

## Allison Creek Hydroelectric Design-Build Project— Increasing Hydropower, Decreasing Diesel Dependency

by Sharon Crisp, Manager of Member Services, Copper Valley Electric Association and Marissa Emmons,  
Vice President of Marketing, McMillen Jacobs Associates

The high cost of fuel continues to plague many rural communities of Alaska. Copper Valley Electric Association (CVEA) realizes this and has been taking huge strides to lessen their reliance on fuel for power generation, and it is with this goal in mind that CVEA continues to work toward its vision to reduce or eliminate dependence on fossil fuel and to stabilize the cost of generation with regional, sustainable resources. CVEA understands that hydropower is the most viable and cost-effective renewable resource and therefore has continued to aggressively move the Allison Creek Hydroelectric Project forward since 2008. This new hydroelectric plant will bring CVEA's hydropower production portfolio from 50% to 64% and reduce its dependence on diesel generation plants by 750,000 gallons of diesel. Upon completion, this project will reduce annual fuel generation costs by \$2.4 million and eliminate 12,000 tons of carbon dioxide annually.



Aerial view of lower half of Allison Creek Project; lower right: power house & access road; upper left: lower tunnel portal.

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## President's Report

by Ellen P. White, PE, Senior Program Manager, Patrick Engineering Inc.



It is hard to believe that another year is almost over. It is a busy time of year for most of us as well as for BSCES and ASCE.

After years of advocating for a long-term federal transportation bill that would fund projects around the country, the Fixing America's Surface Transportation (FAST) Act was signed into law by President Obama earlier this month. This is the first long-term transportation bill passed by Congress in ten years. It allocates \$305 billion over five years for surface transportation reauthorization. It will reauthorize the federal

highway and public transportation programs for FY 2016 through FY 2020 and stabilize the Highway Trust Fund (HTF) during this period.

The FAST Act provides \$233 billion for highways, \$49 billion for transit and \$10 billion dedicated to federal passenger rail. By the end of the bill's five-year duration, highway investment will rise by 15%, transit funding will grow by nearly 18%, and federal passenger rail investment will remain constant. It also creates a dedicated \$1.25 billion freight program to help ensure federal investments are targeted at improving US economic competitiveness, provides \$900 million per year for large-scale projects under a new

## UPCOMING EVENTS

**Engineering Management Group Event**  
January 14, 2016

**BSCES Program Committee Sponsored  
NHI Training**  
February 2 – 4, 2016

**SEI Boston Chapter Event**  
February 10, 2016

**BSCES Program Committee Sponsored  
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April 4 – 15, 2016

**BSCES Program Committee Sponsored  
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April 18 – 22, 2016

**BSCES Program Committee Sponsored  
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June 20 – 25, 2016

**Further Details Inside**



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freight and highways program, and allocates \$199 million of funding for the installation of Positive Train Control (PTC) in FY 2017.

As a result of this, Massachusetts will receive increased funding for highways, transit, planning, and safety programs. The Commonwealth's highway account apportionment will increase from \$586 million in FY 2015 to \$673 million in FY 2020. Similarly, the Commonwealth's transit apportionment will increase from \$339 million to \$384 million during the same period.

Much of the news internationally was dominated by the 2015 United Nations Climate Change

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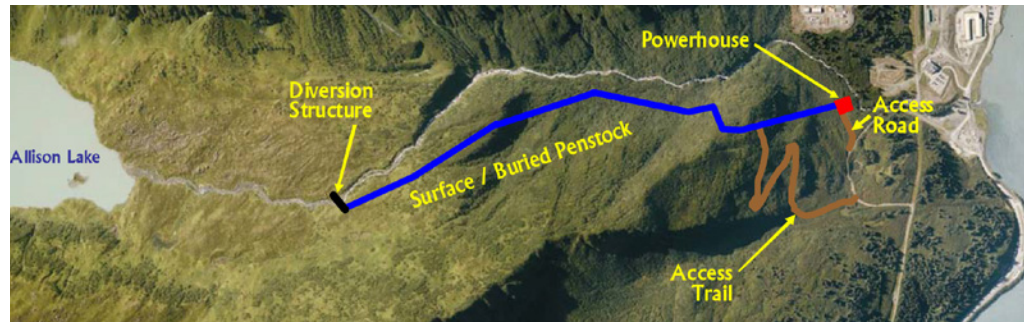
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## Allison Creek Hydroelectric Design-Build Project

*continued from page 1*



*Overview of the Allison Creek Hydroelectric Project Site.*

The project is located in Valdez, Alaska, near the Valdez Marine Terminal, which is the terminus point of the Trans-Alaska Pipeline System. It evolved from a 70-foot-high (with an additional 50 feet buried) rock-fill embankment dam at the outlet of Allison Lake with a conventional intake and buried/surface penstock, to a run-of-river project with a diversion structure further downstream and a powerhouse capable of producing 6.5 MW of electricity per hour saving CVEA's members over \$800,000 in the first year. The purpose of this project is to divert water from Allison Creek via a new diversion structure at an elevation of 1,300 feet into a penstock that will carry the water 7,000 feet (1.25 miles) to a powerhouse near tidewater.

In 2012, CVEA contracted McMillen Jacobs Associates to perform the FERC coordination, permitting and environmental support, design, and self-perform the construction.

The project wrapped up its second construction season in October. The 2015 work plan focused around building the diversion structure, the installation of the penstock, and the inside work at the powerhouse.

The diversion structure, which backs up water enabling a smooth flow into the penstock, took shape this construction season. It requires a wall across the creek that is taller than 20 feet high if you include the portion of the wall that is below ground level.

The diversion structure does not store water but splits the water flow into two channels; one channel goes back into the creek and one channel goes into the penstock. Gates in the diversion structure allow CVEA to control the water going into the penstock. If there is too much water coming down the creek, excess water flows back into the creek over the spillway. CVEA will use 80 cubic feet per second (cfs) of water to run the powerhouse at maximum output.



*Portions of the Penstock were trench buried on steep slopes such as this 60% grade; others traveled through the underground access tunnel.*

The structure, which sits in the creek 1300 feet above sea level, surrounded by very rugged terrain and an extremely steep access road, received over 1000 cubic yards of concrete in 2015.

All the concrete had to be made at the diversion structure location due to the difficulty accessing the site. Despite the challenges of bringing all the materials to this location, testing after each pour has shown top quality concrete.

The diversion structure was 80 percent completed, and the remainder will be finished in 2016.

The pipe that carries water from the diversion structure to the powerhouse is known as the penstock. The penstock builds pressure in the water, as it stacks water molecules on top of other water molecules. There is so much pressure built up in the penstock that the pressure at the powerhouse is approximately 520 pounds per square inch. A stream of water from this pressure can turn a turbine to make electricity.

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## Allison Creek Hydroelectric Design-Build Project

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Once complete, the penstock will be comprised of 171 pieces (most of which are 40 feet long) that will stretch 1.25 miles through the mountains, from the diversion structure to the powerhouse.

The pipe will be buried the entire length of the penstock and will run through the construction tunnel. The upper penstock is 42 inches in diameter and the lower penstock is 36 inches. In 2015 approximately 120 pieces were installed; the remaining pieces, through the most difficult stretch of terrain, will be finished next year.

The powerhouse began this construction season as an empty building. One of the first efforts at the start of the season was installation of the bridge crane. This crane is designed to pick up every piece of equipment installed in the powerhouse and to set it in its proper location. Once installed, the crane was used to set the main shutoff valve, the bifurcation valve, the turbine housing, the pelton wheel, the generator stator, the generator rotor, and all other heavy equipment items needing to be placed in the powerhouse.

In addition to the heavy equipment items, the dispatch office and restroom were built and all the heating and ventilation ducting has been installed.

One of the most complicated tasks in the powerhouse was electrical wiring. The building is not only wired for lighting but it was wired for production of power and communications to sensors, controls, cameras, transformers, and much more.

The powerhouse is now connected into the CVEA system and is receiving power through a 3.8-mile feeder line. This is the same line that will send power to CVEA when the plant becomes operational.

The Allison Creek Hydroelectric Project had a very successful 2015 construction season. It is still on target to begin producing commercial hydropower and delivering it to our members'

outlets in 2016 when the creek allows a full commissioning of the power plant.

Work on the project will resume next year as soon as weather and snow conditions allow.

