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2021 Fall Lecture Series

Rehabilitation and Repair of Structures

Tuesday, October 5, 12, 19, and 26

Zoom Webinar

11:30 AM – 1:30 PM Session

The ASCE Structural Engineering Institute Boston Chapter is pleased to present the 25th Fall Lecture Series entitled *Rehabilitation and Repair of Structures*. The seven lectures that comprise this series will occur virtually during four sessions, which are held on consecutive Tuesdays. Topics include:

- UHPC for Bridge Rehabilitation
- Non-Destructive Testing: Understanding Benefits and Limitations
- Emergency Response and Repair to Bridges Following Vehicle Impact
- Historic Bridge Structure Rehabilitation – Lechmere Viaduct Boston/Cambridge, MA Rehabilitation of Ports
- Revitalizing Urban Waterfronts
- Design for Sea Level Rise
- Strengthening of Concrete and Masonry Structures with Externally-Bonded Systems

Featured Lecture Series session lectures are as follows:

Session 1 – Tuesday, October 5, 2021

Lecture 1 – UPHC for Bridge Rehabilitation

Zach Haber, PhD, *FHWA*

Keeping bridges in a state of good repair is essential to keeping the transportation system operating efficiently. Agencies at all levels can deploy ultra-high performance concrete (UHPC) for bridge preservation and repair (P&R) to maintain or improve bridge conditions cost effectively. UHPC, a fiber-reinforced, cementitious composite material with mechanical and durability properties that exceed those of conventional concrete materials, can be an optimum solution for bridge infrastructure (P&R). Promising applications include bridge deck overlays, girder end repairs, expansion joint repairs, repair of prefabricated bridge element (PBE) connections, and column or pile jacketing. UHPC offers enhanced durability performance and improved lifecycle costs over traditional methods. Participants will receive a brief introduction to UHPC-class materials, an overview of promising applications and the U.S. deployment status and learn about recent projects that have used this technology. Lastly, participants will also learn how current Federal Highway Administration (FHWA) efforts are promoting the use of this innovative technology.

Session 2 – Tuesday, October 12, 2021

Lecture 2 – Non-Destructive Testing: Understanding Benefits and Limitations

Matthew Sherman, PE, *Senior Principal, Simpson Gumpertz & Heger*

Non-destructive testing (NDT) is an essential tool used by civil engineers to quickly evaluate existing conditions and investigate potential failures without causing damage to a structure. Ranging from simple hammer-sounding to highly complex stress wave analysis, these techniques help civil engineers focus

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This lecture series provides eight Professional Development Hours (PDH)

Supported by the staff of The Engineering Center Education Trust

their efforts and save project time by determining the areas of most need. Rapid improvements in technology have made NDT techniques more accessible for practitioners, increasing their availability and reliability, but it is important to know the limitations of each test and understand how to interpret the results. In this session, we will explore the types of available NDT techniques and discuss how to correctly implement and interpret the most common techniques.

By participating in this session you will learn:

- The types of NDT available and the basic physics behind them.
- The benefits and limitations of the most commonly used techniques and how to properly implement them.
- How to interpret and present results from the most commonly used techniques.
- How using multiple NDT techniques can provide a layered approach to balance time, cost, and usefulness.

Lecture 3 – Emergency Response and Repair to Bridges Following Vehicle Impact

Frank A. Artmont, PE, PhD, *Structural Engineer, Modjeski and Masters, Inc.*

This presentation will provide an overview of the design stage work associated with steel bridges which have been subjected to high-speed vehicle impacts. Typically, these stages include the initial response to the accident, analysis of the structure in the damaged state, and development of an action plan for returning the structure to a serviceable condition. These stages will be described in a practical way using a case study.

The case study involved an over-height vehicle which struck and damaged a portion of a through-truss bridge carrying State Route 6 over French Creek in northwestern Pennsylvania in January 2019. The vehicle impacted and severed the bottom chord of the end portal frame and damaged the bottom chords of the next two interior sway frames of the seven panel Pratt truss span. The main truss verticals were dragged inwards and along the direction of motion as a result of their connections with the interior sway frames, severely damaging these critical members and jeopardizing the ability of the structure to carry loads. The structure was immediately closed to all traffic. The project ultimately required an assessment of the capacity of the structure in its damaged state, a determination of whether the bridge could be reopened at a reduced posting, and the development of repair plans for the structure.

Learning Objectives:

- How to evaluate damage after a truck impacting a bridge.
- How to analyze damaged members and determine their capacity.
- How structures redistribute loading after being damaged.
- How damaged structures can be successfully repaired.

