

UPCOMING EVENTS

Engineers and Land Surveyors Day at the State House
May 14, 2020

FHWA-NHI-130078 Fracture Critical Inspection Techniques for Steel Bridges
June 2 – June 5, 2020?

FHWA-NHI-130053 Bridge Inspection Refresher Training
September 29 – October 1, 2020

FHWA-NHI-130055 Safety Inspection of In-Service Bridges
November 30 – December 10, 2020

[Further Details Inside](#)



Why Collaboration is Key to Delivering Better Infrastructure

by John Skinner, Technical Director, Planning and Environment, AECOM

Infrastructure is key to a city's economic and social health, but residents are getting weary of delays. AECOM's Our Future of Infrastructure 2019 research showed that 59% of London residents expect large-scale transportation projects in the capital to be delivered late. London's residents were not alone in thinking like this, with a majority of residents in Sydney, Los Angeles, New York, Toronto, Hong Kong and Chicago (five of nine global cities covered in the study) also citing transportation project delays as a pressing issue.

When major infrastructure projects such as Crossrail and Thameslink (railway lines in the United Kingdom) encounter high-profile delays, scrutiny tends to focus on the tough decisions concerning funding, political debate around challenges to the projects' stated costs and benefits, contract issues and ineffective engagement with stakeholders, who require further detailed information to achieve their buy-in. What receives less debate is the issue of staff turnover during extended program phases, poor communication across disciplines, as well as lack of relevant experience across the project team.

AECOM's experience working on major infrastructure projects such as the Bank Station upgrade (part of the innovative contractor engagement process) and the Wessex Capacity Improvement program at Waterloo station (as part of the Wessex Capacity Alliance), highlighted the importance of getting a team structure right and retaining knowledge across the project cycle. Both these projects were delivered on time because tools and systems were put in place to facilitate collaboration, which allowed potential issues to be spotted before they caused any delay.

Lessons Learned

1. Getting the team structure right and planning ahead

The first task is to identify and appoint team members who are committed to stay with the project long-term, ensuring the retention of institutional knowledge during the project's key phases. Setting up projects with collaboration at the heart of the team ethos and then supporting staff with flexible working arrangements and professional development helps to achieve long-term staff commitment which is crucial.

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President's Report

by Richard Maher, PE, Managing Associate, Perry Associates, LLC



Think safety was the topic of my February *BSCESNews* President's Report, which focused on preventing accidents. We are now in the midst of the pandemic Coronavirus Disease 2019 (COVID-19) and need to think safety again about a hazard that we can't see, taste or smell. The news is fast and furious, and at times contradicting as to what citizens should and should not be doing.

BSCES has received questions from members and event registrants regarding the coronavirus

(COVID-19) outbreak and its impact on upcoming in-person meetings and events. I want you to know that BSCES leaders are monitoring the situation closely and giving careful consideration to the impact of this crisis on our Society and members.

While the circumstances of this outbreak are changing rapidly, at present BSCES decision to proceed with in-person meetings and activities will be on an individual basis in accordance with US Centers for Disease Control (CDC) recommendations and Governor Baker's temporary ban on group gatherings with the goal of

prioritizing the health and safety of participants.

As events are cancelled, we will be notifying registrants and updating the status on our [Events web page](#). Thus far the following events have had the format changed, rescheduled or cancelled.

- Continued with on-line class format—Spring 2020 Professional Engineer Refresher Course (April 2020 PE Exam is cancelled)
- Cancelled—Waterfront Facilities Assessment Workshop, March 12th

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Collaboration is Key*continued from page 1*

Of course, it's not always possible to keep the same team together for the full duration of a project. The best people are constantly in demand. To minimize disruption, it's therefore essential that the team establishes clear, easy-to-follow and appropriate practices and process to log, retain and share knowledge with each other and their collaborators across the project life cycle. This will not only help strengthen relationships and the day-to-day running of the project, but also make sure that any new members of the team can quickly get up to speed.

Second, selection of the right people is crucial across the full lifecycle of the project – from business case to project development, consents, design, procurement and construction scheduling. Together, they can set out the program's critical milestones and organize timings for activities, as well as highlight potential issues that could contribute to delays ahead of time. This practice helps inform decision-making and sets clear parameters for the team to allow them to target resources and solutions where needed.

A third crucial task is to get the contracting strategy right. An alliance approach was appropriate for the Wessex Capacity Alliance project and our commission began at the start of RIBA design Stage 3 and continued to completion (RIBA 6). As experience has shown, it's important not to underestimate the challenges of having a new team to take on and progress an already developed design. Insufficient survey information can lead to high risk allowances.

Finally, once consent is secured, the project team should look ahead to plan future project phases at the same time as the design and build contract, including detailed knowledge of planning conditions, environmental mitigation and legal agreements. For example, rather than waiting until a construction contract has been let, management plans and applying for consents should be incorporated in at the detailed design phase stage.

2. Collaboration tools

To encourage information flow and exchange from one project phase to another, a number of collaboration tools exist. AECOM has developed an integrated approach to managing data on large projects using a combination of Building Information Modelling (BIM), GIS and using a cloud based digital platform for surveys, stakeholder engagement, environmental assessment and consents.

Incorporating digital BIM data makes it possible to highlight potential delays and issues as well as contact team members to discuss possible fixes weeks before anyone arrives on-site. These new digital working methodologies generate efficiencies in delivery, reduce costs and risks, and improve health and safety. BIM tools can include environmental data such as the presence of historic or listed structures, areas of contamination or sites of archaeological interest which enables the whole team to be informed on environmental requirements and specifications, including those required for planning applications, as early as possible.

In addition, via a construction-scheduling tool, BIM can be linked to a simulation tool (Primavera P6) that has allowed AECOM to virtually run and evaluate different construction options. As a result, our team can create the optimum construction sequence in 4D, considering site and access constraints — before work begins on site, while running 'what if' scenarios to flag and mitigate risks.

On site, the use of drones is limiting the need for people to be in potentially hazardous environments and giving teams access to larger project areas in shorter timespans. This larger project area includes an increase in vertical accessibility. Recently, AECOM deployed drones for survey tasks at the Old Oak Common depot in west London. Collecting 3,000 images, the project team was able to use the data generated to create a 3D BIM model for the team. The whole process took just two days, compared to the eight weeks expected with traditional methods. This data is now available for all future project phases.

3. Don't forget the end user

In addition to engaging the project team, intended users of infrastructure should also be engaged with throughout the design and delivery process.

Virtual reality gives teams a new way to engage with staff and the public, helping them to understand how changes will benefit them before they are built. A virtual reality hub was set up at Waterloo Station for the public to come and view the redesigned station. This likely helped to reduce the number of objections and complaints during the works, avoiding delay.

