soil mixers used in the past. The new reclaimers have upgraded horsepower and larger cutting drums that better equip the machines to pulverize asphalt and produce uniform gradation of material. While effective, FDR was primarily used in smaller projects until 1994 when South Carolina DOT used it for a 17-mile long section of Route 97 in York County. This stretch of road was a proving ground for FDR on a large scale. Since then, FDR has proven to be a versatile solution to rebuild any type of worn out asphalt pavement with subbase failure.

The FDR process, uses what is known as the reclamation train. The train uses various pieces of equipment to pulverize the existing asphalt surface and base to the recommended depth, spread a measured dose of cement, hydrate with a measured dose of water, compact, and grade. The speed of construction has made the FDR application a very popular solution amongst those that have used it.

As a promoter with the Southeast Cement Promotion Association, it is my job to help the industry learn the proper way to design FDR, when it is beneficial and to help ensure quality across the state. I have worked with TDOT in revising their SP304 for FDR and many cities in revising their soil cement specifications.

TDOT used FDR for the first time in 2018 and several counties have already been using the application for the past 6 years. However, we will see massive growth in the FDR industry here in Tennessee as it has proven itself and people are seeing how it helps them save time and money.

My presentation covers the basics of FDR and Soil Cement. I touch on specifications and rules that have to be followed when designing and constructing a cement base road.

Value Engineering the Calhoun Bypass (GA) Using a Lime-Pozzolan Blend

Construction on the Calhoun bypass project began in 2016 and consisted of a 6.24-mile long bypass to realign US 41 and SR 53 in Calhoun, GA. The project will ease congestion by connecting SR 53 and I-75 and for an estimated cost of $44 million.

A geotechnical assessment of the project soils found plastic clays throughout the site. These weak, wet soils can prove to be challenging on many construction sites and often adversely affect a projects schedule. Untreated, the plastic soils would need to be removed and replaced with a suitable borrow material. To reduce costs and simplify construction, the project engineers tested with *Calciment,* a product provided by Mintek Resources containing both lime and pozzolan. They confirmed that 3% Calciment™, equating to 2,500 tons, would mitigate the soils plastic and expansive nature and allow them to avoid the more costly remove and replace option.

Testing of the site soils showed that Calciment reduced the expansion of the soil from 20.9% to 6.6% while reducing the plasticity index from 30 to 16. The addition of Calciment™ also reduced the moisture content of the soils aiding in compaction. *Calciment's* blend of lime and pozzolan reacts with the soil to create improved workability and long-term strength. Onsite soils were able to obtain an unconfined compressive strength of nearly 200 psi after within seven days of treating the soil. Portland cement was also tested, but was to be not as effective at reducing expansion or plasticity with these soils. The use of auger-fed spreader trucks facilitated the low dust application of *Calciment*, while the use of a soil reclaimer drastically increased the efficiency of blending and compacting soil lifts. Typical production rates for these kind of applications can be up to 7,000 CY per 8-hr. shift per soil reclaimer.

By using *Calciment*, the project was able to reclassify more than 70,000cy of poor subgrade into a superior foundation and embankment material.

Evaluation and Acceptance of Non-Conforming Piles on Major Bridge Projects

Author:

Mike Batten, PE

HDR

555 Fayetteville St. Suite. 900

Raleigh, NC 27601

mike.batten@hdrinc.com ; 919-232-6675

Presentation Summary:

On major bridge projects supported by driven piles there are typically a number of piles that do not meet the project installation criteria. Potential issues that often arise include: 1) failure to reach the minimum pile tip elevation, 2) failure to meet the required driving criteria due to inadequate driving resistance, 3) piles out of geometrical installation tolerance, and 4) pile damage that occurs during installation. The solutions to rectify these issues can often be very costly for both the DOT and the pile installation contractor. HDR's experience with and techniques used to evaluate non-conforming piles on multiple major bridge projects will be shared. The solutions to this type of evaluation are most productive if the geotechnical engineer and bridge engineer of record are able to work closely together on the evaluation process. For example, geotechnical engineers typically analyze the lateral stability of a single pile using more simple soil structure interaction (SSI) software such as LPILE, but if the behavior of the entire group of piles is considered and the individual pile installation logs are reviewed to assess the adequacy of the group of piles in an entire bent or pier cap, it is often evident that the group of piles is still stable when only a few piles are non-conforming. Several evaluation methods for non-conforming piles will be shared with reference to their historical application on major bridge projects such as 1) Using SSI software such as FB MultiPier or Group to model lateral and axial pile springs for an entire group of piles with custom springs for individual piles that did not meet the driving criteria, 2) Using superposition of end bearing and side resistance measured from end of drive and restrike PDA testing on displacement piles, 3) Modeling as-built pile geometry in SSI software for piles installed outside geometrical tolerances to re-evaluate individual pile demands and foundation stiffness, and 4) Analysis of a damaged pile with consideration of its integrity above the point of fixity based on impedance changes (BTA values) from PDA testing. At least two project case histories on NCDOT projects (Marc Basnight Bridge and an emergency bridge on US 421) will be shared with the evaluation methods implemented on these projects.

STGEC 2019 - Abstract Submission

Kevin D. Hon, P.G.
S&ME, Inc.
4291 Highway 58, Chattanooga, TN 37416
423.499.0957
khon@smeinc.com

Our Aging Infrastructure - Case Study Examples in Tennessee for Using Geophysics to Complement Traditional Exploration

Assessment and expansion of our country's aging, if not crumbling, infrastructure is becoming increasingly important. The ASCE's Report Card for America's Infrastructure (2017) received a "D+" grade which basically equates to a poor rating. Although, Tennessee's 2016 Report Card GPA was a "C", which is above the national average. Everything from roadways, bridges, airports, and dams to land development requires a better understanding of what is located beneath the surface. That said, geophysics can play a considerable role in providing a very cost effective and non-destructive means for subsurface evaluations to assist in making our infrastructure more updated and ultimately safer. This presentation will highlight a variety of applications using several case studies from different types of projects located in Tennessee. Geophysical methods used for these example surveys include, but are not limited to, ground penetrating radar (GPR), frequency domain electromagnetics (FDEM), seismic refraction tomography (SRT), and electrical resistivity tomography (ERT).

Bio:

Kevin Hon has over 15 years of experience in shallow subsurface geophysics after earning his BS in Geology at Wright State University and his MS in Geology at New Mexico State University. Mr. Hon has spent most of his career in geotechnical consulting with an emphasis on engineering and environmental applications. However, four of those years were working for a manufacturer of geophysical systems. He currently serves as the geophysical services group leader and technical lead for geophysical applications within S&ME.

Steering Committee Members

South Carolina
Nicholas Harman, P.E.
Geotechnical Design Policy Engineer
South Carolina Department of Transportation
955 Park St. Room 409
Columbia, SC 29201
Phone: 803-737-1431
Fax: 803-737-0608
Email: harmanne@scdot.org

TRB
Nancy M. Whiting, MSCE
Sr. Program officer- Soils, Geology & Foundations
Technical Activities Division
Transportation Research Board
500 Fifth St, NW Room 488
Washington, DC 20001
Phone: 202-334-2956
Email: nwhiting@nas.edu

Tennessee
Robert Jowers, P.E.
Manager- Geotechnical Engineering Section
Tennessee Department of Transportation
Materials and Tests Division
Building A, 1st Floor
6601 Centennial Blvd
Nashville, TN 37243-0360
Phone: 615-350-4133
Email: Robert.jowers@tn.gov

FHWA
Benjamin S. Rivers, P.E.
Geotechnical Engineer
Federal Highway Administration
Resource Center
61 Forsyth St. SW
Atlanta, GA 30303
Phone: 404-562-3926
Email: Benjamin.rivers@fhwa.dot.gov

Virginia
Carl P. Benson, P.G., P.E.
Geotechnical Engineering Program Manager
Virginia Department of Transportation
1401 East Broad St.
Richmond, VA 23219
Phone: 804-328-3172
Email: carl.benson@vdot.virginia.gov

Standing officer
William Broyles, Treasurer
4206 Brownsboro Glen Road
Louisville, KY 40241
Phone: 502-418-8800
Email: bill.broyles2011@gmail.com

West Virginia
Mark Nettleton, P.E
Acting Geotechnical Group Leader
West Virginia Department Of Highways
190 Dry Branch Dr.
Charleston, WV 25306
Phone: 304-558-9705
Email: mark.a.nettleton@wv.gov