Session 3 – Tuesday, October 19, 2021

Lecture 4 – Historic Bridge Structure Rehabilitation – Lechmere Viaduct Boston/Cambridge, MA

Katie Mancinelli, PE, *Senior Structural Engineer, VHB*

Stephen Jahnes, PE, *Project Manager, VHB*

This session describes considerations for repair and rehabilitation of historic bridge structures.
The discussion will include an overview of the process to follow when a bridge structure has been identified as eligible or listed in the National Register of Historic Places. Also discussed will be challenges with designing and detailing for a piece of legacy infrastructure, and the challenges associated with utilizing new materials and technologies to increase the load carrying capacity, marrying new and historic design details, and planning for the unknown. The presentation will highlight the Lechmere Viaduct project as a specific case study to show how these considerations can be applied.

Learning Objectives:

- Understand the Section 106 process and its impact on design development and construction execution.
- Discuss how modern materials and current technologies can be applied in a conscientious way and benefit a historic structure rehabilitation.

Lecture 5 – Revitalizing Urban Waterfronts

Erika Rosenstein, PE, *Group Leader Ports and Maritime, Jacobs*

Many major coastal cities originated as hubs for maritime industry and trade. Throughout the 20th century urban centers utilized their waterfront primarily as working seaports. However, with the advent of centralized container terminals, many of these facilities became obsolete and were abandoned as operating ports. A significant number of cities struggled to repurpose their waterfronts initially and much of the associated infrastructure has fallen into various states of disrepair. Increasingly,

there is a call to revitalize these underutilized waterfront sites with future-focused adaptive reuse and improved public access. Undertaking rehabilitation work along the waterfront is challenging due to the harsh and dynamic marine environment, the complexity of underwater repair work, and limited site access. All these factors make rehabilitation and continued maintenance of waterfront infrastructure far more difficult and costly than typical inland facilities. However, through holistic planning and a judicious repair approach, these transformations are achievable, and can create incredible new assets for our urban centers. There are several examples of the successful conversion of former industrial shipping sites into mixed-use hubs and public waterfront parks throughout the country.

Learning Objective:

- This presentation will focus on the history of urban waterfronts, challenges of the rehabilitation work, the importance of lifecycle modelling for continued maritime maintenance, and the growing importance of embedding adaptive resiliency into designs.

Session 4 – Tuesday, October 26, 2021

Lecture 6 – Design for Sea Level Rise

Richard Houghton, ASLA, *Principal Landscape Architect, Tighe & Bond*
Eric Ohanian, PE, *Project Manager, Tighe & Bond*
Andrew Stebbins, LEED AP, Senior *Project Manager, The Architectural Team (TAT)*

This session describes approaches for addressing potential future sea level rise in coastal building projects and bridges. The discussion includes review of some current guidelines and approaches for estimating projected sea level rise and wave impacts. The presentation will highlight some recent building and bridge projects that demonstrate different approaches that landscape architecture, architecture, engineered systems, seawall design, and overall infrastructure design can work to protect and enhance communities with solutions that serve multiple purposes.

- Guidelines for estimating impacts of sea level rise/ risk assessment/ wave impacts.
- Building design applications and some case studies.
- Bridge design applications and some case studies.

Learning Objectives

- Recognize strategies for coastal resilience.
- Discuss approaches for developing resilient buildings and bridges.
- Explore opportunities to enhance the public landscape.
- Apply creative problem-solving for protecting the waterfront.

Lecture 7 – Strengthening of Concrete and Masonry Structures with Externally-Bonded Systems

Gustavo Tumialan, PhD, PE, *Senior Project Manager, Simpson Gumpertz & Heger*

Repair and rehabilitation projects often include structural strengthening to increase or restore the load-carrying capacity of elements subjected to deterioration or damage, construction or design errors, increased service loads, and building code requirements. Externally-bonded fiber-reinforced polymer (FRP) and fiber-reinforced cementitious matrix (FRCM) composite systems are viable tools for structural repair, strengthening, and rehabilitation of existing concrete and masonry members. High tensile strength, light weight, resistance to corrosion, ease of installation, and limited disruption to building operations during installation make externally-bonded systems an attractive option.

FRP systems have been used for about two decades in the United States. FRCM systems is another strengthening tool, introduced to the US repair industry in recent years but with several years of experience in Europe. This presentation will primarily focus on FRP systems and will also provide an overview on FRCM systems.

Objectives:

- Introduce externally-bonded systems commonly used for structural strengthening.
- Describe available guides for the design and construction of externally-bonded systems for structural strengthening, including recent developments.
- Discuss advantages and limitations of externally-bonded systems, structural behavior, design considerations, in-service performance, installation methods and QA/QC.
- Present case studies illustrating the use and potential of externally-bonded systems for strengthening of concrete and masonry structures.