In addition, engaging the independent users, embedding ergonomics and human factors into

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Technological Advances of Automated, Real-Time Geotechnical and Structural Instrumentation Systems

by *Brendon Murphy, Assistant Project Manager, Contractor Services, and Justin Zarrella, Senior Project Manager, Contractor Services, GZA*

Geotechnical and structural instrumentation is not a new concept for infrastructure development and rehabilitation projects. In fact, the practice dates back to the 1960's and was largely introduced to the Civil Engineering community in 1982 when John Dunncliff published *Geotechnical Instrumentation for Field Monitoring Performance* in collaboration with AASHTO and FHWA. While the concept of field sensor monitoring has become more common in modern construction, the instrumentation practice continues to be plagued with limitations due to improper upfront planning, high costs associated with labor intensive manual data collection, and inadequate response times due to low frequency data collection and delayed data processing.

Recent advances in monitoring technology have solved many of these issues. We now can remotely monitor field sensors with increased data quality and frequency, visualize data in real-time, and streamline informed decision making. By raising awareness of this technology to owners, engineers, and contractors, instrumentation will continue to evolve and play an important role in future projects to help mitigate risk and prevent failures. Additionally, these systems will be used optimize construction means and methods, increase workflow efficiency, accelerate project schedule, and reduce project cost. But before we dive any deeper into this innovative technology, let's take a closer look at some of the past limitations.

Improper Planning in the Design Phase

It's critical to recognize the importance of upfront planning and integration of instrumentation systems into engineering designs early in the planning phase. For many projects, geotechnical and structural instrumentation is installed after signs of damage, movement, or

imminent failure were observed in the field. The issue with the waiting until failure approach is that it may become difficult to safely install an effective monitoring solution and too late to react/mitigate the problem. Instead, instrumentation systems should be designed to proactively monitor changing conditions allowing the team to preemptively act, prevent critical failures, and protect valuable assets for all stakeholders. Additionally, with the emphasis on safety in the construction workplace, it's important to consider the benefits that proactive monitoring will have on worker safety.

High Costs of Labor-Intensive Monitoring

Historically, instrumentation sensors have been monitored in the field manually by qualified personnel or survey crews that are experienced with collecting and processing the data. This workflow can be very labor intensive and costly for limited data points. The cost for an instrumentation engineer to collect daily readings could be thousands per week. In situations where survey crews are required, that cost could easily double. For larger projects, these costs could be higher by orders of magnitude. For smaller projects, there may not be enough budget for an adequate instrumentation system even if it's vital to verify engineering performance and ensure safe working conditions. These costs often lead to project teams overlooking the importance and value these systems can provide.

Limited Data Frequency, Poor Data Quality, and Delayed Response Time

With any manual monitoring program, the frequency of data collection is limited and the turn-around time to process and visualize the data can be slow. This issue is compounded by introducing human error at each step of the

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Robotic Total Station providing real-time survey data of adjacent tracks.



Robotic Total Station, Tiltmeters, and Seismographs monitoring critical utility infrastructure during sheet pile installation.

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Automated, Real-Time Geotechnical and Structural Instrumentation Systems

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workflow. This can severely limit the ability for project engineers to analyze meaningful data and make timely, informed decisions. Especially in the case of larger and more complex projects where the size of the data sets can be excessive. This can leave the team vulnerable to critical failures, damage to assets, workplace injuries, and potential litigation.

Limitations of Manual Monitoring Due to Poor Access

Often with construction projects, key infrastructure that requires critical monitoring may be difficult or impossible to access safely. This could include tunnels, highways, utilities, adjacent buildings, elevated structures, marine structures, etc. Much of this infrastructure would require night work, road closures, track closures, police details, flaggers, and/or specialized equipment to gain access. Each of these circumstances results in reduced monitoring frequencies and potential risk for all stakeholders. Additionally, manual monitoring would come with a significant cost impact.

New Technology: Automated, Real-Time Instrumentation Monitoring

How do we as an industry make the transition from reactive to proactive monitoring? How do we increase data quality and monitoring frequency in a cost-efficient manner? One answer to these questions is cloud-based monitoring technology. Recent advances with instrumentation hardware and software now allow the project team to automate system components and allow for remote, real-time data collection, processing, visualization, and analysis. This eliminates costly labor efforts, removes more human error, and streamlines meaningful data analysis. Instruments can be controlled, reading frequencies adjusted, and data validated, all remotely from any device connected to the internet.

Imagine being able to monitor instrumentation data in real-time as critical operations are being



Image view on Sensemetrics Software Platform of retaining wall structure being remotely monitored.

performed. Imagine being able to receive real-time alert notifications via email/text for threshold exceedances. The ability to be alerted in the field by visual beacons and audio sirens when working conditions are becoming unsafe as well as the ability to receive customized automated data reports at predetermined times is now a reality.

GZA has devoted significant time and resources into developing a turnkey solution for automated field data collection and real-time data processing. GZA has worked with Sensemetrics (a California-based IIoT technology company) to streamline the flow of data directly from field sensor, to onsite hardware, to a secure, web-based software platform. This allows the project team to remotely access, visualize, and analyze data within seconds of it being collected. The focus is to allow staff to dedicate more time on data visualization and analysis rather than labor intensive manual data collection and processing.

An abbreviated list of typical geotechnical/structural sensors that can be automated include Robotic Total Stations, GPS's, Seismographs, Inclinometers, Piezometers, Extensometers, Strain Gages, Load Cells, Displacement Transducers, Tiltmeters, and more. Data from these sensors can be transmitted by radio signal

from local "Node" locations to centralized "Supervisor" dataloggers. From the Supervisors, data is then transmitted to the cloud using a globally compliant, cellular network or direct ethernet connection. Satellite communications are also available for remote projects with little or no access to cellular reception. The system of Nodes and Supervisors is incredibly dynamic as it operates using self-healing mesh network technology. This means that data transfer isn't reliant upon direct line-of-sight from Node to Supervisor. If line-of-sight is lost, the network reevaluates connection paths and automatically finds a new data transmission solution through other Nodes and Supervisors. This is extremely useful on congested projects with a lot of equipment and materials moving around the site or for inaccessible locations.

Remote diagnostics are another key function of these automated systems. Various mechanical and environmental factors can be tracked and analyzed remotely including temperature, barometric pressure, cellular signal strength, and battery voltage. Each of these diagnostics can be assigned threshold limits to proactively warn the project team of potential technical issues. For example, being alerted to decreasing battery

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Would you like to contribute to the newsletter of the oldest civil engineering society in the country? The BSCES Newsletter Editorial Board is seeking members who are willing to write articles for publication in *BSCESNews* or to join the Editorial Board.

Typically 400 to 900 words, *BSCESNews* featured articles are about technical topics or professional matters of interest to civil engineers. The May 2020 issue of the newsletter for example, will highlight the BSCES Government Affairs & Professional Practice Committee and feature one or more articles on the theme of State of Infrastructure.

Editorial Board members meet monthly via conference call to plan upcoming issues of the newsletter. They also solicit, write and/or review newsletter articles.

For more information on how you can become a *BSCESNews* contributor contact BSCES Newsletter Editorial Board Chair Sean Horan at Sean.Horan@gza.com or BSCES Association Manager Rich Keenan at rkeenan@engineers.org or at 617/305-4110.