Steering Committee Members

Alabama
Kaye Chancellor Davis, P.E.
Asst.M&T Bureau Chief- Geotechnical
ALDOT- Bureau of Materials and Tests
3700 Fairground Rd
Montgomery, AL 36110
Phone:334-206-2277
Fax: 334-234-6263
Email: chancellork@dot.state.al.us

Arkansas
Paul Tinsley
Staff Geotechnical Engineer
Arkansas Department of Transportation
10324 Interstate 30
Little Rock, AR 72203
Phone: 501-516-2496
Email: paul.tinsley@ardot.gov

Florida
Larry Jones
Assistant State Structures Design Engineer
State Geotechnical Engineer
Florida Department of Transportation
605 Suwannee St. MS 33
Tallahassee, FL 32399-0450
Phone: 850-414-4305
Fax: 850- 414-4955
Email: Larry. Jones@dot.state.fl.us

Georgia
Glen Foster, P.E.
State Geotechnical Engineer
Georgia Department of Transportation
15 Kennedy Dr.
Forest Park, GA 30297
Phone: 404-363-7548
Email: gfoster@dot.ga.gov

Kentucky
Michael Carpenter, P.E.
Transportation Engineering Branch Manager
Kentucky Transportation Cabinet
Division of Structural Design
Geotechnical Branch
1236 Wilkinson Blvd
Frankfort, KY 40601
Phone: 502-564-2374
Email: michael.carpenter@ky.gov

Louisiana
Chris Nickel
Pavement & Geotechnical Engr. Admin.
Louisiana DOTD
201 Capitol Access Road, Room 606Y
Baton Rouge, LA 70802
Phone: 225-379-1016
Email: chris.nickel@la.gov

Mississippi
Sean Ferguson
State Geotechnical Engineer
Mississippi Department of Transportation
P.O. Box 1850
Jackson, MS 39215-1850
Phone: 601-359-1795
Email: sferguson@mdot.ms.gov

North Carolina
Thomas G. Santee, P.E.
Eastern Region Geotechnical Ops Engineer
North Carolina Department of Transportation
3301 Jones Sausage Rd. Suite 100
Garner, NC 27529
Phone: 919-662-4710 x 220
Email: tgsantee@ncdot.gov

STGEC 2019 PLANNING COMMITTEE

Brian Egan, P.E.	Director, TDOT Materials and Tests Division
Robert Jowers, P.E.	STGEC Chairman, TDOT Geotechnical Engineering Section
Travis W. Smith, P.E.	STGEC Conference Coordinator, TDOT Geotechnical Engineering Section
Lori Fiorentino	STGEC Speaker Coordinator, TDOT Geotechnical Engineering Section
Besmir Zenelaku Jeremiah Kokes	STGEC Exhibitor Committee, TDOT Geotechnical Engineering Section
Besmir Zenelaku Randy Jones	STGEC Transportation Committee, TDOT Geotechnical Engineering Section
Christine Wickhorst Frank Ponzio, P.E.	STGEC Spouse Program Committee, TDOT Geotechnical Engineering Section
Ginger Bennett Karen Hughes Chilyere Smith, PG	STGEC Gift and Door Prize Committee, TDOT Geotechnical Engineering Section
Randy Jones, PG	STGEC Food Coordinator, TDOT Geotechnical Engineering Section
Erin Napier	STGEC Program Coordinator, TDOT Materials and Tests Division

STGEC History

The Southern Transportation Geotechnical Engineering Conference (STGEC) is an annual meeting that has been taking place since 1969 when the Federal Highway Administration proposed that the southeastern states should meet to discuss landslide problems along I-40 near Rockwood, Tennessee along I-75 in northern Georgia, and settlement problems with high interstate embankments.

The first STGEC meeting was held in Atlanta, Georgia, near the Georgia Tech campus from December 5-7, 1969. Professor George Sowers was the guest speaker. There were approximately 50 attendees to the meeting. This event was such a success, interest spread quickly and an annual conference was soon established. A steering committee was formed to be a governing body consisting of one member of each state transportation agency involved as well as one member each from the Federal Highway Administration and the Transportation Research Board. The committee also established a set of by-laws to assist in governing the group. The main objective in these meetings is to discuss the transfer of technology concerning the rapidly advancing technology of soil mechanics and to share success or problems in the geotechnical field to meet the demands for economical and successful transportation systems.

