Approximately one-fourth of the Nation’s 600,000 bridges require rehabilitation, repair, or total replacement. However, the work that occurs on-site construction activities can have significant social impacts to mobility and safety. In many cases, the direct and indirect costs of traffic detours that result from the loss of a bridge during construction can exceed the actual cost of the structure itself. For example, full-lane closures in large urban centers, or on highways with heavy traffic volumes, can have a significant economic impact on commercial and industrial activities in the region. Partial lane closures and other bridge activities that occur alongside adjacent traffic can also lead to safety issues. Because of the potential economic and safety impacts, minimizing traffic disruptions is a goal that should be elevated to a higher priority when planning bridge related construction projects. ABC is bridge construction that uses innovative planning, design, materials, and construction methods in a safe and cost-effective manner to reduce the onsite construction time that occurs when building new bridges or replacing and rehabilitating existing bridges.

ABOUT THE SPEAKER:

Mr. Beerman brings over 20 years of experience related to program delivery and oversight, design, repair/rehabilitation, management, inspection and construction for both highway and rail structures located throughout the United States. He currently serves as a Senior Structural Engineer with the Federal Highway Administration Resource Center based out of Atlanta, GA and is the national deployment coordinator for Accelerated Bridge Construction for the agency. Mr. Beerman chairs the TRB Joint Subcommittee for Accelerated Bridge Construction (AFF00-2), serves as the FHWA’s liaison for the AASHTO SCOBs subcommittee on bridge construction (T4), is an Executive Panel member for the U.S. Department of Transportation’s University Transportation Center for Accelerated Bridge Construction, and co-chairs the Georgia/Carolina’s regional PCI committee. Prior to joining the Federal Highway Administration Mr. Beerman has held government positions with the Louisiana and West Virginia Departments of Transportation; in addition to private sector positions with Modjeski and Master’s and HDR, Inc. Mr. Beerman is the recipient the FHWA’s Team Leadership award, the FHWA Bridge Leadership Council’s National Leadership award, and the FHWA Associate Administrator’s Corporate award.
Foamed Glass Lightweight Aggregate
Craig Calabria, Ph.D., P.E.

Foamed Glass Lightweight Aggregate (FG-LWA) is a product created using recycled glass and other recycled additives. FG-LWA has been successfully used on numerous highway applications as a lightweight fill and aggregate for lightweight concrete in northern Europe for over 20 years and is now available in the U.S. As a material for road construction purposes, this light weight aggregate has unit weights ranging from 150 to 400 kg/m$^3$ (~10 – 25 lb./ft$^3$) and also exhibits excellent thermal insulating properties. FG-LWA has other beneficial characteristics such as stability under long-term burial conditions, volume stability, ease of transport and handling, and its inert (non-leachable) behavior. Other geotechnical engineering applications where FG-LWA can be used include: bridge abutments fill, retaining wall fill, drainage or capillary break layer, green roof and plaza deck fill.

ABOUT THE SPEAKER:
Specialized by education and experience in geotechnical/geoenvironmental engineering and with more than forty years of experience in consulting engineering and the construction industry, Dr. Craig Calabria served as Principal of GeoSystems Consultants. Dr. Calabria earned Bachelor and Master degrees from Drexel University, Philadelphia, USA, and PhD from Salford University, Manchester, United Kingdom (UK). Dr. Calabria worked on projects in Far East, Middle East, Canada, the Caribbean as well as more than fifteen states and territories in the USA. Dr. Calabria is a Registered Professional Engineer in four states.

Dr. Calabria has been engaged as an expert witness, technical consultant, participated in regulatory proceedings, and presented technical lectures to regulatory groups and community advisory committees on behalf of clients. Dr. Calabria was primary investigator for state-of-the-art literature review, investigating construction techniques and engineering properties of organic soils.

Dr. Calabria is currently engaged as a Senior Consultant to various A/E firms and visiting professor at Salford University Manchester, UK. He taught courses in Soil Mechanics, Foundation Engineering, Engineering Geology, and Landfill Design at Drexel University and the University of Pennsylvania in Philadelphia. In 1994, Dr. Calabria was named the American Society of Civil Engineers (ASCE) Philadelphia Section Geotechnical Engineer of the Year, and the Civil Engineer of the Year in 2000.
ANNOUNCEMENTS

Congratulations to the Geotechnical Engineer of the Year for 2017: Robert Crawford, P.E.

Philadelphia Section ASCE
2017 Awards Program
News Release

5/4/17 - For Immediate Release

The Philadelphia Section of the American Society of Civil Engineers (ASCE) has cited Robert Crawford as our Geotechnical Engineer of the Year for 2017. This award was presented to Mr. Crawford at the Section’s annual Spring Social, which was conducted on May 4.