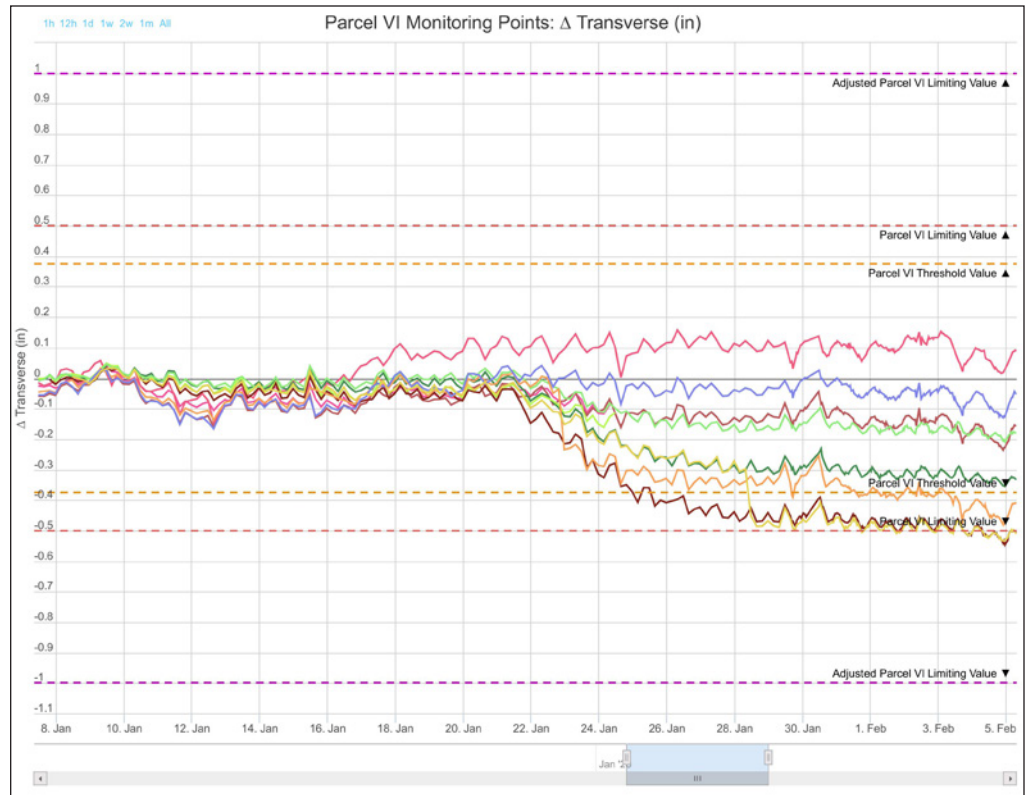
Automated, Real-Time Geotechnical and Structural Instrumentation Systems

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voltage because solar panels are blocked or because hard power was cut. Additionally, these diagnostics allow us to remotely validate fluctuations in the instrumentation data due to several factors including environmental conditions (seasonal or otherwise).

Case Study for Automated, Real-Time Instrumentation Monitoring

After taking a look at the technology, it's important to visit an example of how it can be used in the wild to both provide technical excellence and return on investment. A good example is a bridge replacement project that involved reconstructing the bridge abutments with new sheet piles and replacing the bridge superstructure. This work was being performed in proximity to critical utility infrastructure which was very sensitive to both vibration and deformation. As a result, sheet piles were required to be installed using a silent push system. Unfortunately, ground conditions were not favorable, and schedule was critical. As an alternative, a variable moment hammer was proposed. As a part of the approval process, automated instrumentation was implemented to monitor the utility infrastructure during a test program to validate system performance. The real-time monitoring system included a Robotic Total Station, Tiltmeters, and Seismographs. The system was effective in demonstrating that the variable moment hammer could be operated close to the critical utility infrastructure without any threshold exceedances or harmful effects. The instrumentation remained in place until the project was successfully completed. This system ultimately provided significant cost savings to the project team and accelerated task completion.



Real-time Robotic Total Station data.

Final Conclusions

An important takeaway is that this technology is not replacing the engineer. Instead the technology is allowing engineers to spend more time reviewing and analyzing high frequency data rather than spending time in the field collecting and processing intermittent manual readings. With software features that include geospatial maps, image/plan uploads, graphing, alerting, reporting, polar plots, slope stability and groundwater modeling, the end user has

unlimited tools to consume sensor data and make timely, informed decisions. As the industry looks for innovative ways to solve the nation's complex infrastructure challenges, the need for effective monitoring solutions has become more critical than ever. With superior data quality, increased monitoring frequencies, and vastly reduced labor efforts, these remote systems are more capable and cost-efficient than ever before.

Collaboration is Key

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designs is essential to improving experiences and reducing possible objections. For example, when designing London railway stations, the AECOM teams analyzed people's psychological, behavioral and physical needs, such as passenger movement and behavior, in order to plan a station layout that would reduce overcrowding and optimize travel time.

During the work at Bank Station, this type of analysis showed that the inclusion of a traveller rather than a lift (elevator) would achieve better

interchange times and reduce congestion. At Waterloo Station, the project team was able to demonstrate to passengers how they would be able to find their way around the improved station with enhanced signage and wayfinding.

Conclusion: Collaborate or Face Delay

Collaboration between client, designers, contractors, stakeholders, and intended users is essential for any successful project but requires an investment in training and commitment from the project leadership to make it happen.

With the tools and approaches described above, the risk of program delays can be greatly reduced. An appropriate procurement strategy, alliance-type approaches, team colocation and deployment of innovative technologies all play a role. By empowering team members and providing the right tools, consistency through the project cycle can be achieved while optimizing stakeholder engagement and reducing delays during the consenting and delivery phases.

Improved Project Estimating with Machine Learning Technology

by Tristan Harvey-Rice, Associate Cost Consultant, and Edward Day, Associate Cost Consultant, AECOM

Recent advances in processing power, storage capacity and cloud services have made machine learning an affordable tool for commercial organizations in the built environment. The increase in power and deep analysis has the potential to identify correlations between variables within potentially huge datasets, and create models with those correlations which then facilitate predictions. Machine learning packages don't require expertise in statistical principles to use and they offer previously unobtainable levels of computing power at a fraction of the cost available 10-15 years ago. That's great news from the construction industry. Here are a few reasons why:

Improve Cost Predictions

Project costs in the built environment are traditionally separated into defined sections, for example, internal finishes or risks etc. An average rate is then calculated using the project-level gross internal floor area (GIFA) to output a cost per square meter for each element. With just one variable to measure, inaccurate estimations are often generated.

Machine learning algorithms identify interrelationships between all available building details—such as the differences between a one and ten-story building even if they have the same footprint—allowing for far more accurate estimating with less analytical effort.

Provide Qualitative and Quantitative Predictions

Qualitative data, from site complexities to material specifications and standards (BREEAM ratings etc.), can be used as well as quantitative data to train machine learning algorithms. The inclusion of data such as roof types and construction methodology is particularly effective for a more unusual scheme—i.e. projects with a smaller GIFA but a higher cost driven by location, specification or design choices—as it provides a more detailed and holistic picture of building data from the start of a project. But all projects will see improved predictions.