The previous name of this conference was, until 1976, the Southeastern Soil Engineering Conference. The steering committee chaired by the host member selects the time, place, duration of each conference for the following year. The conference rotates among member states and this method ensures that each state involved has hosted multiple times since the conference’s existence.

STGEC HISTORY

Number	Year	Location	Date
1	1969	Atlanta, Georgia	Dec. 5-7
2.	1970	Jackson, Mississippi	Dec. 2-4
3.	1971	New Orleans, Louisiana	Dec. 7-9
4.	1972	Montgomery, Alabama	Nov. 13-16
5.	1973	Orlando, Florida	Nov. 26-30
6.	1974	Covington, Kentucky	Sept. 16-19
7.	1975	Gatlinburg, Tennessee	Sept. 22-25
8.	1976	Raleigh, North Carolina	Sept. 21-23
9.	1977	Hot Springs, Arkansas	Oct. 25-28
10.	1978	Wheeling, West Virginia	Oct. 9-12
11.	1979	Charleston, South Carolina	Oct. 29-Nov.1
12.	1980	Atlanta, Georgia	Nov. 3-6
13.	1981	Virginia Beach, Virginia	Oct. 12-15
14.	1982	Jackson, Mississippi	Oct. 18-21
15.	1983	Montgomery, Alabama	Oct. 18-21
16.	1984	Winter Park, Florida	Oct. 2-5
17.	1985	Gatlinburg, Tennessee	Sept. 30-Oct. 4
18.	1986	Louisville, Kentucky	Oct. 6-10
19.	1987	Hot Springs, Arkansas	Oct. 5-8
20	1988	Raleigh, North Carolina	Oct. 3-6
21.	1989	Charleston, West Virginia	Oct. 7-11
22.	1990	New Orleans, Louisiana	Oct. 29-Nov. 1
23.	1991	Charleston, South Carolina	Oct. 7-11
24.	1992	Williamsburg, Virginia	Nov. 9-13
25.	1993	Natchez, Mississippi	Oct. 4-8
26.	1994	Atlanta, Georgia	Oct. 24-28
27.	1995	Huntsville, Alabama	Oct. 23-27
28.	1996	Cocoa Beach, Florida	Oct. 21-25
29.	1997	Chattanooga, Tennessee	Oct. 27-31
30.	1998	Louisville, Kentucky	Oct. 13-16
31.	1999	Asheville, North Carolina	Oct. 4-8
32.	2000	Little Rock, Arkansas	Oct. 2-6
33.	2001	Roanoke, Virginia	Oct. 16-19
34.	2002	Baton Rouge, Louisiana	Oct. 7-11
35.	2003	Charleston, South Carolina	Oct. 20-24
36.	2004	Biloxi, Mississippi	Oct. 18-22
37.	2005	Lake Lanier Islands, Georgia	Oct. 31-Nov.4
38.	2006	Florence, Alabama	Oct. 30-Nov.3
39.	2007	Bowling Green, Kentucky	Oct. 8-12
40.	2008	Pigeon Forge, Tennessee	Oct. 27-31
41.	2009	Wilmington, North Carolina	Nov. 2-5
42.	2010	Charleston, West Virginia	Oct. 4-7
43.	2012	Richmond, Virginia	Oct. 22-25
44.	2013	Baton Rouge, Louisiana	Dec. 2-5
45.	2014	Mobile, Alabama	Oct. 27-30
46.	2015	Greenville, South Carolina	Oct. 19-23
47.	2016	Biloxi, Mississippi	Nov. 7-10
48.	2017	Savannah, Georgia	Dec. 11-15
49.	2018	Louisville, Kentucky	Oct. 8-11
50.	2019	Chattanooga, Tennessee	Nov. 4-7