### Goals for 2016 include:

- Installation of remaining 36 pieces of penstock
- Construction of final 17 percent of diversion structure
- Completion of communications building at diversion structure
- Tie-in of electrical and communications from powerhouse to diversion structure
- Sending water to penstock for the first time
- Performing turbine and generator checks and tests
- Training CVEA Operators to run new power plant
- Generation of commercial power

*For additional project information and up-to-date photos of construction activities, visit the award-winning [Allison Creek website](#).*



*The pelton wheel inside its casing at the powerhouse.*



*Penstock installation outside of the tunnel along the upper access road.*

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## Cast Iron Encroachment in the Natural Gas Industry

by Michael Tupper, PE, Lead Engineer, National Grid

With miles upon miles of active cast iron gas mains in Massachusetts, the issue of cast iron encroachment is one which is constantly on the mind of nearly all of the local natural gas distribution companies (LDC's). So what is cast iron encroachment in the natural gas industry and why is it important? In basic terms, cast iron encroachment is considered when there are deep excavations which expose, undermine or are within the influence zone of existing active cast iron gas mains. The Massachusetts Department of Public Utilities (MADPU) highlighted the importance of cast iron encroachments in a letter addressed to the Pipeline and Hazardous Materials Safety Administration (PHMSA) in 2011. In this letter, the MADPU cited a Cornell University study which indicated that small diameter encroached cast iron pipes were likely to fail. The MADPU further stated in that 2011 letter that current regulations required the LDC's to replace any pipe which was determined to be encroached immediately. The Code of Massachusetts Regulations (CMR) outlines specific criteria and guidelines which determine when a cast iron natural gas pipeline is considered encroached and mitigation is required.

The code identifies two categories of cast iron encroachment: CMR 113.06—Replacement of Cast-Iron Pipe at Trench Crossings and CMR 113.07—Replacement of Cast-Iron Pipe Adjacent to Parallel excavations. As the title suggests, the first type of encroachment occurs when a cast iron main is exposed and undermined by an excavation crossing the pipeline, commonly referred to as cross trench encroachment. In general, cross trench encroachments are identified when an excavation crosses perpendicular to an existing cast iron pipeline and the diameter and depth of cover of the pipeline meet specific dimensional criteria defined in CMR 113.06. The second category of cast iron encroachment defined by the code is commonly referred to as parallel encroachment. Again, as the title suggests, this occurs when a cast iron pipeline is adjacent to a parallel excavation. In general, parallel encroachments are identified when the excavation is greater than 8 feet in length and the pipeline is exposed, undermined or at least half of the pipe diameter lies within the angle of influence of the excavation. In both categories of cast iron encroachment, the code requires the "encroached" pipeline to be replaced. The length of replacement

is calculated on a case by case basis utilizing criteria of the identified encroachment.

Cast iron encroachments are best described utilizing an example. Figure 1 depicts a recent drainage installation project which consisted of the installation of 12" PVC drain pipe, catch basins and drain manholes. As a result of the proposed drainage installation two natural gas cast iron encroachments were identified. The first is a cross-trench encroachment and is located at the intersection of Essex St & Hawthorn St where the proposed 12" PVC drain crosses the existing 6" CI LP gas main. The second is a parallel trench encroachment located on Essex St where the proposed 12" PVC drain runs adjacent to the existing 4" CI LP gas main.

Cross-section A-A shown in Figure 2 at the intersection of Essex St and Hawthorn St provides a detail of the proposed 12" PVC drain installation crossing the existing 6" CI LP gas main. As can be seen in the cross-section, the proposed 12" PVC drain pipe excavation will expose and undermine the existing 6" CI LP gas

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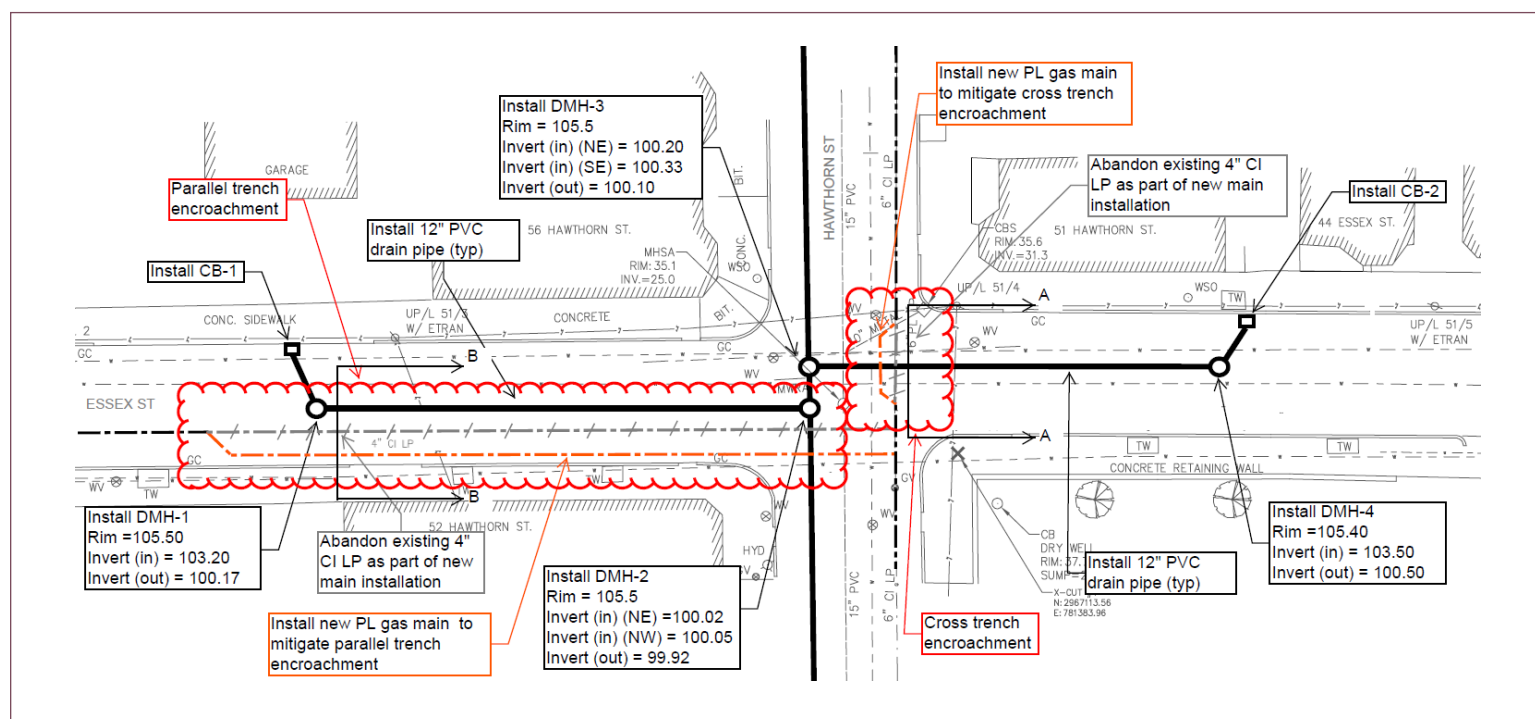


Figure 1: Example of cross-trench and parallel trench encroachment

## Cast Iron Encroachment in the Natural Gas Industry

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main. The existing 6" CI LP gas main has a depth of cover = 2'-6" and the drain pipe trench width is 4'-8". Therefore, as defined in CMR 113.06(1)(b) – Table 1, the existing 6" cast iron gas main is encroached and is required to be replaced. CMR 113.06(2) requires the minimum length of replacement be equal to 26'-8".

Cross-section B-B shown in Figure 2 provides a detail of the proposed 12" PVC drain installation at the location where the drain pipe is adjacent to the existing 4" CI LP gas main in Essex St. In this case, the proposed 12" PVC drain excavation will not expose or undermine the existing 4" CI LP gas main; however the existing 4" CI LP gas

main will fall within the Angle of Influence (AOI) as defined in CMR 113.03. The existing 4" CI LP gas main has a depth of cover = 30" and is located 10" from the edge of the excavation resulting in the main falling within the AOI. Therefore, as defined in CMR 113.07(1) & 113.07(3)(b), the existing 4" cast iron gas main is encroached and is required to be replaced. CMR 113.07(6) requires the minimum length of replacement to extend a safe distance, determined by the operator, beyond the point where the parallel excavation terminates. Depending on the situation, this is typically considered to be 10-ft.