Unique Predictions for Less Resources

Machine learning techniques can be applied to a range of variables in the design and build process to measure for Unique outcomes. Moreover, they can extract data from Building Information Modelling (BIM) systems or other estimating systems (CostX, Global Unite, Candy, PRISM, etc.), without the need for manual input. Machine learning algorithms can be linked to these systems to analyze specific project outcomes, for example, to facilitate the cost estimate of a school on the number of students it must provide for.

AECOM has successfully prototyped several machine learning solutions for the built environment, comparing the results to traditional cost and measurement classification systems Rules of Measurement (NRM). Findings show that the prediction of costing, scheduling and performance were significantly improved.

An edited version of this article first appeared in Building magazine in September 2019.

President's Report

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- Cancelled—Student Night 2020, March 25th
- Cancelled—The Hub on Causeway Tour, March 31st
- Rescheduled—31st Annual Francis M Keville Dinner, from April 2nd to November 12th
- Cancelled—2020 John R. Freeman Lecture, April 14th

BSCES is following the recommendations offered by the CDC as well as state and local governments to protect our community and to limit the spread of the virus. We encourage our members to stay informed about the Corona-virus by visiting the [CDC](#) and the [Massachusetts Department of Public Health](#) websites.

Members are also encouraged to follow good health habits such as frequently washing their hands; avoiding touching their eyes, nose, and mouth; social distancing and not attending meetings and events if sick.

We appreciate everyone's patience during this time of change. If registered for an event, BSCES will honor a refund, if requested, by sending an email to BSCESReg@engineers.org or you may elect to contribute your fee, as unrestricted, to support the mission of BSCES, a 501(c)(3) organization.

It is essential that individuals practice good health habits to prevent the spread of the virus though the community. As engineers, we understand the numbers game of compounding

and need to educate others. Be grateful to those that provide services to us and be safe today.

This issue of *BSCESNews* is focused on the Construction Institute Boston Chapter and Construction. Be sure to read the page 7 featured group article written by Andrew Giocondi from Skanska.

I'd like to once again thank our Society Sponsors especially AECOM, which is sponsor of this March newsletter. Please be sure read the two articles submitted by AECOM for publication in this issue of *BSCESNews*. Entitled "Why Collaboration is Key to Delivering Better Infrastructure" and "Improved Project Estimating with Machine Learning Technology," these articles can be found on page 1 and page 6, respectively.

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Featured Group

Construction Institute Boston Chapter

by Andrew Giocondi, PE, ENV SP, Project Manager, Skanska USA Civil and Chair, Construction Institute Boston Chapter

Boston and its surrounding communities continue to be a hub for development and innovation. We see constant progress across public and private sectors, in commercial, residential and infrastructure projects. The Construction Institute (CI) Boston Chapter has kept a finger on the pulse of activity through a number of site tours and workshops. Our goal is to continue hosting events across all industries/disciplines and to continue to engage our diverse membership.

We kicked off the fall with the Green Line Extension Project Site Tour in September of 2019. Our presentation and tour featured the southern end of this transformative project. We were given a unique insight into the design and construction as well as the innovative steps taken to get the project moving again after it had been stalled. The walking tour featured the flyovers at the Union Branch junction, the new Lechmere Station site, and the new Green Line Maintenance facility.

In November, CI Boston Chapter co-sponsored the *Public Private Partnership Workshop: Innovative Financing Methods for Large Project in New England*. We were thrilled for the opportunity to co-sponsor this event with Government Affairs & Professional Practice Committee, Transportation & Development Institute Boston Chapter, and the Boston Society of Architects. This half-day workshop delved into managing large projects, both market and organizational challenges as well as a panel discussion on multi-jurisdictional plans. We welcomed close to 50 attendees from across the country and industry.

At the end of January, we hosted the Autodesk Technology Center Tour. We toured the BUILD Space in Boston where we learned about the research and development workspace to which Autodesk invites startups, colleges and universities, and industry experts to explore ways to advance the building industry. The

center focuses on industrialized construction, digital fabrication, automation and robotics in construction, and other ideas that are transforming the built world including architecture and engineering. We not only saw the space, but also had the chance to interact with current residents on their projects.

We look forward to hosting the postponed *The Hub on Causeway Tour* at some future date. Surrounding North Station/TD Garden, The Hub on Causeway is a 1.87 million square foot mixed-use development featuring three towers with retail, office, hotel, and residential uses. Our tour will focus on Phase Three (The Office Tower). We are excited about this opportunity to hear the team speak about the unique construction methods employed to construct a high-rise tower over an occupied building below.

Stay tuned as we continue to plan our future events. The *31st Annual Francis M. Keville Scholarship Dinner*, which was scheduled for April 2, has been rescheduled for November 12, 2020. We are also looking for an opportunity to get involved in Construction Safety Week 2020, which has been postponed from early May to September. This fall we will also be hosting our biennial CI Summit Day. More details on all these events will follow.

This year I have been most impressed with the increased activity in our group and new faces that have joined us. I love to see the diversity our group attracts. Our meetings and events draw engineers, architects, consultants, contractors, and students from private companies, public agencies, and colleges/universities. I believe this assortment of perspectives is what makes our group so strong.

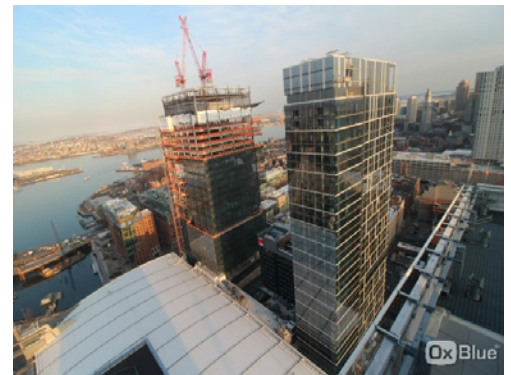
If you are interested in joining the Boston Chapter of the Construction Institute or have ideas for future events or meeting topics please contact me at Andrew.Giocondi@skanska.com.



The CI Boston Chapter visits the Green Line Extension Project in September



The BUILD space was bustling during our January tour of the Autodesk Technology Center



View of The Hub on Causeway. Canceled March CI tour will be rescheduled

BSCES Member Profile:

Mehrdad Sasani, PhD, Professor of Civil and Environmental Engineering, Northeastern University

by Bruce Jacobs, PE, PhD, Wentworth Institute of Technology, BSCES President-Elect

The esteemed Dr. Mehrdad Sasani is a professor of civil and environmental engineering at Northeastern University. He received his PhD from the University of California at Berkeley and his MS in Structural Engineering from Tehran Polytechnic. His research and scholarship interests include: the progressive collapse of structures; earthquake engineering; building design for multi-hazard resilience; and structural integrity and reliability.