50th STGEC Attendees

Abruzzo	Mike	Richard Goettle, Inc.
Adamo	Anthony	TTL, Inc.
Agee	John	Terracon Consultants, Inc.
Allen	Lauren	Mintek Resources
Arellano	David	University of Memphis
Arp	Matt	Wright Brothers Contracting
Ashburn	Russ	GEOSERVICES, LLC
Ashtiani	Jay	United Consulting
Bailey	Ilya	Ranger Consulting, Inc.
Bailey	Joseph	Infrastructure Consulting & Engineering
Bailey	Reid	GeoStabilization International
Bailey	Warren	Ranger Consulting, Inc.
Bambarger	James	TTL, Inc.
Barnes	Robert	ECS Central, PLLC
Barnwell	Molly	AL DOT
Barrett	Dusty	American Engineers, Inc.
Batten	Mike	HDR Engineering Inc. of the Carolinas
Bauer	Jennifer	Appalachian Landslide Consultants, PLLC
Belk	Neill	Wood Environment & Infrastructure Solutions, Inc.
Bender	Susanne	Infrastructure Consulting & Engineering
Billington	Edward	ESP Associates, Inc.
Black	Christopher	GA DOT
Blanton	Jamie	Thompson Engineering, Inc.
Bogdan	Lucian	DYWIDAG Systems International, USA, Inc
Bonner	Cameron	AL DOT
Boone	Jessie	Southeast Cement Promotion Association
Boone	Simon	Access Limited Construction
Boudra	Luther	Wood Environment & Infrastructure Solutions, Inc.
Boudra	Mildred	Wood Environment & Infrastructure Solutions, Inc.
Bozorgi	Arash	RK&K
Brill	Gary	Schnabel Engineering
Broyles	Christina	STGEC - Treasurer
Broyles	William	STGEC - Treasurer
Bruce	Zachary	HDR Inc.
Buffington	Sandy	Ranger Consulting, Inc.
Burnett	Darrel	Metric Engineering, Inc.
Bussey	Kenny	HDR Engineering Inc. of the Carolinas
Caldwell	Tripp	Humboldt MFG. Co.
Campbell	Ben	Propex GeoSolutions
Cannon	John	Terracon Consultants, Inc.
Carlton	Beverly	AL DOT
Carpenter	Michael	KY Transportation Cabinet Division of Structural Design
Carroll	Scott	A H Beck Foundation Company, Inc.

50th STGEC Attendees

Carter	Lake	Ingios Geotechnics, Inc.
Chappell	Doug	Wurster Engineering & Construction, Inc.
Chittenden	Devin	HDR Inc.
Clarke	Richard	Simco Drilling Equipment, Inc.
Clements	Mike	Huesker Inc.
Conrad	Robert	Plasti-Fab EPS PRODUCT SOLUTIONS
Cowan	Jacob	American Engineers, Inc.
Crace	Adam	Stantec Consulting Services Inc.
Cross	Eric	Pyramid Geophysical Services
Curtis	Richard	Terracon Consultants, Inc.
Czor	Lee	Geotechnology, Inc.
Dapp	Steven	Dan Brown and Associates, PC
Denbroeder	Erik	Williams Form Engineering Corp.
Derenski	Andy	Uretek usa
DiCindio	Michael	Acker Drill Company
Dorsey	Matthew	Geopier Foundation Company
Dorsey	Renardo	AL DOT
Dotson	Jamey	Geosyntec Consultants
Dulaney	Bennett	Southern Earth Sciences, Inc.
Edwards	Brian	HDR Inc.
Elsayed	Ashraf	Geotechnology, Inc.
Embry	Scott	GeoStabilization International
Epstein	Aaron	Geocomp Corporation
Fanara	Pete	Geo-Terrain Organization, Inc.
Fargher	John	ESP Associates, Inc.
Ferguson	Nicholas	Louisiana DOTD/LTRC
Filshill	Archi	AERO AGGREGATES, LLC
Fisher	Anthony	The Reinforced Earth Company
Ford	Doug	Atlas Tube
Fordham	Frank	The Reinforced Earth Company
Foster	Glen	GA DOT
Farmer	Chris	Bacon Farmer Workman Engineering & Testing, Inc.
Freistaedter	David	GeoStabilization International
Friedrich	Chuck	Carolina Stalite Co.
Fuller	Shannon	Drew Foam Companies, INC
Gardner	Renee	South Carolina Department of Transportation
Gasiecki	Eric	ECS Central, PLLC
Gautreau	Gavin	Louisiana DOTD/LTRC
Gersbach	Jeff	DYWIDAG Systems International, USA, Inc
Givens	Derek	Drew Foam Companies, INC
Givens	Ronnie	Drew Foam Companies, INC
Godfrey	John	ECS Central, PLLC
Gomez	Milton	Aerix Industries
Gonzales	Rafael	Southern Earth Sciences, Inc.