Recognizing and mitigating cast iron encroachments is an important aspect of operating a natural gas distribution system. Encroachment mitigation is required by the Massachusetts code, but even beyond code compliance, addressing encroachments helps to reduce risk and promotes a safe and reliable pipeline system. As seen in this example, cast iron encroachments also represent an opportunity for the various underground utilities (water, sewer, drain, telecom, etc.) to work collaboratively to implement efficient, productive projects which are able to address multiple utilities in one location at the same time.

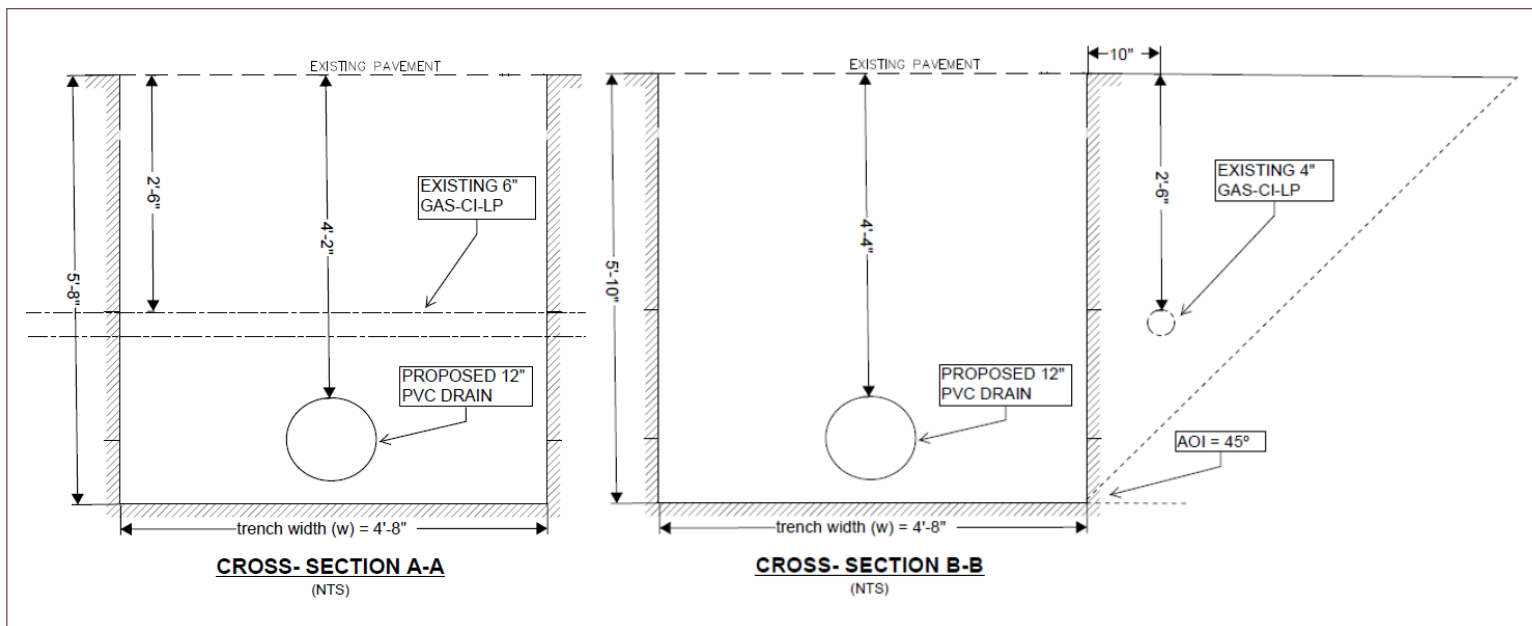


Figure 2: Cross-section of cross-trench and parallel trench encroachment

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## Solar... Coming to a Roof Near You

by Ronald Burns, PE, Principal Engineer, CHA Consulting, Inc.

Solar Panels seem to be going up everywhere. Solar Energy has been a bright spot in the Massachusetts economy for a number of years now. The sector took off in 2007 when then Governor Patrick set a goal of 250 MW of solar electric capacity installed by 2017. That goal was reached by 2013 (four years early). So a new, more ambitious goal was set: 1600 MW of solar electric capacity installed by 2020. This would equal 3-4% of the state's current electric demand. Well according to the Massachusetts's Executive Office of Energy and Environmental Affairs (EOEA) more than 841 MWs of solar electric capacity has been installed as of 2015. That is already halfway to the goal. That is equal to the electric capacity needed to power roughly 128,000 homes.

Currently Massachusetts ranks No. 2 in solar jobs in the country with over 12,000 jobs. In 2014, Massachusetts was ranked No. 4 for installed solar electric capacity for that year.

How did Massachusetts become a national leader in Solar Power? It sure wasn't the climate. Massachusetts is closer to the Snow Belt than the Sun Belt. For example, a photovoltaic (PV) solar array in Boston might generate an average of roughly 4.5 kWh/m<sup>2</sup>/day in Boston vs. 6.5 kWh/m<sup>2</sup>/day for the same array in Phoenix. The solar market in Massachusetts was helped by a few conditions:

- High energy costs
- Favorable regulatory climate
- Market forces

Massachusetts along with other New England states has historically had significantly higher electricity rates than the national average (roughly \$0.15/kwhr vs. \$0.10/kwhr in 2011 prices). These higher than average energy costs reduce the differential between solar and other non-renewable energy sources. As mentioned, the state government set a goal of increasing the share of energy supplied by renewable sources as part of its overall climate change and sustainability strategy. These goals were backed up by a helpful regulatory framework which allowed net metering and significant incentives in the form of rebates, tax credits, solar renewable energy credits, etc. Net metering is where any excess electricity generated by the solar system can be sent out to the electric power grid and the owner of the system is given a credit.

The industry has also benefited from market forces. Improvement in technology, installation practices and increase in the overall production of solar panels and related equipment worldwide has helped drive the price of solar down significantly. For example the price of PV solar systems has dropped over 53% since 2010.

Small scale residential solar has been a significant part of the growth. At the beginning of 2015 according to the Massachusetts Clean Energy Center over 10,500 residential solar systems have been installed with the capacity to power more than 100,000 homes. The drop in cost of solar systems over time has been so significant that Massachusetts has ended its rebate program for small scale residential solar systems. The program initially started with a 20% rebate that dropped to 5% before the program was closed down in Jan. 2015. Financing mechanisms have also played a significant role in helping the growth of solar. To help consumers mitigate the capital costs of installation, companies have offered leases and paid power agreements (PPAs). These agreements basically allow the solar company to build the solar system on the home owner's roof in return for a reduction of the homeowner's electric bill. The solar company owns the solar equipment. This approach results in the homeowner putting down little if any money for a PV solar system. This financing method is very popular in Massachusetts with approximately 54% of the residential solar systems installed having been financed with these methods.

While robust growth to reach the 2020 goal is expected to continue there are a few clouds on the horizon. As part of its regulations the state had set net metering caps with each of the major utilities. This was done to force the utilities to "buy" the excess solar power produced rather than allow

them to buy or not depending on market prices for electricity on the Grid. To limit the financial exposure to the utilities the state set caps on the amount they had to buy. Once that cap was reached the utility did not have to purchase any more electricity from the solar systems. Thanks to the growth of solar in Massachusetts the cap set by the state has been increased three times since they were first put in place. The governor and legislature have both put forth proposed solutions for a new net metering cap. The utilities are looking for some reduction in the price they must pay for the solar. Right now they pay the retail rate for the excess solar power. This a significant difference from the wholesale rate they get from other generation sources. They say, ultimately the increased cost for solar has to be passed on to the rest of their non-solar powered customers. Advocates of the retail pricing claim that it should not be compared to non-renewable energy sources since their pricing does not reflect the collateral benefits that solar provides such as reduced emissions.

Right now neither plan has been adopted. So once the current backlog of projects is completed new solar projects will be very limited until the new net-metering caps are approved. While distressing for the moment, it is another indicator of how far solar energy in Massachusetts has come. The regulatory challenge reflects the sort of healthy debate that needs to occur as our state moves to more sustainable energy sources.