Following his graduation with a master's degree in Structural Engineering from Tehran Polytechnic, he simultaneously served as a structural engineering consultant and an instructor at Tehran Polytechnic. During his time in private practice, he carried out analysis, design, and rehabilitation of a variety of high-rise and industrial buildings. This laid the groundwork for an academic career focused on structural engineering. He eventually moved to the United States and completed his PhD in Structural Engineering at the University of California at Berkeley. While completing his graduate studies, he worked part time for Exponent Failure Analysis, engaged in collapse and performance evaluation of the Royal Palm Hotel in Guam and a number of large industrial facilities.

Dr. Sasani has had a prolific academic career. This has resulted in contributions to three books and the generation of more than 70 publications in refereed journals and conferences. Dr. Sasani's publications have addressed topics such as response of structures to seismic actions, evaluation of progressive collapse of structures, and reliability and resilience of structures for man-made and natural hazards. His articles have been published in a variety of ASCE journals, including the Journal of Structural Engineering, Journal Engineering Mechanics, and Natural Hazards Review and other journals serving the structural engineering community as well as in ASCE conferences such as Congress on Technical Advancement and Structures Congress and other conferences.

Dr. Sasani has taken seriously his role in the dispersal of academic research to the engineering community. He has presented the results of his academic research at numerous national and international conferences and has given more than 50 invited talks. Noteworthy presentations include Building Performance and Design for Multi-Hazard Resilience at the BSCES SEI 2019 Fall Lecture Series; A Multi-Hazard view of Progressive Collapse Resistance for Enhancing Resilience of Society at 5th International Disaster and Risk Conference; System Level Collapse Resistance of Structures at 2015 International



Mehrdad Sesani, PhD

Colloquium on Engineering Structures for Extreme Loads; Building Resilience as a Design Objective at ACI 2015 Spring Convention Hot Topic Session; and Progressive Collapse Resistance of Reinforced Concrete Structures presented at Carnegie Mellon University, Pennsylvania State University, Purdue University, University of Texas at Austin, Stanford University, and a number of other institutions.

His work has resulted in receipt of a number of awards including the BSCES Clemens Herschel Award for outstanding paper in both 2016 and 2019 and the BSCES President's Award for his contribution to the creation of the Massachusetts Architects and Engineers Emergency Response Task Force. He also received the National Science Foundation CAREER Development Award. He is a fellow of American Society of Civil Engineers, Structural Engineering Institute of ASCE, and American Concrete Institute.

Where did your interest in how buildings collapse come from?

Following a magnitude 7.3 earthquake in the south Caspian Sea region in 1990, and as part of a reconnaissance team, one of my professors took me to the region and I saw firsthand the destructive power of an earthquake that claimed tens of thousands of lives. A few years later, I received a scholarship from the United Nations to study for three months at the International Institute of Earthquake Engineering and Engineering Seismology in Skopje, Macedonia. This confirmed for me that I would like to continue to study performance of structures under earthquakes.

Several years ago, I received an "engineering" report in the mail describing how the collapse of the World Trade Center could not have been the result of the impact of an airplane and must have been caused by the intentional demolition of the building. How do you react to these people?

This is not correct. I've also seen these reports and once tried to correspond with them to explain where their analysis was in error. I don't think I was successful. My first day of work at Northeastern University was on September 9, 2001. I had been hired as a structural engineer with background in performance of structures during earthquakes, but was also quickly drawn into the field of how to construct buildings that would be more resistant when subject to explosions.

It's difficult to do field tests on collapsing buildings. How do you manage to be there when a building fails?

Interesting story. For years, I wanted to instrument buildings or other structures and carefully monitor what happened as columns or other key structural members failed. Knowing that there was a community of implosion experts, I reached out to several and found that they were not interested in such collaboration. Eventually, I wore down Douglas and Mark Loizeaux of Controlled Demolition, Inc. Although not engineers themselves, they had the foresight to understand the contribution that they could make to enhancing building safety. This was an amazing opportunity. Two of my former PhD students, Drs Marlon Bazan and Serkan Sagiroglu, were instrumental in this effort. Marlon, Serkan, some undergraduate students, and I would instrument each building slated for demolition by implosion with close to hundred potentiometers and strain gages. We monitored building response and measured their displacements and strains as one or a few columns were selectively exploded. This provided the basis for many of experimental and analytical field studies that we have been carrying out since 2007.

I've found civil engineers to be a conservative bunch that are not interested in adopting new practices. How do you go about making sure that what you're learning is helping to improve the practice of structural engineers?

One way is by participating in the development of standards. I'm involved for instance with the development of the ASCE SEI Disproportionate Collapse Mitigation of Building Structures Standard and serve as the Chair of the America Concrete Institute committee 377 on Performance-Based Structural Integrity and Resilience of Concrete Structures and a Member of the General Structural Requirements Committee of the ASCE SEI ASCE-7 Minimum Design Loads and Associated Criteria for Buildings and other Structures.

continued on page 9

BSCES Member Profile: Mehrdad Sasani, PhD

continued from page 8

I also make sure to expose my students to new concepts by making use of my research outcomes in the courses that I teach.

I saw you in a video from a Discovery Channel show on Progressive Collapse. What was that about?

Yes, that documentary was about my fieldwork and a national competition involving an experiment we conducted in a lab on campus. We made a model of a

building structure and knocked out one of the columns. In this competition, 33 professional and student teams from the US and Canada participated by carrying out analyses to predict and explain the building failure response. This was a huge effort, but it was an amazing experience to see so many students and peers were interested in progressive collapse resistance of structures.

Any advice that you give your students that you might share with our readers?

Complex simulation without validation is questionable. That's why it was so amazing to have the data from the building response to explosions. Also, it's good to have practical experience before or during working in academia. For me, it helped me to guide the direction of my research and to understand the real world problems faced by design engineers.

Recent News and Updates

BSCES Awards Nominations Deadline is Extended to June 1

Do you know a worthy award recipient? If so, then download, complete and submit the 2020 BSCES Employer Recognition and/or Section Awards nomination forms contained in this newsletter by the Monday, June 1, 2020 submission deadline. The Large and Small Employer Recognition Awards are given to those organizations who exhibit exemplary support of ASCE and BSCES. The BSCES Section Awards are given to individuals who have made significant contributions to the civil engineering profession and their communities. Please see the awards nomination forms for further details.

2020 BSCES Sustainability in Civil Engineering Award—Call for Entries

The BSCES Committee on Sustainability is accepting nominations for the 2020 Sustainability in Civil Engineering Award until Monday, June 1, 2020. The purpose of this award is to recognize civil engineering infrastructure projects that embody the principles of sustainability espoused by the BSCES Committee on Sustainability, ASCE, and the Institute for Sustainable Infrastructure (ISI). For more information, please see the insert at the end of this newsletter.