50th STGEC Attendees

Gore	Octavia	GA DOT
Graham	David	Dan Brown and Associates, PC
Griffing	Zachary	Mississippi Department of Transportation
Gross	Ryan	Simco Drilling Equipment, Inc.
Guyomard	Vince	The Reinforced Earth Company
HACKNEY	NATHAN	CJ Geo
Haddad	Maysoon	Thompson Engineering, Inc.
Haddad	Saieb	Thompson Engineering, Inc.
Haney	Brian	Fugro Loadtest
Hannah	Therrell	CENTRAL MINE EQUIPMENT COMPANY
Hannam	David	Golder Associates Inc.
Harman	Nickolas	South Carolina Department of Transportation
Heenan	Jeff	Pyramid Geophysical Services
Heinzer	Mark	City of Chattanooga Department of Transportation
Herrera	Rodrigo	Florida Department of Transportation
Hewatt	Jason	Redi-Rock International
Hoilman	Jeff	Propex
Hon	Kevin	S&ME, Inc.
Hooks	Benjamin	Bacon Farmer Workman Engineering & Testing, Inc.
Howey	Beth	HDR Engineering Inc. of the Carolinas
Hruby	Thomas	NOVA Engineering & Environmental, LLC.
Hyatt	Tom	GRL Engineers, Inc.
Issa	Moussa	GA DOT
Jacobs	Scott	Hayward Baker & Case Atlantic Company
Johnson	Benjamin	Berkel & Company
Johnson	Brandon	Louisiana DOTD/LTRC
Jones	Larry	Florida Department of Transportation
Karasek	Jim	Drew Foam Companies, INC
Keller	David	Richard Goettle, Inc.
Kilgore	Rick	Ranger Consulting, Inc.
Kilgore	Tammy	Ranger Consulting, Inc.
Kitchens	Lance	Russo Corporation
Knieper	John	SiteMix Pressure Grouting LLC
Krupansky	Joseph	Gannett Fleming
La Cour	Ian	Mississippi Department of Transportation
Lam	Jeff	Rocscience Inc.
Leon	Lila	HDR Inc.
Lewis	Dwane	Southeast Cement Promotion Association
Lewis	Paul	Gannett Fleming
Lien	Bon Hsiang	Wood Environment & Infrastructure Solutions, Inc.
Lin	Guoming	Terracon Consultants, Inc.
Lins	Brian	Cal-Cert Company
Litkenhus	Mark	Stantec

50th STGEC Attendees

Littel	Eric	Huesker Inc.
Long	Nathan	KSWA
LuQuin	José	GeoStabilization International
Luskin	Mark	ECS Central, PLLC
Lyne	Bob	Geobrugg North America
MacDonald	Wesley	Geosyntec Consultants
Maher	Stephen	Geopier Foundation Company
Mai	Kevin	Louisiana DOTD/LTRC
Marasa	Mike	Hayward Baker & Case Atlantic Company
Marsal	Eric	American Excelsior Company
Martin	Mary Carolyn	Russo Corporation
McDonald	Michael	Stantec Consulting Services Inc.
McGee	Peggy	Ranger Consulting, Inc.
McGirl	James	S&ME, Inc.
McGirl	James	S&ME, Inc.
McGirl	James	S&ME, Inc.
McKinney	Mac	Diedrich Drill
Meadows	Casey	Redi-Rock International
Meyer	Sam	Menard Group USA
Miller	Dru	GeoStabilization International
Miller	Joel	Retired
Milligan	Nick	Foundation Technologies, Inc.
Mitchell	Dennis	American Engineers, Inc.
Moghaddam	Rozbeh	RBM Consulting Group, Inc.
Molino	Marty	GeoTesting Express, Inc.
Moore	Jack	Arcosa Lightweight
Moore	Judi	Ameritech Slope Constructors, Inc.
Moore	Roger	Ameritech Slope Constructors, Inc.
Moore	Roger	Ameritech Slope Constructors, Inc.
Moore	Timothy	Stantec Consulting Services Inc.
Morris	Matthew	Gannett Fleming
Muchard	Mike	Applied Foundation Testing
Mulla	Mohammed	Thompson Engineering, Inc.
Mylapore Ganesh	Ramnath	Terracon Consultants, Inc.
O'Riorden	Theresa	Geocomp Corporation
Oliphant	Julie	KSWA
Patterson	Michael	Drew Foam Companies, INC
Peck	Michael	TTL, Inc.
Peters	Kyle	ECS Central, PLLC
Pierce	Adam	Propex GeoSolutions
Poindexter	Marilyn	Atlas Tube
Rauser	Jesse	Louisiana DOTD/LTRC
Razavi	Ali	2MNEXT