Speakers:

Zach Haber, PhD, *FHWA*

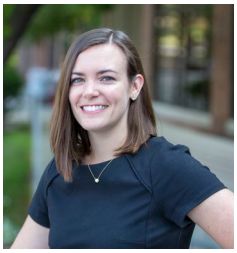
Dr. Zach Haber is a research structural engineer on FHWA's Bridge Engineering Research Team at the Turner-Fairbank Highway Research Center (TFHRC) in McLean, Virginia, USA. Dr. Haber provides technical assistance and outreach to bridge owners, designers, and consultants interested in developing or deploying innovative bridge engineering solutions. He also supports the Bridge Engineering Research Team involvement in high-profile FHWA initiatives such as Every Day Counts (EDC) and forensic investigations of bridge failures in the US. Dr. Haber is currently the co-lead for the FHWA's EDC-6 innovation: UHPC for Bridge Preservation and Repair. Dr. Haber received his BSCE and MSCE from the University of Central Florida, and his PhD from the University of Nevada, Reno.

Matthew Sherman, PE, *Senior Principal, Simpson Gumpertz & Heger*

Matthew Sherman specializes in the intersection of construction operations, structural engineering, and construction materials. As a Senior Principal with Simpson Gumpertz & Heger, he leads integrated teams of engineers, chemists, petrographers, and other professionals to solve complex interdisciplinary challenges. His work includes evaluating existing structures, assessing concrete materials, designing integrated repairs, supporting new construction, and overseeing repair and rehabilitation of specialty structures. Mr. Sherman gives back to the industry in many ways, including as an active member and Fellow of the American Concrete Institute and International Concrete Repair Institute.

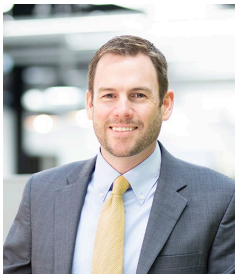
Frank A. Artmont, PE, PhD, *Structural Engineer, Modjeski and Masters, Inc.*

Dr. Frank A. Artmont is an Engineer in the National Bridge Group of Modjeski and Masters, Inc. He received his BS in Civil Engineering and PhD in Structural Engineering at Lehigh University. His recent projects with M&M include design of the new Hawk Falls Bridge for the Pennsylvania Turnpike Commission, the forensic study of the fracture in the Delaware River Turnpike Toll Bridge, the investigation of the Chirajara Bridge Collapse in Colombia, the rehabilitation of the SR4001 English Center Suspension Bridge, and numerous other design, rehabilitation, and research projects related to steel and concrete bridges. Frank has presented at numerous conferences and meetings over the past eight years and is an active member of the AASHTO/NSBA Collaboration.



Katie Mancinelli, PE, *Senior Structural Engineer, VHB*

Katie is a Senior Structural Engineer in VHB's Watertown, Massachusetts, office. She has extensive experience in design and construction of roadway and pedestrian transportation infrastructure projects delivered through both conventional Design-Bid-Build and alternative Design-Build procurements. Her experience is focused on the structural design of replacement and rehabilitated bridges, culverts, earth retention systems, and bridge load ratings. As a consultant to state agencies and large municipalities Katie helps clients improve mobility by solving complex transportation issues.



Stephen Jahnes, PE, *Project Manager, VHB*

Stephen is a Project Manager in VHB's Watertown, MA, Structures group and is a professional engineer licensed in Massachusetts. For more than a decade, he has delivered effective solutions on bridge engineering projects through skillful project management and innovative design. He works closely with Transportation agencies including MassDOT, Massport, and the MBTA and has contributed to notable projects such as the Lechmere Viaduct Restoration project, the Route 44 over 24 Design Build Bridge Replacement, and he has provided bridge inspection services for several Massport owned bridges.

Erika Rosenstein, PE, *Group Leader Ports and Maritime, Jacobs*

Erika Rosenstein manages Jacobs' Ports and Maritime Boston team. She has 13 years of experience founded in design development for structural rehabilitation with a specific focus on coastal resiliency and asset management for maritime infrastructure. Her passion projects find themselves at the intersection of the built environment and the water's edge, and specifically in improving community connectivity to the water through the development and maintenance of public waterfront spaces. She has a BS in Civil Engineering from Washington University in St. Louis and is a Professional Engineer in Massachusetts and New York.