BSCES Remembers Former BSCES President Mark Hasso

Mark H. Hasso, PhD, 73, of Chestnut Hill, formerly of Westborough, passed away on

Monday, March 16th, 2020. Mark was president of BSCES in 2000. He proudly served as a professor of construction management at Wentworth Institute of Technology for over thirty years. During this time, he received many accolades and awards from BSCES/ASCE, CMAA, Wentworth Institute of Technology, Engineering News Record (ENR) and others. Recently he was inducted to the National Academy of Construction. Born in Baghdad, Iraq, he was the son of the late Habib Hasso and Reina Ballo. Mark received master's and PhD degrees in Construction Management from Worcester Polytechnic Institute and another master's degree in Civil Engineering in the field of Highway and Transportation from the City University of London. If inclined, feel free to donate in his memory to St. Ignatius of Loyola Church in Chestnut Hill.

Learn More About the ASCE Presidential Nominees

The official nominees for 2021 ASCE president-elect are Maria Lehman, PE, ENV SP, F.ASCE, and Dennis D. Truax, PhD, PE, DEE, D.WRE, F.NSPE, F.ASCE. Each nominee has recorded a brief video introducing themselves and talking about their objectives if elected. [Click here](#) to view the videos.

Structures Congress 2021 Call for Proposals

SEI invites abstracts and sessions on topics of interest to structural engineers at every level of their career. Emphasis is on presentations that

support advancing the structural engineering profession including leadership development, innovation and novel project solutions, emerging technologies, resilience, sustainability, functional recovery, Global Climate Change, and innovative research with practical applications. Implementation of these topics to the full life-cycle of structures including design, analysis, fabrications, construction, testing and maintenance welcomes. To learn more, [click here](#).

Take Advantage of ASCE's Mentor Match

[Mentor Match](#) is a tool that brings together mentors and mentees to develop workplace and technical abilities, find a proper work/life balance, resolve dilemmas and in the process perhaps even become friends.

Suggest a Seminar Topic

Is there an engineering topic that you would like BSCES to feature in an upcoming seminar? If so, members of the BSCES Program Committee would like to hear from you. Charged with developing technical training programs that address members' professional development needs, the Program Committee oversees the Society's National Highway Institute training, spring and fall Professional Engineer Refresher Courses and other topical workshops. If you have a technical topic that you would like the Program Committee to consider, send your suggestion to BSCES Program Committee Chair Jeff Lewis at jlewis@garofaloassociates.com or BSCES Association Manager Rich Keenan at rkeenan@engineers.org.

SEND US YOUR NEWS! Looking to strengthen the community that is BSCES, the BSCES Executive Committee and Newsletter Editorial Board has decided to expand the content of this *BSCESNews* Recent News and Updates column by including more member news. Have you recently been recognized for a professional accomplishment, passed the Professional Engineer Exam, received a promotion, or changed employers? If so, send your news items to BSCES Association Manager, Rich Keenan, rkeenan@bsces.org.

Upcoming Events

For more information and to register for events, please visit www.bsces.org

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.

Engineers and Land Surveyors Day at the State House

Sponsored by the Government Affairs & Professional Practice Committee

Thursday, May 14, 2020

Massachusetts State House, Boston, MA

9:00 AM – 11:45 AM

On Thursday, May 14, 2020, BSCES, ACEC/MA, and MALSCE members gather at the Massachusetts State House for the annual Engineers and Land Surveyors Day at the State House along with leaders from other engineering and design-related associations. Meetings are arranged with members' Massachusetts state representatives and state senators based on where members live and vote.

Please [click here](#) for further details.

TAKE AN NHI COURSE IN 2020!

The National Highway Institute is celebrating their 50th year in operation by offering reduced attendee fees on a number of their courses offered during 2020. The BSCES Program Committee is taking advantage of this one-time opportunity by scheduling the following NHI courses, which are being offered with reduced registration fees.

FHWA-NHI-130078 Fracture Critical Inspection Techniques for Steel Bridges

Sponsored by the Program Committee

Tuesday, June 2 – Friday, June 5, 2020

AECOM, Boston, MA

8:00 AM – 4:30 PM

This course curriculum examines current practices, while addressing new and emerging technologies available to bridge inspectors. In

addition, the course features classroom training; hands-on workshops for popular types of nondestructive evaluation (NDE) equipment; and a case study detailing the preparation of an inspection plan of a fracture critical bridge.

Please see the Insert at the end of this month's newsletter for further details.

FHWA-NHI-130053 Bridge Inspection Refresher Training

Sponsored by the Program Committee

Tuesday, Sept. 29 – Thursday, Oct. 1, 2020

AECOM, Boston, MA

8:00 AM – 4:30 PM

The major goals of this course are to refresh the skills of practicing bridge inspectors in fundamental visual inspection techniques; review the background knowledge necessary to understand how bridges function; communicate issues of national significance relative to the nation's bridge infrastructures; re-establish proper condition and appraisal rating practices; and review the professional obligations of bridge inspectors. This course is based on the "Bridge Inspector's Reference Manual," 2002 (updated 2006), with reference to the AASHTO Manual as defined by the National Bridge Inspection Standards regulation.

Please see the Insert at the end of this month's newsletter for further details.

Rescheduled Date!

31st Annual Francis M. Keville Dinner

Sponsored by the CI and T&DI Boston Chapters

Thursday, November 12, 2020

Revere Hotel Boston Common, Boston, MA

5:00 PM Reception; 6:30 PM Dinner

FHWA-NHI-130055 Safety Inspection of In-Service Bridges

Sponsored by the Program Committee

Monday, November 30 – Friday, December 11, 2020

Hilton Garden Inn Worcester, Worcester, MA

8:00 AM – 4:30 PM

This two-week course is based on the 2015 FHWA "Bridge Inspector's Reference Manual" (BIRM) and provides training on the safety inspection of in-service highway bridges. Satisfactory completion of this course will fulfill the training requirements of the National Bridge Inspection Standards (NBIS) for a comprehensive training course. This course is not geared towards fracture critical, underwater, or complex structures. All participants must show that they passed either of the following pre-requisite courses: FHWA-NHI-130101, *Introduction to Safety Inspection of In-Service Bridges* or FHWA-NHI-130054 *Engineering Concepts for Bridge Inspectors*.

Please see the Insert at the end of this month's newsletter for further details.

Attend an ASCE Seminar in Boston!

Earthquake-Induced Ground Motions

Thursday – Friday, July 16 – 17, 2020

[Click here to learn more.](#)

Deep Foundations: Design, Construction, and Quality Control

Thursday – Friday, August 6 – 7, 2020

[Click here to learn more.](#)

2019–2020 BSCES Sponsors

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2020 Employer Recognition Awards

The Boston Society of Civil Engineers Section of the American Society of Civil Engineers Awards Committee invites you to nominate an organization to receive the Small Employer Recognition Award or the Large Employer Recognition Award. Please see the following awards description for nomination instructions. To be eligible to receive this award your award nomination must be received by the BSCES Awards Committee no later than **Monday, June 1, 2020**.

As a means of fostering the members of the civil engineering profession, the Boston Society of Civil Engineers Section/ASCE has established an award to recognize those employers who commit to providing exceptional opportunities to their engineers. Special recognition will go to those organizations who exhibit exemplary support as evidenced by:

1. Encouraging technical and professional growth through continuing education, training, mentoring, project experience, participation in development of technical papers or presentations, and other means.
2. Tackling staff quality-of-life issues in the modern workplace.
3. Contributing to the community to make a positive impact.
4. Encouraging active participation in professional societies such as ASCE/BSCES.