50th STGEC Attendees

Reccord	Todd	Ameritech Slope Constructors, Inc.
Richardson	David	Durham Geo Slope Indicator
Riggs	Kevin	Tensar International Corporation
Robertson	Donald	Applied Foundation Testing
Ross	Adam	KY Transportation Cabinet Division of Structural Design
Santee	Thomas	NCDOT
Savage	David	CMEC
Savage	Tammy	CMEC
Schmidt	Woody	Mintek Resources
Sheffield	Richard	Thompson Engineering, Inc.
Siar	Bill	Diedrich Drill
Simmons	Justin	Hayward Baker & Case Atlantic Company
Simpson	Michael	Infrastructure Consulting & Engineering
Sinharoy	Santanu	United Consulting
Sliger	Ellen	Florida Department of Transportation
Smith	Dan	Geotechnics
Smith	Kristy	Louisiana DOTD/LTRC
Snider	Tim	Plasti-Fab EPS PRODUCT SOLUTIONS
Snyder	Katie	City of Chattanooga Department of Transportation
Snyder	Matt	ICE of CAROLINAS, PLLC
SOBODASH	EDWARD	American Wick Drain Corporation
Speck	Jeffrey	Arcosa Lightweight
Sternberg III	Sam	Dan Brown and Associates, PC
Stoerger	Audrey	HDR Inc.
Story	Trip	Drillers' Choice, Inc
Stroud	Michael	Mississippi Department of Transportation
Sullivan	Randall	Golder Associates Inc.
Sutmoller	Nico	Aerix Industries
Tallent	Jeff	GEL Solutions
Taluskie	Taylor	Terracon Consultants, Inc.
Tavera	Ed	NOVA Engineering & Environmental, LLC.
Tay	Eric	NOVA Engineering & Environmental, LLC.
Taylor	Gary	RK&K
Thompson	Samantha	2MNEXT
Thomson	Sally	Infrastructure Consulting & Engineering
Thurman	Jess	Louisiana DOTD/LTRC
Tinsley	Raymond	Arkansas DOT
Towery	Trevor	Elastizell Corp. of America
Tutolo	Tom	Pile Dynamics, Inc.
Tyner	Charlie	Drew Foam Companies, INC
Upchurch	Harvey	TTL, Inc.
Valiquette	Michael	Infrastructure Consulting & Engineering
Vaughan	Johanna	Draper Aden Associates

50th STGEC Attendees

Vencill	Kal	EGSci Consulting Inc.
Vinson	James	SoilTech Consultants
Vissman	Courtney	Golder Associates Inc.
Walker	John	Mobile Drill Intl
Walker	Kevin	HDR Inc.
Warburton	Wayne	Aldea Services
Watkins	Bret	HDR Inc.
Watkins	Miles	Wood Environment & Infrastructure Solutions, Inc.
Watson	Joshua	GEOSERVICES, LLC
Wester	Josh	Mintek Resources
White	Stephen	Controls Group USA Inc
Wiesman	Kevin	Access Limited Construction
Wilder	Barry	Road Worx, Inc.
Wilson	Harris	Russo Corporation
Winans	Joe	Acker Drill Company
Wood	Clinton	University of Arkansas
Zeb	Asif	GeoStabilization International
Zhang	Jim	Skanska
Zimmerman	Shandie	Huesker Inc.