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## Featured Group

### Geo-Institute Boston Chapter

by Jon Davies, PE, CEng, Principal Geotechnical Engineer, Hatch Mott MacDonald and Geo-Institute Boston Chapter Chair

BSCES established the Geotechnical Group, a technical committee made up of local geotechnical engineering professionals, in 1969 for the purpose of “promoting and coordinating technical and professional activities in order to disseminate information” for the benefit of its members. The committee name was changed in 1999 to the BSCES GeoInstitute to better align with ASCE’s national geotechnical committee and after that committee evolved into the ASCE Geo-Institute the BSCES Geo-Institute became the Geo-Institute Boston Chapter. Throughout these various renamings our basic mission remains the same: to foster continuing education and to provide a venue for the sharing of knowledge between engineers, geologists, and contractors in the geotechnical community.

As part of the Geo-Institute Boston Chapter’s commitment to promote technical and professional activities and the dissemination of information, we helped to organize the first Charles C. Ladd Memorial Lecture on November 16, 2015. It was with great sadness that we saw the passing

of Professor Charles C. Ladd of MIT on August 4, 2014. Professor Ladd has had a profound influence on the geotechnical community as a whole, and particularly in Boston. At MIT, he advised scores of Master’s and PhD students, many of whom are amongst us as colleagues and teachers. The first Memorial lecture, which was held at MIT, was titled “Trends in Mechanically Compressed Sediment Behavior with Stress and Plasticity” and given by John T. Germaine, ScD, Research Professor, Civil and Environmental Engineering Department, Tufts University. The presentation was attended by a crowd of over 200 people and was very well received. It also included tributes from Professor Don DeGroot and Professor Lewis Edgers and was attended by multiple generations of the Ladd family.

#### Upcoming Geo-Institute Boston Chapter events include:

- **Lunch and Learn**—a half-day course held in late January with a focus on practical information sharing. Details to be announced.

- **Port of Miami Tunnel**—a dinner lecture held on March 10, 2016, presented by Peter F. Donahue, PE, ENV SP and Steve Dusseault both of WSP | Parsons Brinckerhoff

Please check future editions of *BSCESNews* for details.

We would like to thank all past and present Geo-Institute Boston Chapter Committee members, their employers, our presenters, and all of you that attend our events for your support.

Currently, the Geo-Institute Boston Chapter Committee consists of 13 geotechnical professionals from local consulting firms, specialty construction companies, and academic institutions, who proudly volunteer their time to serve BSCES and the engineering community in the manner originally set forth in 1969. We are always looking for additional members—geotechnical practitioners in the public or private sector or educators who are interested in getting involved in the committee’s activities and promoting our mission. For more information, please contact me at [Jon.davies@hatchmott.com](mailto:Jon.davies@hatchmott.com).

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## Award-Winning Green High School Shines

by Bonnie Ashworth, Quincy, MA

It's not the high school you attended or even your children may have attended; it's a shining example of what a carefully envisioned, designed, and constructed school can be. Quincy High School (QHS) went from a facility with a student population assigned to either academic or vocational/technical education tracks, housed in two old, tired buildings connected by a bridge, to a comprehensive high school in one building designed with many sustainable features on every floor by design firm SMMA (Symmes, Maini, & McKee Associates).

From the outside, the school looks like a large building in harmony with the site and setting. Enter and you're immediately struck by the light, openness, and clean lines of the interior, all in spick-and-span condition. A large group of people on a recent school tour, organized by Sally Owen for the Quincy Park Department's Environmental Treasures Program, got to see all four floors of the building and learn of its uniqueness from architects Alex Pitkin and Matt Rice of SMMA, Susan Karim (Quincy Planning Department), Shelly Dein (Director of Sustainability and Energy for Quincy), and Larry Taglieri (Principal, QHS).

The journey to the new school was driven by educational considerations as well as the age, layout, and condition of the complex. Years of evaluation, discussion, and planning led to general guidelines and then specific plans by the design firm SMMA for a new building that could accommodate a comprehensive school, one with a balance of academic and technical education, or as Principal Larry Taglieri said: "a high school schedule that allows students to pursue their ambitions in core academic subject areas as well as in any one of our fifteen technical majors. All of the programs are integrated throughout the school." There are four wings and three academies of learning dedicated to STEM, Fine Arts, and the Humanities, implemented by interdisciplinary teams.

The school was a challenging project. For example, there is complicated topography across the 23 acre site, a coastal floodplain, and small wetlands that had to be replicated. Plus, the building is located in downtown Quincy, with traffic and other revitalization ongoing; students remained on site and continued with their classes during construction. Alex Pitkin noted that it's been 11 years since the design process began, construction took three years, the new school was fully completed in 2010, and now, "It's what a high school should be."



Quincy High School, located in downtown Quincy, is one of a new generation of schools both physically and academically. (Richard Mandelkorn Photography)

Sustainable design features and areas of focus listed by SMMA include: HVAC system energy efficiency, daylight and views, indoor air quality, sustainable materials, water conservation, renewable energy, acoustical quality, sustainable construction practices, urban heat island reduction, and commissioning of building systems. Sustainable outcomes for QHS are 30% energy and water efficiency savings above baseline and a 30 kW photovoltaic array.

One of the most impressive and unique sustainable features of the school is actually hidden on the roof. Coined the "renewable garden," the roof of Quincy High School is home to solar hot water collectors, solar photovoltaic panels, a designed wind turbine, a rooftop greenhouse, composting, and an herb garden. Creating a living laboratory for multiple areas of study, the renewable garden closes the ecological loop between resource waste (food scraps), inputs (nutrient-rich compost, solar), and outputs (plants/herbs, energy).

Tour participants picked up so much information on different aspects of the school, from large to small considerations, as the groups went from floor to floor. Shelly Dein talked about the solar component. Solar panels are spread across the entirety of the roof. Under a power purchase agreement with the electric company, the city receives a discounted rate for its own electricity in exchange for the solar energy it creates and isn't responsible for maintaining the system. Fun facts she noted are that solar panels were first patented about 125 years ago and the space race caused an explosion of the technology.

There is no wasted space in the school; Alex Pitkin commented that every space, including the corridors, is designed for teaching and

learning. Matt Rice, who was the project architect and focused on the shops located in the Science and Technology wing, pointed out that the exposed concrete floors in the shops have a great environmental and monetary benefit because they can simply be wet mopped rather than waxed, creating a positive sustainable impact. Many shops are similar in size and are connected for flexibility, with high ceilings incorporating acoustically absorptive and durable materials, making the areas less noisy.

Other details, such as the rubber surfacing on the stairs, stainless steel stair railings, recycled material that looks like carpet but is designed to remove dirt from shoes and protect the floor surface, low E glass in all the windows, light filtration blinds and multiple light level settings in classrooms, acoustical panels in ceilings, and white reflective walls, as well as strategic placement of windows, transoms, and sidelights to enhance daylight, all illustrate the meticulous thought that went into all aspects of the design. Even the boiler room was remarkable with a series of high-efficiency boilers arranged in sequence to save on wear and tear of the equipment while still handling all of the building's energy needs. The boiler room has a very small footprint for a lot of coverage in a 330,000 square foot building. Passive design elements were also incorporated to improve the social climate of a school that has 1,450 students, such as lockers on only one side of corridors and oversized doors to reduce jostling.

Is it any wonder that Quincy High School is MA-CHPS Certified under high performance design guidelines first published in the state in 2006? QHS has met criteria for being an environmentally sustainable and healthy place of learning and is

*continued on page 13*

## President's Report

*continued from page 1*

Conference. Some progress was made. An accord was achieved to limit average global warming to 2 degrees Celsius above pre-industrial temperatures and strives for a limit of 1.5 degrees if possible. This agreement, however, does not mandate how much each signatory country must reduce its greenhouse gas emissions as each country is allowed to set its own goal. It also does not establish a method to hold countries accountable for not keeping their commitments. Another open item was financial compensation for developing countries that have been damaged by climate change. Even though an accord was reached in Paris, individual countries must still ratify or approve the agreement in their respective countries. It will become legally binding if joined by at least 55 countries which together represent at least 55 percent of global greenhouse emissions.

Locally, I am happy to announce that BSCES was selected to receive the ASCE History and Heritage Citation for 2015. The award will be presented at the Regions 1, 2, 4, & 5 Multi-Region Leadership Conference in Pittsburgh this February. Special thanks to BSCES Vice President and Awards Committee Chair Bruce Jacobs, Hydroanalysis Inc., who spearheaded the nomination process.