Mr. Crawford is the Chief Engineer for James J. Anderson Construction Company in Northeast Philadelphia, where he directs the engineering activities for the firm’s construction projects. He has held this position since 2009 and has over thirty years in the heavy and highway construction industry in the Philadelphia region. He has been an integral part of major local projects as part of the I-95 rebuilding program, including the currently-underway Girard Avenue interchange reconstruction.

Mr. Crawford received his Bachelor of Science degree in Civil Engineering from Drexel University in 1986 as well as a Masters degree from Drexel the following year. He is an active member of the Section’s Delaware Valley GeoInstitute. He and his family reside in Newtown, Bucks County.
Earn PDHs at 2016-2017 DVGI Events

Upcoming Dates for 2016-2017 Dinner Meetings and events are as follows:

- **May 16th**: Joint Meeting with SEI
- **June 23rd**: DVGI Golf Outing

*One PDH will be awarded for most dinner meetings that you attend.*

*If you are interested in presenting at one our monthly meetings or have ideas about potential speakers, please get in touch with a DVGI board member.*

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HAVE DVGI PUBLISH YOUR ARTICLE, ADVERTISEMENT, OR JOB POSTING

- Do you have an interesting article on a project or individual in your organization that you would like to have published in the DVGI newsletter?
- Would you like to get the word out about a job opening, new venture, etc. to our membership via the newsletter?

Please submit your articles or news items for consideration in the next edition of the newsletter or get in touch about our reasonably-priced advertising by contacting Theresa Loux (tloux@aeroaggregates.com).

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**DVGI Merchandise Available for Purchase**

Coffee mugs ($8) and lapel pins with the DVGI logo ($5) are available for purchase. See Russ Preuss if you are interested in purchasing either of these items.

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**ASCE/G-I Members:**

Read past and present issues of Geo-Strata magazine online at [www.asce.org](http://www.asce.org)
ANNOUNCEMENTS

Geosynthetic Institute

**GSI Webinars for 2017—(1.5 PDH/each)**

*From 11:30 AM—1:00 PM (Eastern Time)*

*Topics, Dates and Registration at [www.geosynthetic-institute.org/webinar.htm](http://www.geosynthetic-institute.org/webinar.htm)*

*Cost: GSI Members $200; Nonmembers $250*

<table>
<thead>
<tr>
<th>Date</th>
<th>GSI No.</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 24</td>
<td>W-13</td>
<td>Beneficial Uses of Abandoned and/or Closed Landfills</td>
</tr>
<tr>
<td>June 14</td>
<td>W-14</td>
<td>Lifetime Predictions of Exposed &amp; Nonexposed Geosynthetics</td>
</tr>
<tr>
<td>June 28</td>
<td>W-21</td>
<td>A Brief Overview of Geosynthetics and Their Major Applications</td>
</tr>
<tr>
<td>July 12</td>
<td>W-15</td>
<td>In-Situ Stability of Soil Slopes Using Nailed GS</td>
</tr>
<tr>
<td>August 9</td>
<td>W-16</td>
<td>Sand Drains-to-Wick Drains to Sand Columns</td>
</tr>
<tr>
<td>September 13</td>
<td>W-17</td>
<td>Geosynthetics in Erosion Control</td>
</tr>
<tr>
<td>October 11</td>
<td>W-1</td>
<td>MSE Wall Failure Data Base (300 cases)</td>
</tr>
<tr>
<td>October 25</td>
<td>W-2</td>
<td>MSE Wall Back Drainage Design</td>
</tr>
<tr>
<td>November 8</td>
<td>W-3</td>
<td>MSE Wall Remediation and Monitoring</td>
</tr>
<tr>
<td>December 13</td>
<td>W-4</td>
<td>MSE Wall Field Construction Inspection Practices</td>
</tr>
</tbody>
</table>
Civil Engineering Risk Management
September 18–19, 2017

The practice of risk management in an organization is key to effectively detecting threats, while also recognizing and identifying opportunities. This two-day short course presents practical guidance on how to effectively incorporate risk management into an organization's mission and day-to-day operations. Utilizing proven risk management planning and implementation techniques within an enterprise improves:

- decision making
- project management and delivery
- achievement of enterprise goals and objectives
- communication among internal and external stakeholders

Mechanically Stabilized Earth Walls & Reinforced Soil Slopes
Date to be announced

This popular course presents the latest national recommendations for the design and construction of reinforced soil structures. It includes wall design guidance on LRFD and ASD plus hands-on instruction in using two powerful software packages, MSEW and ReSSA, which are licensed to the FHWA and State DOTs.