Members who want an organization to be considered for recognition should provide a letter demonstrating the firm's commitment to its engineers. Firms nominated shall be actively participating in BSCES via sponsorship, employee membership, contributions to the newsletter, etc. Letters shall include the total number of employees in the firm, number of BSCES members, and cite specific examples of its employees being actively involved in BSCES.

The awards committee will review the nominations and select an exemplary small employer and a large employer in the Section. Organizations with less than 50 employees are eligible for the Small Employer Award. Awards will be presented at the 171st BSCES Annual Awards Dinner. Successful recipients will be considered for endorsement as potential (future) applicants for the ASCE Employer Recognition Award. No organization will be eligible to receive the award in consecutive years.

Complete and return this nomination form and attachment to the BSCES Awards Committee no later than Monday, June 1, 2020 to be eligible for the award.

Name of Organization: _____

Nominator/Title: _____

Address: _____

Telephone: _____ Email: _____

Signature: _____ Date: _____

Organization: _____

Contact Person: _____

Title: _____

Office Address: _____ Website: _____

Telephone: _____ Email: _____

Please attach a brief (no more than two pages) narrative describing why the organization meets the criteria described in this nomination form.

Please complete this form and the additional pages and return it via email, fax, or mail to bsces@engineers.org, 617/227-6783, or BSCES Awards Committee, Boston Society of Civil Engineers Section/ASCE, The Engineering Center, One Walnut Street, Boston, MA 02108-3616, respectively. For questions, contact BSCES Awards Committee Chair Christopher Hersey at 617/590-5546 or Vice.President2@BSCES.org.

Thank you for your continued support of ASCE and BSCES.

Each year, BSCES presents awards to deserving individuals in the Section or in the community who are nominated by their peers in recognition of their service. Here is your opportunity to nominate a co-worker, friend, or someone who you think deserves special recognition. Please see the following awards descriptions and nomination instructions.

The Nominations Deadline is **Monday, June 1, 2020**. The Awards Committee will review all nominations and present a list of candidates for selection by the Board of Government. Awards will be presented at the 171st BSCES Annual Awards Dinner.

I would like to nominate _____ For the:

_____ **CITIZEN ENGINEER AWARD:** This award is presented to a BSCES member or registered professional engineer for outstanding public involvement in local or national legislation, education (at any level), non-profit volunteer organizations, community activities, or similar activities improving the image of ASCE, BSCES and the civil engineering profession.

_____ **HORNE/GAYNOR PUBLIC SERVICE AWARD:** This award is presented to a BSCES member or registered professional engineer for unpaid public service in a municipal, state or federal-elected or appointed post for philanthropic activities in the public interest.

_____ **GOVERNMENT CIVIL ENGINEER AWARD:** This award is presented to a BSCES member who is serving as a paid public sector engineer at a federal, state, or municipal agency, department, or authority in Massachusetts.

_____ **CLEMENS HERSCHEL AWARD:** This award recognizes an individual who has published a paper, not necessarily published in the BSCES Journal, that has been useful, commendable, and worthy of grateful acknowledgment. If nominating for the Clemens Herschel Award, please attach the name of the paper and names of all authors, if co-authored.

_____ **JOURNALISM AWARD:** This award is presented to a journalist or other author who has published one or more articles, papers, books, social media blogs, or film for a non-technical audience that raises awareness of the contributions of the civil engineering profession.

_____ **PRE-COLLEGE EDUCATOR AWARD:** This award is presented to a member of the K-12 educational community who integrates engineering topics, particularly civil engineering, in a manner that benefits the profession and may promote students to pursue an engineering career. The Public Awareness & Outreach Committee reviews these nominations and recommends the recipient to the Board.

_____ **COLLEGE EDUCATOR AWARD:** This award is presented to a member of the academic community who inspires and encourages civil engineering students through exceptional teaching and mentorship. Educators empower students to realize full potential and exemplify the profession in their classroom. Candidates shall be actively teaching in a classroom setting at a college or university in New England.

_____ **YOUNGER MEMBER AWARD:** This award is intended to recognize a BSCES member, 35 years of age or younger on February 1 in the year of the award, who has made an outstanding contribution to BSCES and/or the civil engineering profession.

_____ **ENGINEER OF THE YEAR AWARD:** This award is presented to a BSCES member, with 15 years or more professional experience, who has exhibited extraordinary leadership in the form of managerial leadership, technical excellence, professional integrity, and mentorship of other engineers.

_____ **PROJECT OF THE YEAR AWARD:** This award is presented to a BSCES member and her/his project team who has served in a major role on an innovative, challenging, unique, and/or complex project located in the Commonwealth of Massachusetts. The majority of the work should have been completed by engineers located within Massachusetts.

To submit a nomination, complete this form and return it by the nomination deadline via email, fax, or mail to bsces@engineers.org, 617/227-6783, or BSCES Awards Committee, Boston Society of Civil Engineers Section/ASCE, The Engineering Center, One Walnut Street, Boston, MA 02108-3616, respectively.

Name and Company Address of Nominee(s)*:

Is this a re-nomination? Yes _____ No _____

**Please attach a brief (no more than one page) explanation of the candidate's qualifications for nomination.*

Your Name: _____ Daytime Telephone: _____ Email: _____

NOTE: *If you nominated someone last year who was not selected, you may re-nominate the individual(s).*

QUESTIONS: *Contact BSCES Awards Committee Chair Christopher Hersey at 617/590-5546 or Vice.President2@BSCES.org.*



2020 SUSTAINABILITY IN CIVIL ENGINEERING AWARD

Call for Entries

The purpose of the Sustainability in Civil Engineering Award is to recognize civil engineering infrastructure projects that embody the principles of sustainability espoused by the BSCES Committee on Sustainability, ASCE, and the Institute for Sustainable Infrastructure (ISI). Such projects prominently and creatively incorporate the five sustainability indicators of quality of life, leadership, resource allocation, natural world, and climate risk. Awards will be offered in two categories differentiating project scale.

Eligibility

To be eligible, a project must demonstrate adherence to the principles of economic, social and environmental sustainability as identified by ASCE/ ISI criteria for sustainable infrastructure. **The project must have been designed by a team of civil engineers based in Massachusetts, and must have been constructed within the last five years.**

Rules for Submission

1. Entries for the award must include:
 - A completed Entry Form ([BSCES Sustainability Award Form](#))
 - A printout of the Envision™ project assessment scoring table from the ISI website completed by an Envision Sustainable Professional (ENV SP).
2. **Entries must be submitted no later than June 1, 2020.** The winner will be announced at the BSCES Annual Awards Dinner event in 2020. Entries may be submitted electronically to bsces@engineers.org.