There are two upcoming events that we are excited to sponsor. A roundtable panel discussion about Public Private Partnerships organized by the Engineering Management Group will be held on Thursday, January 14. See the Insert at the end of this newsletter for more information about this dinner meeting or consult the [event listing](#) that is posted on the BSCES website. On Saturday, January 16th, the Public Awareness & Outreach Committee will be sponsoring the New England Future City Competition at MassDOT's headquarters, 10 Park Plaza in Boston. The Future City Competition is a project-based learning experience where student teams develop a virtual city using SimCity software, and are tasked with researching and designing a solution to a city-wide issue. This year's challenge, Waste Not, Want Not, asks students to design a waste management system for their city that is safe, environmentally sound, and energy efficient. Students then build a scale model of their city using recycled material. Volunteers (either engineers or engineering college students) are still needed to serve as competition judges. If you are interested, please contact [Olivia Richards](#).

I would also like to call your attention to the event pages and inserts for this newsletter where you will find listings for four BSCES Program

Committee-sponsored National Highway Institute courses—Bridge Inspection Refresher Training, Safety Inspection of In-Service Bridges and Tunnel Safety Inspection (two offerings). All four programs will be held at the Hilton Garden Inn Worcester during the months of February, April and June 2016. BSCES is pleased to make these courses available locally, saving members the cost of having to travel out of state to take these essential training programs.

In closing, I would like to thank all of our corporate sponsors, particularly this month's featured sponsor, McMillen Jacobs Associates. We are grateful for their support of BSCES and encourage you to read their featured article about the Allison Creek Hydroelectric Design-Build Project, which was written by Sharon Crisp, Copper Valley Electric Association and Marissa Emmons, McMillen Jacobs Associates. The Geo-Institute Boston Chapter is the featured group for this newsletter and I encourage you to read their featured article on page 7 which was written by ASCE Geo-Institute Boston Chapter Chair Jon Davies of Hatch Mott MacDonald. If you wish to become involved with this chapter's committee, contact Jon at [jon.davies@hatchmott.com](mailto:jon.davies@hatchmott.com).

Finally, I want to wish all of you a very happy holiday season and best wishes for 2016!

## BSCES Legislative Fellow Update from Beacon Hill Project-Specific Transportation Legislation

*by Michael Sullivan, PE, Senior Bridge Engineer, Collins Engineers, Inc., 2015-2016 BSCES Legislative Fellow*



There are numerous bills filed with the Joint Committee on Transportation for the 2015–2016 legislative session. Here's a brief overview of various proposed legislation as it pertains to individual projects, studies, or initiatives:

**H2944—An Act relative to public safety at the Furnace Brook Parkway in the city of Quincy.** If enacted, this legislation would direct MassDOT to evaluate proper public safety improvements signage, lighting, landscaping, and utility maintenance at the Furnace Brook Parkway Rotary Intersection in the city of Quincy.

**H2965—An Act establishing a special commission on transportation in the city of Boston.** If enacted, this legislation would establish a special commission to examine current transportation and infrastructure in ward 6 and 7 in the city of Boston. The commission would recommend prioritized transportation improvement projects from funding made available in line item 6622-1383 of chapter 79, acts of 2014 (For the purpose of implementing South Station improvements). This bill would

also remove language in the above referenced item 6622-1383 to "take into consideration the recommendations of the 2014 South Boston Waterfront Transportation Plan."

**H2959—Resolve relative to construction on Route 3.** If enacted, this legislation would require MassDOT to publish a schedule for reconstruction of the Route 3/Route 93/Route 128 interchange, known as the "Braintree Split", to be issued no later than July 1, 2016.

**S1875—An Act facilitating the completion of the New Bedford/Fall River commuter rail extension project.** If enacted, this legislation would make completion of commuter rail service to Bedford and Fall River from Boston a priority project for the MBTA. The bill would also ensure that no state money is spent on the extension for bus or rapid bus alternative options.

**S1849—An Act to study the feasibility of high-speed rail access between Springfield and Boston.** If enacted, a study would be completed to examine and evaluate the costs and economic opportunities related to establishing high-speed rail service between the two cities. The study would include

project capital costs; operating costs; revenue estimates; ridership levels; using existing rail right-of-way; environmental and community impact estimates; availability of funding sources; and the resulting economic, social, and cultural benefits to the Greater Springfield region and the Commonwealth as a whole.

**S1842—An Act directing the Massachusetts Department of Transportation to conduct a highway noise study in Quincy.** If enacted, MassDOT would be directed to conduct a comprehensive noise study along the northbound and southbound sides of Route I-93 in the city of Quincy from exit 10, Squantum Street/Milton to the I-93/Route 3 split. The study would determine the ambient noise level generated by existing Route I-93 traffic.

**H3000—An Act providing for an analysis of Route 60 in the town of Arlington.** If enacted, MassDOT would conduct a comprehensive analysis of route 60/Pleasant Street extending from Route 2 to the rotary intersecting with Mystic Valley Parkway in the town of Arlington. The analysis would include vehicle and pedestrian safety and would make recommendations to increase safety for motorists and pedestrians.

Public hearings have not yet been scheduled for the proposed bills. However, hearings are expected to be held before the spring.

## Recent News and Updates

### Button and Sharpin Named 2015 BSCES Honorary Members

At the 167th BSCES Annual Awards Dinner on September 30, 2015, the BSCES Board of Government was pleased to present the Section's highest award, BSCES Honorary Membership, to Ronald E. Sharpin, PhD, PE and posthumously to Charles Button, PE. Brief biographies of these two exceptional individuals who have made significant contributions to our profession and the public good are presented below.

**Charles Button, PE** Charlie was named a BSCES Honorary Member posthumously for his forty-five year career as a professional engineer and manager for public infrastructure systems, which includes thirty-five years of service to many regional and local public agencies. These included the Massachusetts Water Resources Authority, the Boston Water and Sewer Commission and the Hartford, CT Metropolitan District Commission. In addition, Charlie also helped to improve the water environment, public infrastructure and public health as founder and president of Freshwater Consulting and during his work with several private engineering consulting firms in the Boston area. His expertise included the analysis, design and construction of water, wastewater and drainage infrastructure in the United States and internationally.

Charlie also served as the Chairman of the Boston Conservation Commission for more than a decade. He was a member of the Board of Overseers of the Boston Museum of Science, a past president of the Boston Society of Civil Engineers (2001), a past member of the New England Chapter – APWA Board of Directors and an active member of the American Society of Civil Engineers, the Water Environment Federation, the New England Water Environment Association, the Select Society of Sanitary Sludge Shovelers, the National Society of Professional Engineers, the Massachusetts Society of Professional Engineers, the Boston Harbor Association, and the Tufts University Civil Engineering Alumni Association.

**Ronald E. Sharpin, PhD, PE** Ron received BSCES Honorary membership for his contributions to the civil engineering profession through a distinguished career and unparalleled record of service to BSCES. After a year as director of BSCES in 1974, he became chairman of the BSCES Continuing Education Committee, a position which he held for 40 years. In this capacity Ron oversaw BSCES' highly regarded Professional Engineer Refresher Course that is held in the spring and fall of each year, developing the schedule of 12 classes in coordination with seven other instructors. Ron also taught the course's exam review, water supply and wastewater classes and helped roughly 2,000 BSCES members and non-members prepare for the Massachusetts PE Exam.

Ron began his career serving with the Army Reserve in Fort Knox, KY and Fort Meade, MD before attending the University of Cincinnati where he earned a BS in civil engineering and a MS in sanitary engineering. While pursuing further degrees, he worked for state agencies until his graduation in 1970 with two additional Master's and a Doctorate degree. He then moved to Boston to continue working in the engineering industry. In 1995 Ron taught civil engineering courses to undergraduates at Merrimack College, before working as a consultant to the State of MA in the Metropolitan District Commission, Division of Watershed Management; Planners Collaborative, Inc; Department of Conservation and Recreation, Division of Water Supply Protection; and most recently as Water Superintendent of the Town of Holliston from which he recently retired.

### 2016 Ernest A. Herzog Call for Papers

The Herzog Award committee is still seeking submissions for the 2016 Ernest A. Herzog Award. Submitted papers shall present an infrastructure project, innovation or idea in which the author was actively involved in as an owner, advocate, engineer, or end-user. Areas of application may include design, construction, operation, maintenance, management or financing of infrastructure components or systems. For more details about this award, see the insert at the end of this month's newsletter.