This practical training program, based on AASHTO and FHWA technical specifications and design and construction recommendations on soil reinforcement, will help you appreciate and implement mechanically-stabilized earth walls and reinforced soil slopes (MSEW/RSS).

This course enables you to gain practical knowledge in all areas of mechanically stabilized earth walls and reinforced soil slopes, including:

- design (LRFD, Allowable Stress for MSE Walls, designs beyond AASHTO)
- construction monitoring
- contractual aspects

ABOUT THE INSTRUCTOR
Master Trainer Jerry A. DiMaggio, P.E., D.GE has more than 40 years of experience in construction and civil and transportation engineering, as a world-renowned technical expert, project manager, consultant and instructor.

Also in Fall 2017...
- Management Essentials for the Railroad Industry
- Management Essentials for Engineers & Scientists
- PE Exam Review Course

Visit the University of Delaware Professional Engineering Outreach website to view other upcoming programs for engineers.
See outreach. engr. udel. edu/part-time-education-training

University of Delaware
PROFESSIONAL ENGINEERING OUTREACH
302-831-8302 enggoutreach@udel. edu
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INTERNATIONAL CONFERENCE ON HIGHWAY PAVEMENTS & AIRFIELD TECHNOLOGY
Loews Philadelphia Hotel
Philadelphia, PA
August 27-30, 2017

Sustainable Pavements and Safe Airports

Register Today!
This conference brings together designers, project/construction managers, academics, and contractors from around the world to discuss construction, design, and research topics related to highway and airfield pavements and airport safety technologies.

For information on exhibits and sponsorships, please contact Drew Caracciolo at dc.caracciolo@asce.org or (703) 295-6087.

Conference Co-Chairs
Imad Al-Qadi, Ph.D., P.E., Dist. M.ASCE
University of Illinois at Urbana-Champaign
Hasan Ozer, Ph.D., M.ASCE
University of Illinois at Urbana-Champaign
Eileen M. Velez-Vega, P.E., M.ASCE
Kimley-Horn Puerto Rico, LLC
Scott D. Murrell, P.E., M.ASCE
Applied Research Associates

www.pavementsconference.org
EVENTS AND CONFERENCES

3rd Annual GeoWall Competition

Congratulations to all students who participated in the 3rd Annual Mid-Atlantic Regional (MAR) GeoWall competition, held on Saturday, April 8, 2017, at the University of Maryland, College Park. The competition was once again championed by members of DVGI. Three schools participated: University of Delaware, Temple University, and the University of Mount Union (who traveled from Alliance, OH to attend the event!). The teams designed a scale retaining wall made from poster board facing, packaging tape, and a minimal amount of kraft paper reinforcement to hold back hundreds of pounds of backfill and a surcharge and horizontal load. On competition day, the students displayed a poster with the details of their designs, and manufactured, built, and tested their MSE walls. Points were based on the quality and content of information presented in design poster, reinforcement quantity, and construction time. The University of Delaware team won the competition!

A special thank you to all of the judges, all of the sponsors for the MAR competition, and to UMD as the host school. If you have any questions or would like to get involved with the 2018 competition, please get in touch with Eric Backlund (ebacklund@kleinfelder.com).

(All images courtesy of T. Loux)
EVENTS AND CONFERENCES

4th ANNUAL DVGI GOLF OUTING

You are invited to participate in the 4th Annual Delaware Valley Geo-Institute Golf Outing on June 23, 2017. Proceeds from the outing will benefit the scholarship fund. This event is an excellent opportunity for you to demonstrate your continued support for the DVGI.

Come join us to get some fresh air, network, and have a good time!

Who: ASCE and DVGI Members, Friends, Clients
All Skill Levels Welcome
Prizes for Best and Most Honest Team Scores

Where: Jeffersonville Golf Club
2400 W. Main Street
Jeffersonville, PA 19403

When: Friday, June 23, 2017
Tee times starting at 12:30 pm, Scramble Format

Cost: Golf Registration: $100/person
Cost includes Cart along with Beef and Beer Buffet following Golf

Sponsorships: Individual Hole $125
Closest to the Pin $150
Long Drive $150
Back By Popular Demand: Shortest Driver $150
Beverage $150
Dinner $250
Prize Donations Always Appreciated

Sponsorships include Company Signage at the Tee Area

Registration: Online at www.DVGI.org
Villanova Presents: 2017 PA Stormwater Management Symposium

October 11-12, 2017

Hosted by Villanova University, this symposium will include topics related to resilient stormwater systems. The purpose is to advance the knowledge, and understanding of sustainable stormwater management for those dealing in all aspects of planning, design, construction, maintenance and operations, and regulatory compliance. There will be a workshop for municipal officials preceding the symposium on October 10th.