Richard Houghton, ASLA, *Principal Landscape Architect, Tighe & Bond*

Richard Houghton, ASLA, is a Principal Landscape Architect at Halvorson | Tighe & Bond Studio, where he specializes in commercial and municipal projects. He has more than 15 years of landscape architecture and urban design experience that includes parks, plazas, streetscapes, playgrounds, and performance spaces. Rich recently completed the award-winning new Hancock Adams Common, a transformative project in downtown Quincy that realigned the urban fabric to create an activated park and streetscape.

Eric Ohanian, PE, *Project Manager, Tighe & Bond*

Eric Ohanian, PE, is a project manager at Tighe & Bond focusing on bridge design, assessments, and construction. Eric was awarded the 2020 Young Professional of the Year through ACEC/MA. He has held an active role in many projects across Massachusetts and is published on topics ranging from complex bridges, charity bridges in Haiti, and culvert asset management. Eric is active with BSCES YMG and EMG, as well as various organizations throughout New England.

Andrew Stebbins, LEED AP, Senior *Project Manager, The Architectural Team (TAT)*

Andrew Stebbins, LEED AP, is a senior project manager at The Architectural Team (TAT) with over 25 years of professional experience. A leading planner and designer of innovative resilient waterfront developments including Boston's award-winning Clippership Wharf, Stebbins is a valued advisor and a frequent speaker on topics related to sea-level rise, flood mitigation, and storm resiliency. His project portfolio includes a wide range of new construction and adaptive reuse initiatives in the multifamily, mixed-use commercial, and senior living sectors.

Gustavo Tumialan, PhD, PE, *Senior Project Manager, Simpson Gumpertz & Heger*

Mr. Tumialan is a Senior Project Manager at Simpson Gumpertz & Heger, Inc. Gustavo specializes in the investigation, evaluation, repair, and rehabilitation of structures. His expertise includes structural condition assessment, diagnosis and remediation of distressed and deteriorated structures, design of repairs and modifications to existing structures, in-situ load testing of concrete structures, and preparation of contract documents for remedial work. He has conducted extensive research on strengthening of reinforced concrete and masonry structures with externally-bonded FRP systems and successfully completed many projects using this technology. He is a Fellow of the American Concrete Institute (ACI). He is a member of the ACI Committees ACI 562 – Evaluation, Repair, and Rehabilitation of Concrete Buildings, ACI Committee 440 – FRP Composites (Chairman of Sub-committee 440M – Masonry Strengthening), ACI Committee 437 – Strength Evaluation of Concrete Structures, and ACI 549 – Thin Reinforced Cementitious Products.

Registration Deadline is Friday, October 1, 2021, to sign up for the full Lecture Series at discounted rate.

Registration fees for the full series are:
$150 BSCES Members, $180 Non-Members
$120 Public Sector Members, $150 Public Sector Non-Members
$50 Senior Members (65+), $50 Student Members

Registration deadlines to sign up for an individual session are as follows:

Session1: Friday, October 1, 2021 **Session 2: Friday, October 8, 2021**
Session 3: Friday, October 15, 2021 **Session 4: Friday, October 22, 2021**

Registration fees for each individual session are:
$50 BSCES Members, $60 Non-Members
$40 Public Sector Members, $50 Public Sector Non-Members
$20 Senior Members (65+), $20 Students

Information/Registration:

Register to participate in the full Lecture Series or first session and pay by credit card online here. Click on the appropriate hyperlink below to register for an individual session and pay by credit card online.

Session 1 **Session 2**
Session 3 **Session 4**

To register online for an event at the BSCES member rate you must login using your BSCES assigned username and password. If you do not know your BSCES member login information call 617/227-5551. To register for multiple sessions, please complete and return the registration form below following the submission instructions. You can also use this form to register for the full lecture series or individual sessions. Cancellations received after the applicable registration deadline noted above and no-shows will be billed. Registered participants will be provided a website reference for downloading handouts/notes.

Registration Form

SEI Boston Chapter 2021 Fall Lecture Series

Tuesday, October 5, 12, 19, and 26, 2021
11:30 AM – 1:30 PM Zoom Webinar

Registrant Information

Name: _____
Company (if applicable): _____
Address: _____
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Registration Fees

Full Series of Four Lectures

- ☐ $150 BSCES Member
- ☐ $180 Non-Member
- ☐ $120 Public Sector Member
- ☐ $150 Public Sector Non-Member
- ☐ $50 Senior (65+) and Student Member

Single Lectures

- ☐ $50 BSCES Member
- ☐ $60 Non-Member
- ☐ $40 Public Sector Member
- ☐ $50 Public Sector Non-Member
- ☐ $20 Senior (65+) and Student Member

Check Lecture(s) you wish to register for: ☐ 1 ☐ 2 ☐ 3 ☐ 4

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