### BSCES is Accepting Nominations for the "Sustainability in Civil Engineering Award"

BSCES through its Committee on Sustainability is seeking nominations for the 2016 Sustainability in Civil Engineering Award. This award, now in its second year, will be presented at the 168th BSCES Annual Awards Dinner in the fall of 2016. The award will recognize a Massachusetts civil engineering infrastructure project constructed within the last three years that exemplifies the principles of sustainability espoused by the Institute of Sustainable Infrastructure (ISI). Project nominations will be accepted through May 1, 2016 and will then be evaluated by a judging panel convened by the Sustainability Committee. For more information regarding submission guidelines and evaluation criteria please see the insert at the end of this newsletter or download the awards form from our website at BSCES Sustainability Award Form.

### BSCES Wins Another Award

BSCES recently received notification from ASCE that it has been awarded the 2015 History & Heritage Citation. The application was prepared by BSCES Vice President Bruce Jacobs, HydroAnalysis, Inc. The application highlighted BSCES' recognition of the Choate Bridge as an ASCE Civil Engineering Historic Landmark and involvement in the celebration of the 100th anniversary of the Cape

Cod Canal. The award will be presented at the Regions 1, 2, 4, & 5 Multi-Region Leadership Conference in Pittsburgh, on February 12–13, 2016. Congrats to all involved!

### First Ladd Lecture

On July 1, 2015, the BSCES Charles C. Ladd Fund was officially established. The fund was developed in memory of this beloved MIT Professor and in recognition of his accomplishments as a gifted educator and innovative researcher on the behavior of soils. He was actively involved in the local professional community and served as president of BSCES in 1977 and was internationally sought after as a consultant working on large, complex and difficult projects. The fund was established to "support a lecture presented by an eminent academic or practitioner. The specific lecture topic will be decided by the lecturer; but the scope of the lecture should be related to soil behavior and construction on soft ground with an emphasis on practical topics with engineering relevance and/or case studies." The first lecture, conducted on November 16th at MIT, was a tremendous success! Over 200 students and professionals attended the presentation by Professor John Germaine from Tufts University. The committee is already hard at work planning for the next lecture in 2017.

### Hitting the Rhode

This year's Rhodes Scholars that were recently announced includes Northeastern civil engineering student Logan Jackson. Originally from Kentucky, Ms. Jackson hopes to increase "the number of diverse people in STEM fields." And if getting a civil engineering degree is not enough, she is president of Northeastern University's chapter of the National Society of Black Engineers and is a violinist in her university's symphony orchestra. Congrats to Logan!

### Social Media

Did you know that BSCES is "connected"? As the forms of communication continue to expand, BSCES is trying to keep up with all of the social media outlets. Our twitter account has over 300 followers from state agencies to engineering firms. We invite you to follow us and #BSCES if you attend one of our events. The BSCES Facebook page has almost 800 "likes". The page is used to announce upcoming events, provides pictures galleries of some of our signature events, and sometimes shows the lighter side of engineering. Almost 1800 individuals have connected with BSCES on LinkedIn. This forum is used for meeting announcement and discussions that are more technical in nature. These sites, in addition to the BSCES homepage, will provide information on upcoming events and highlight BSCES accomplishments.

## MassDOT Route 128/Interstate 95 Add-A-Lane Westwood-Dedham-Needham, MA (Part 2)

by Larry Cash, PE, MassDOT Project Manager; Malek Al-Khatib, PE, The Louis Berger Group, Inc. Project Manager; Daniel Deng, PE, The Louis Berger Group, Inc. Project Engineer; Jason Ringler, PWS, CWB, The Louis Berger Group, Inc. Senior Environmental Scientist

The following article is the second part of a two-part article on the MassDOT Route 128/Interstate 95 Add-A-Lane project. Part one appeared in the November 2015 issue of BSCESNews and can be viewed by [clicking here](#).

The evaluation of existing bridge structures were performed and followed by recommendations and design effort to either rehabilitate or replace existing bridge structures. The bridges were evaluated by considering their condition and ability to meet the current AASHTO and MassDOT Bridge Manual design criteria including HS 25 truck loading, five-meter vertical clearance, and lateral recovery zones. Based on the cost analysis, complete replacement of the seven bridges was found to be the most cost-effective solution. Temporary bridges were designed to facilitate the roadway construction in the Charles River/Route 135 area. Support of excavation, including the steel sheeting, soldier pile with lagging and tieback, was installed to accommodate the stage construction. Cofferdam was utilized for the construction of the piers for Charles River Bridge. The project also included extensive geotechnical analysis to determine the types of foundations to be utilized for the new bridge. The stage construction for seven bridges are summarized as follows:

**1. Great Plain Avenue over Route 128/Interstate 95 Northbound and Southbound**, a two-span continuous steel multi-beam bridge with full height abutment and multi-column center pier which was demolished and constructed at Stage 1.

**2. Route 128/Interstate 95 Northbound over Charles River**, a three-span continuous steel multi-beam bridge with stub abutments and multi-column piers.

Phase 1—Demolition:

- Demolish a portion of the existing concrete pier on the west side

Phase 2—Construction and Demolition:

- Construct partial permanent piers and bridge superstructure for two lanes traffic
- Shift traffic to partial permanent bridge
- Demolish the remainder of concrete pier

Phase 3—Construction:

- Construct the remaining portion of drilled shafts pier and bridge superstructure

**3. Route 128/Interstate 95 Southbound over Charles River**, a three-span continuous steel



Charles River bridge

multi-beam bridge with stub abutments and column piers.

Phase 1—Demolition:

- Install bolt-down type concrete barrier to the existing deck while maintaining four lanes traffic on the existing bridge
- Demolish a portion of the existing deck on the west side

Phase 2—Demolition and Construction:

- Construct west side of the bridge for two lanes traffic
- Another two lanes of northbound traffic will be accommodated by the cross over utilizing the east portion of newly constructed Route 128 SB bridge
- Demolish the east portion of the existing bridge

Phase 3 – Construction:

- Construct the east portion of the northbound bridge

Phase 4—Final Condition:

- Final bridge with five lanes traffic and wide shoulder next to high speed lane as the proposed bridge width has increased to accommodate stage construction to keep four lanes open at all time

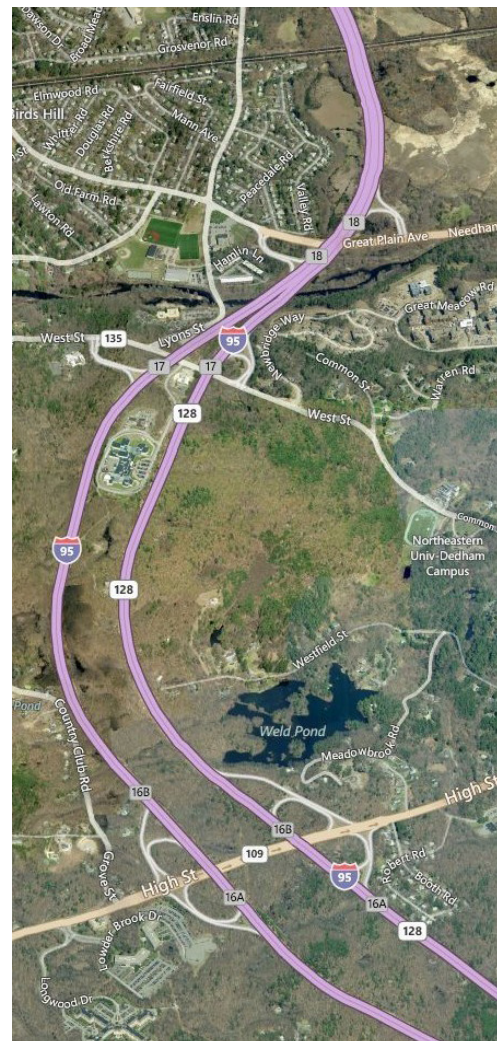
**4. Route 128/Interstate 95 Northbound over Route 135**, a single-span steel multi-beam bridge with a full height of abutments.

Phase 1—Demolition:

- Install bolt-down type concrete barriers to the existing deck while maintain four lanes traffic on the existing bridge
- Demolish a portion of the existing deck on the west side

Phase 2—Construction:

- Construct west portion of the permanent NB bridge



Rte 128 aerial view

- Construct temporary NB bridge west of the newly constructed permanent bridge

Phase 3—Demolition and Construction:

- Shift the traffic onto partial permanent bridge and temporary bridge
- Demolish remaining portion of the existing bridge
- Construct permanent NB bridge

Phase 4—Final Condition:

- Shift traffic to permanent bridge and remove temporary bridge

**5. Route 128/Interstate 95 Southbound over Route 135**, a single-span steel multi-beam bridge with a full height of abutments.