Call for Presenters: Interested authors are encouraged to submit a brief abstract of not more than 200 words by June 15.

Please visit the VUSP website for more information:
ANALYSIS AND BEHAVIOR OF DOUBLE SHEET PILE COFFERDAM

Bashar S. Qubain, MASCE, Jianchao Li, MASCE and Kamil Nazha, MASCE

ABSTRACT: The Philadelphia Water Department is rehabilitating Belmont Raw Water Basin. As part of this work, a 500-ft long, temporary cofferdam was designed to retain 35 ft of combined water and soil at the western half during the reconstruction of the eastern half. A cofferdam that comprises two integral rows of sheet piles was selected to take advantage of the soil’s weight between the sheet piles for increased stability. To fine tune the design, a geotechnical investigation was carried out to verify the subsurface conditions and, in particular, the top of rock variations along the centerline of the cofferdam. A detailed finite element analysis was performed based on the subsurface findings and incorporating the construction sequence to evaluate the behavior of the cofferdam at the following stages: installation of tie rods to connect to the two rows of sheet piles; partial excavation and installation of tiebacks; complete excavation of the east basin, and demolition of the cofferdam. Inclinometers and survey markers were installed every 100 ft along the cofferdam and were monitored throughout construction. The deformation measurements were in good agreement with the finite element results.
Summary: Due to high top of rock and lack of sheet pile embedment, GeoStructures used FEM method to design a hybrid double row sheet pile cofferdam. The hybrid system incorporated conventional system components as well as tiebacks to compensate for the lost embedment and provide the necessary stability. The system was constructed and instrumented using inclinometers and survey markers. Evidently, the deflections of the sheet piles based on FEM were in general agreement with those measured in the inclinometers.

When embedment is restricted due to shallow rock, a double wall system can significantly improve stability, and provide a superior water cutoff when backfilled with soil or even crushed stone. It can also accommodate heavy equipment on top which is an advantageous during construction to install seepage countermeasures such as grout curtains, if necessary.

The finite element method offers a deeper insight and better understanding of the deformation behavior and interaction between tiebacks, sheet piles, infill soil and retained earth/water during various excavation and installation stages. Traditional limit equilibrium methods do not offer information about the deformation behavior of the system and may end up with an overly conservative design or, in some cases, undesirable deformations.
Axial Force in Tiebacks

Horizontal Displacement of East Row Sheet Piles (FEM vs. Inclinometers)
SITE-SPECIFIC DYNAMIC ANALYSIS: 1-D VERSUS 2-D

Jianchao Li, P.E., MASCE and Bashar S. Qubain, Ph.D., P.E., MASCE

ABSTRACT: When the subsurface profile at a given site cannot be simplified as horizontal layers or the depth to bedrock varies across the profile, validation of a typical 1-D soil column analysis is desirable in calculating the site-specific response spectrum. This point is illustrated through a detailed analysis of a multi-story building project site underlain by very soft marine clay deposits. The subsurface profile and the corresponding dynamic soil parameters are determined through field exploration, geophysical testing, and laboratory testing. Consequently, a 2-D dynamic finite element analysis is performed to provide insight into the effects of a sloping rock. The results indicate that the short period response across the sloping rock is substantially magnified in the 2-D analysis. The 1-D soil column underestimates the short period amplification factor of the spectral acceleration $F_a$ while the 1-sec period amplification factor $F_v$ generally increases with the thicker soil profile. The boundary effects of a 2-D analysis are also discussed.
Example response spectral acceleration from modified Loma Prieta, 1989

**Findings:** Short period responses across a sloping rock are substantially magnified in the 2-D analysis. The single soil column 1-D analysis underestimates the short period response and thus the site coefficient $F_s$ compared to the 2-D analysis. The site coefficient $F_s$ of the 1-sec period surface acceleration spectrum typically increases with thicker soil profile.

1-D *SHAKE* analysis or single soil column (finite element) analysis can be used for generally horizontal soil and rock profile. When site conditions indicate a sloping soil/rock profile or highly variable depth to rock, the result from a 1-D analysis is questionable and the analysis may not be conservative for short period responses. Therefore, 2-D finite element analysis should be used to capture the variations in the soil/rock profile.

*Thanks to GeoStructures for contributing the articles featured in this newsletter.*

![GeoStructures, Inc.](image)

Do you have an article or news to share? Please get in touch with our newsletter editor (tloux@aeroaggregates.com)