2019 BSCES Sustainability in Civil Engineering Award Winners

- 2019 Small Project Category: Massachusetts Department of Conservation and Recreation (DCR)/ The Lawrence and Lilian Solomon Foundation, *Greenough Boulevard Greenway Expansion*

Through a \$1.8 million public/private partnership completed in 2016, the project included enhancing public safety along the river, providing a fully accessible multi-use path next to the river, reclaiming parkland and enhancing the scenic value of the Charles River Reservation, improving the environmental quality of the Charles River, and maintaining Greenough Boulevard as a fully functional parkway.

- 2019 Large Project Category: NB Development Group, LLC, *Boston Landing Station*

Through a public-private partnership completed in 2017, NB Development Group funded and managed the design and construction of the approximately \$20 Million station in close collaboration with the MBTA and MassDOT. In November 2017, the project earned the Envision Silver Award from the Institute for Sustainable Infrastructure. The station is the first transit project in New England to achieve Envision verification, recognized in the Quality of Life category.



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FHWA - NHI - 130078:

Fracture Critical Inspection Techniques for Steel Bridges

Tuesday, June 2, 2020 – Friday, June 5, 2020

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AECOM, 1 Federal Street, 8th Floor, Boston, MA
Tuesday through Thursday, 8:00AM – 4:30PM
Friday, 8:00 AM – 2:00 PM

This training examines current practices, while addressing new and emerging technologies available to bridge inspectors. In addition, the course features classroom training; hands-on workshops for popular types of nondestructive evaluation (NDE) equipment; and a case study.

The first day of the training focuses on the concept of fracture critical members (FCMs), FCM identification, failure mechanics, fatigue in metal, and an overview of NDE methods. Day two includes demonstration sessions and hands-on applications of NDE techniques for dye penetrant, magnetic particle testing, Eddy current testing, and ultrasonic testing. Days three and four emphasize inspection procedures and reporting for common FCMs, including problematic details, I-girders, floor beams, trusses, box girders, pin and hanger assemblies, arch ties, eyebars, and cross girders/pier caps. The course will conclude with a case study detailing the preparation of an inspection plan of a fracture critical bridge.

Please note: Prior to taking this course, participants should have completed NHI course 130055, Safety Inspection of In-Service Bridges, or possess equivalent field experience relative to bridges. Participants also should have a thorough understanding of bridge mechanics and bridge safety inspection procedures as required by the National Bridge Inspection Standards. Please visit the NHI website at www.nhi.fhwa.dot.gov or contact them at 703/235-0500 for additional information on the prerequisite course requirements.

Registration Deadline: Friday, May 1, 2020

Registration Fees: \$850 Members, \$1,050 Non-Members

Registration fee includes course materials, continental breakfast, breaks, and lunch.

Information/Registration:

Attendance for this program is limited to 30 participants. Individuals who attempt to register after the course is closed will be added to a waiting list. Reservations will be accepted on a first-come first-serve paid reservation basis. Register to attend this course and pay by credit card online at <http://bit.ly/FractureCritical2020>. 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 login information, call 617/227-5551. You can also register for this event by mail or email. To do so, download and complete a [BSCES Event Registration Form](#) and follow the submission instructions. Please note that cancellations or no shows received after May 1, 2020 will be billed.



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WSP USA

FHWA-NHI-130053

Bridge Inspection Refresher Training

Tuesday, September 29, 2020 – Thursday, October 1, 2020

AECOM, 1 Federal Street, 8th Floor, Boston, MA
Tuesday through Thursday, 8:00AM – 4:30PM

The major goals of this course are to refresh the skills of practicing bridge inspectors in fundamental visual inspection techniques; review the background knowledge necessary to understand how bridges function; communicate issues of national significance relative to the nations' bridge infrastructures; re-establish proper condition and appraisal rating practices; and review the professional obligations of bridge inspectors. This course is based on the "Bridge Inspector's Reference Manual," 2002 (updated 2006), with reference to the AASHTO Manual as defined by the National Bridge Inspection Standards regulation.

Core course topics include inspector qualifications and duties, bridge mechanics, record keeping and documentation, fatigue and fracture in steel bridges, traffic safety features, safety, National Bridge Inventory (NBI) component ratings, superstructure type identification, inspection techniques and case studies for decks, superstructures, bearings, substructures, channels and culverts, and a mock bridge inspection classroom exercise. Optional topics include inspection of truss gusset plates, adjacent box beams, and post-tensioning tendons.

Registration Deadline: Tuesday, September 1, 2020

Registration Fees: \$900 Members, \$1,100 Non-Members

Registration fee includes course materials, continental breakfast, breaks, and lunch

Information/Registration:

Attendance for this program is limited to 30 participants. Individuals who attempt to register after the course is closed will be added to a waiting list.

Reservations will be accepted on a first-come first-serve paid reservation basis. Payment must be received with registration to secure a slot. Register to attend this course and pay by credit card online at <http://bit.ly/BridgeInspectionRefresher2020>. 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 login information call 617/227-5551. You can also register for this event by mail or email. To do so, download and complete a [BSCES Event Registration Form](#) and follow the submission instructions. Cancellations or no shows after September 1, 2020 will be billed.



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FHWA-NHI-130055

Safety Inspection of In-Service Bridges

Monday, November 30, 2020 – Friday, December 11, 2020

Hilton Garden Inn Worcester, 35 Major Taylor Boulevard, Worcester, MA
Monday through Friday, 8:00 AM – 4:30 PM

This 10-day course is based on the 2015 FHWA “Bridge Inspector’s Reference Manual” (BIRM) and provides training on the safety inspection of in-service highway bridges. Satisfactory completion of this course will fulfill the training requirements of the National Bridge Inspection Standards (NBIS) for a comprehensive training course. This course is not geared towards fracture critical, underwater, or complex structures. Mid-term and final examinations based on course content will be administered to participants.

Please note: To take this course participants must show that they have passed one of the following pre-requisite courses: FHWA-NHI-130054 *Engineering Concepts for Bridge Inspectors*; FHWA-NHI-130101, *Introduction to Safety Inspection of In-Service Bridges*; or FHWA-NHI-130101a *Prerequisite Assessment for Safety Inspection of In-Service Bridges*. A FHWA/NHI certification of completion with the participant name on it will be required to be presented to BSCES preferably at time of registration or no later than Friday, September 25, 2020. Please forward your prerequisite certificate in the form of a PDF document to bsces@engineers.org.

Registration Deadline: Friday, September 25, 2020

Registration Fees: \$2,000 Members, \$2,200 Non-Members

Registration fee includes course materials, continental breakfast, breaks, and lunch

Information/Registration:

Attendance for this program is limited to 30 participants. Individuals who attempt to register after the course is closed will be added to a waiting list.

Reservations will be accepted on a first-come first-serve paid reservation basis. Payment must be received with registration to secure a slot. Register to attend this course and pay by credit card online at <http://bit.ly/SafetyInspectionBridges2020>. 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 login information call 617/227-5551. You can also register for this event by mail or email. To do so, download and complete a [BSCES Event Registration Form](#) and follow the submission instructions. Cancellations or no shows after September 25, 2020 will be billed.