Phase 1 – Demolition:

- Install bolt-down type concrete barriers to

*continued on page 12*

## MassDOT Route 128/Interstate 95 Add-A-Lane

*continued from page 11*

the existing deck while maintain four lanes traffic on the existing bridge

- Demolish a portion of the existing deck on the east side

Phase 2 – Construction:

- Construct east portion of the permanent SB bridge
- Construct temporary SB bridge east of the newly constructed permanent bridge

Phase 3—Demolition and Construction:

- Shift the traffic onto partial permanent bridge and temporary bridge
- Demolish remaining portion of the existing bridge
- Construct permanent SB bridge

Phase 4—Final Condition:

- Shift traffic to permanent bridge and remove temporary bridge

### 6. Route 109 over Route 128/Interstate 95 Northbound, a single-span steel multi-beam bridge with a full height abutments.

As Route 109 is a major connector between Westwood and Dedham, a two-stage demolition and construction was implemented to maintain the existing traffic in each direction.

The existing abutment was supported on ledge without a footing. During the demolition, the ledge was found to be fractured and additional removal was deemed to be necessary. As the ledge elevation was lowered, the concrete volume for the proposed abutment has increased and exceeded the threshold for normal concrete placement. As a result, mass concrete was designed and performed for the proposed abutments construction.

### 7. Route 109 over Route 128/Interstate 95 Southbound, a single-span steel multi-beam bridge with a full height abutments.

Similar condition was found on the existing ledge and mass concrete was also performed for the proposed abutments construction.

The project required Environmental Permitting and coordination with MassDOT Environmental Division and Massachusetts Department of Environmental Protection, as well as individual NOI processes with the towns of Dedham, Needham and Westwood and the Army Corps of Engineers. Following issuance of Orders of Conditions from each municipality,



Great Plain Avenue



Rte 135 temporary bridge

401 Water Quality Certification, Chapter 91 license and ACOE Programmatic General Permit, further field investigation determined that driving steel pile for temporary excavation supports (cofferdams) was not feasible due to shallow bedrock in the area. Consequently, temporary cofferdams composed of large geotextile bags filled with sand and covered with polyethylene fabric were selected as the preferred alternative, resulting in an increased temporary coverage area to achieve similar internal working dimensions. The wider footprint of the stacked, geotextile sand bags combined with the extension of the fabric beyond the sand bags increased the amount of temporary impacts to river bed over the originally permitted sheet pile cofferdam. The additional temporary impacts were refined for the three project phases, each anticipated to be approximately one year in duration. Individual amendments to all permits were developed, submitted, and approved during active construction, allowing for an uninterrupted work schedule. During the construction, minor modifications to the proposed drainage design in certain locations were also granted by the local Conservation Commissions due to changes in field conditions.

Comprehensive drainage analyses were required for design of a new drainage system as well as coordination with roadway designers for adjacent Add-A-Lane contracts and implementation of the EIR commitments as they relate to storm water management. Wetlands, subject to protection by the Massachusetts Wetlands Protection Act, were flagged and surveyed to

obtain accurate limits. Due to the approval of the recently completed Total Maximum Daily Load (TMDL) for Nutrients (i.e. Phosphorus) in the Lower Charles River Basin by the US Environmental Protection Agency, Louis Berger had to consider the impacts of the additional impervious pavement on the excessive nutrient levels affecting the river. This required additional work to evaluate existing and proposed new Best Management Practices (BMPs) for phosphorus removal utilizing the best practicable methods available within the project limits and Right-of-Way. The design has also included adding/revising drainage detention and filtration basins.

Overhead sign supports and cross culverts, as well as noise walls adjacent to the Route 109 off-ramp from Route 128 North were designed and highway landscaping was included. The pavement stripping and the lane shifting at the interface with the adjacent contracts were coordinated and implemented.

In the end, through collaboration among MassDOT District 6, Project Field Office, McCourt Construction Company and Louis Berger Team, the construction of this project is completed on schedule.

Construction Cost: **\$80M**

Contractor: **McCourt Construction Company**

Construction Award Date: **May 2010**

Target Completion Date: **December 2015**

Percent Complete: **100%**

## Award-Winning Green High School Shines

*continued from page 8*

considered as belonging to the next generation of schools. The success of the project is reflected in Quincy High School's selection as a 2013 Green Ribbon School under the US Department of Education Green Ribbon Schools program. Schools are evaluated for outstanding efforts at reducing environmental impact and utility costs, promoting improved health, and effectively teaching environmental education. Susan Karim, responsible for submitting the extensive Green Ribbon Schools application, reflected: "Touring the school and seeing firsthand the city's progressive efforts toward sustainable development and integrated education afforded by SMMA's thoughtful design inspired me to nominate Quincy High School for this award. The national Green Ribbon School designation is both rewarding and well deserved."

SMMA has been recognized for its work with several awards, including a Design Concept Award in 2010 and a Project of Distinction Award in 2011, from CEFPI (Council of Educational Facility Planners International). In addition, SMMA received a citation for design innovation in 2012 for the design and planning of Quincy High School from the National School Boards Association and American Institute of Architects.

QHS is a green and beautiful example of what a large building with a sizable population of students and staff can be. Any numbers of the tour participants could be heard to comment that they wouldn't mind returning to high school in such a magnificent facility with such an enlightened approach to education.



*Daylighting is a fundamental design aspect of QHS and contributes significantly to the warm atmosphere of the building. (Richard Mandelkorn Photography)*

## Upcoming Events

**For more information and to register for events, please visit [www.bsces.org](http://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.*

### Engineering Management Group Event

**Thursday, January 14, 2016**

Wyndham Boston Beacon Hill  
5 Blossom Street, Boston, MA

5:30 PM Social/Registration

6:30 PM Meal

7:15 PM Presentation

#### **Public Private Partnerships (P3): Round Table Discussion on the Funding Source to Rebuild America's Infrastructure**

*Pamela Bailey-Campbell, Vice President, Jacobs Engineering*

*Tom Pelnik, Managing Director of EY Infrastructure Advisors, Ernst & Young*

*Anatoly Darov, PE, Esq., BSCES Past President, Partner, Burns and Levinson*

*Nicholas Rubio, President of United States Operations, Cintra*

It's no secret that Massachusetts's infrastructure is in desperate need of repair, and finding a funding source is an obstacle. Massachusetts' recent legislation on P3s will allow a new avenue to fund your project. Join us for a unique round table discussion on the benefits, challenges, and logistics to using a P3 funding source. BSCES is flying in experts from across the country, with

over 75 years of experience working on P3 projects, to educate the audience on this new funding mechanism from four very different points of view.

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

### **BSCES Program Committee Sponsored NHI Training**

**Tuesday – Thursday, February 2 – 4, 2016**

Hilton Garden Inn Worcester  
35 Major Taylor Blvd, Worcester, MA

8:00 AM – 4:30 PM

#### **FHWA-NHI-130053— Bridge Inspection Refresher Training**

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.

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

### SEI Boston Chapter Event

**Wednesday, February 10, 2016**

Northeastern University  
Behrakis Health Center, Room 010  
30 Leon Street, Boston, MA

6:00 PM Registration, Social and Pizza

7:15 PM Presentation

#### **Kingdom Tower—A Megatall Building**

*Joseph G. Burns, PE, SE, C.Eng, FASCE, LEED AP, Managing Principal, Thornton Tomasetti*

Megatall buildings are currently defined by the Council on Tall Buildings and Urban Habitat as those reaching the height of 600m or higher. Within the past decade, four such buildings have come to fruition and more are being planned. The one-kilometer tall Kingdom Tower in Jeddah, Saudi Arabia, which is currently under construction, will become the world's tallest building when completed. Co-hosted by several Northeastern University student groups, this presentation will focus on the planning and design of the Kingdom Tower; but, will also discuss relevant aspects of other recent Megatall buildings.

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

*continued on page 14*

## Upcoming Events *(continued from page 13)*

### BSCES Program Committee Sponsored NHI Training

**Monday – Friday, April 4 – 15, 2016**

Hilton Garden Inn Worcester  
35 Major Taylor Blvd, Worcester, MA

8:00 AM – 4:30 PM

**FHWA-NHI-130055—**

#### Safety Inspection of In-Service Bridges

This two week course is based on the 2012 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.*

### BSCES Program Committee Sponsored NHI Training

**Monday – Friday, April 18 – 22, 2016**

**or**

**Monday – Friday, June 20 – 24, 2016**

Hilton Garden Inn Worcester  
35 Major Taylor Blvd, Worcester, MA

8:00 AM – 4:30 PM

**FHWA-NHI-130110—**

#### Tunnel Safety Inspection

This five-day, Instructor-led Training (ILT) is highly interactive and builds upon participants’ prior knowledge of tunnel and/or bridge inspection. This course covers the entire breadth of knowledge necessary to manage or execute a successful tunnel inspection based on the National Tunnel Inspection Standards (NTIS), Tunnel Operations, Maintenance, Inspection and Evaluation (TOMIE) Manual and Specifications for the National Tunnel Inventory (SNTI). During the course, the instructor will lead participants through a series of case studies, concluding with a virtual tunnel inspection that takes place in a computer-simulated, 3D environment.

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

## ASCE Webinars

ASCE WEBINARS

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ASCE | CONTINUING  
EDUCATION

The following webinars are only a few of the many online programs offered to ASCE members. Sign up with the code WEBBOSSEC to contribute 20% of your purchase to the Boston Society of Civil Engineers Section/ASCE.

#### Introduction to Rock Mechanics

December 17, 2015, 12:00 PM – 1:00 PM

#### Alternative Designs for

#### Anchorage to Concrete

December 18, 2015, 11:30 AM – 1:00 PM

#### Improving Safety at Railroad

#### Highway Grade Crossings

December 18, 2015, 12:00 PM – 1:30 PM

For a full listing of ASCE Webinars, [click here](#).

## Classifieds

We’re

# HIRING

Project Managers  
& Schedulers

PMA CONSULTANTS, LLC

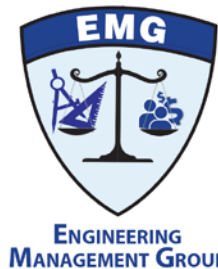
25 Braintree Hill Office Park, Suite 303  
Braintree, MA 02184

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Boston Society of Civil Engineers Section  
American Society of Civil Engineers



## Public Private Partnerships (P3): Round Table Discussion on the Funding Source to Rebuild America's Infrastructure

**Pamela Bailey-Campbell**, *Vice President, Jacobs Engineering*

**Tom Pelnik**, *Managing Director of EY Infrastructure Advisors, Ernst & Young*

**Anatoly Darov, PE, Esq.**, *Partner, Burns and Levinson*

**Nicolas Rubio**, *President of United States Operations, Cintra*

**Thursday, January 14, 2016**

**The Wyndham Boston Beacon Hill, 5 Blossom Street, Boston, Ma**

**5:30 PM Social/Registration; 6:30 PM Meal; 7:15 PM Presentation**

It's no secret that Massachusetts's infrastructure is in desperate need of repair, and finding a funding source is an obstacle. Massachusetts' recent legislation on P3s will allow a new avenue to fund your project. Join us for a unique round table discussion on the benefits, challenges, and logistics of using a P3 funding source. BSCES is flying in experts from across the country, with over 75 years of experience working on P3 projects, to educate the audience on this new funding mechanism from four *very* different points of view (POV).

**The Engineer's POV:** Pamela Bailey-Campbell: Vice President at Jacobs Engineering

**The Financier's POV:** Tom Pelnik - Managing Director of EY Infrastructure Advisors, LLC (EYIA), an affiliate of Ernst & Young LLP

**The Lawyer's POV:** Anatoly Darov, PE - Partner at Burns and Levinson, Past President of BSCES

**The Concessionaire's POV:** Nicolas Rubio - President of Cintra's United States Operations, Young LLP

**Registration Deadline: Friday, January 8, 2016**

**\$90 Members, \$115 Non-Members, \$75 Public Sector Members**

**\$90 Public Sector Non-Members, \$30 Senior Members (65+) & Students,**

**Tables of 10 are available for \$900.00 regardless of membership**

### Information/Registration:

Register to attend this meeting and pay by credit card online at [http://bit.ly/EMG-P3\\_Jan16](http://bit.ly/EMG-P3_Jan16). 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. 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 received after January 8, 2016 and no-shows will be billed.

# Ski/Ride Day Trip to Stowe, Vermont with BSCES Younger Member Group



Ski or Ride with YMG and Boston Ski and Sports Club (BSSC) at Vermont's tallest mountain! With 116 trails, there is something for every level of skier or rider.

When: Saturday, January 30th.

Price: \$81 (includes bus ride and lift ticket)

Pick-up Locations: Two Motor Coach Route Options

## Route 1

5:00 AM – Sun & Ski, Pembroke

5:30 AM – Quincy Adams MBTA Station

6:00 AM – Dartmouth St. Garage, Back Bay

## Route 2

5:30 AM – Riverside MBTA Station

6:00 AM – Woburn Park & Ride

Deadline to register is January 27<sup>th</sup>.

Register online at [BSSC.com](http://BSSC.com) and use the promo code BSCES16 to receive the special YMG Rate.

Please E-mail [BSCESYMG@gmail.com](mailto:BSCESYMG@gmail.com) once registered; to tell us which route you plan to use and for more information.





Boston Society of Civil Engineers Section  
American Society of Civil Engineers

## Program Committee



### FHWA-NHI-130053 Bridge Inspection Refresher Training

**Tuesday, February 2, 2016 – Thursday, February 4, 2016**

**Hilton Garden Inn Worcester, 35 Major Taylor Boulevard, Worcester, 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 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.

**Registration Deadline: Friday, January 8, 2016**

**Registration Fees: \$1,450 Members, \$1,750 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-served 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/NHIBridgeRefresher2016>. 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. There are no refunds for no shows or for registrants who cancel after January 8, 2016.



Boston Society of Civil Engineers Section  
American Society of Civil Engineers



STRUCTURAL  
ENGINEERING  
INSTITUTE

Boston Chapter

## Kingdom Tower - A Megatall Building

**Joseph G. Burns, PE, SE, C.Eng, F.ASCE, LEED AP**

*Managing Principal, Thornton Tomasetti*

**Wednesday, February 10, 2016**

**Northeastern University, Behrakis Health Center, Room 010, 30 Leon Street, Boston, MA**

**(Accessible by Green Line (E) via Northeastern Station and Orange Line via Ruggles Station)**

**6:00 PM Registration, Social and Pizza; 7:15 PM Presentation**

Megatall buildings are currently defined by the Council on Tall Buildings and Urban Habitat as those reaching the height of 600m or higher. While many such towers have been proposed over the years, it has only been within the past decade that four megatalls have finally come to fruition: Burj Khalifa (Dubai), Shanghai Tower (China), Mecca Royal Clock Tower (Saudi Arabia), and Ping An Financial Center (China). The one-kilometer tall Kingdom Tower in Jeddah, Saudi Arabia which is currently under construction will become the world's tallest building when completed. As with all tall buildings, the most important drivers for various engineering solutions are: performance under environmental wind and seismic lateral loads; foundations; structural materials; construction efficiencies and scheduling; architectural shaping; internal planning; usage; and aesthetics. For megatalls, however, the importance of these drivers becomes more pronounced to the point that the structural demands on the architecture and planning usually become the critical factor in the success or failure of the project. This presentation will focus on the planning and design of the Kingdom Tower; but, will also discuss relevant aspects of other recent Megatall buildings.

*This event is co-hosted by Northeastern University's Graduate Structural Engineering Association, ASCE Student Chapter and Student Government.*

**Registration Deadline: Friday, February 5, 2016**

**\$20 Members, \$25 Non-Members**

**\$15 Public Sector Members, \$20 Public Sector Non-Members**

**\$5 Student Members and Senior Members (65+)**

**Northeastern University Student Members No Charge**

### Information/Registration:

Register to attend this meeting and pay by credit card online at <http://bit.ly/SEI-2-10-15>. 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. 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 received after Registration Deadline February 5, 2016 and no-shows will be billed.



### **FHWA-NHI-130055**

## **Safety Inspection of In-Service Bridges**

**Monday, April 4, 2016 – Friday, April 15, 2016**

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

This two week course is based on the 2012 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-130101, *Introduction to Safety Inspection of In-Service Bridges*; FHWA-NHI-130054 or *Engineering Concepts for Bridge Inspector*. 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, March 4, 2016. Please forward your prerequisite certificate in the form of a PDF document to [bsces@engineers.org](mailto:bsces@engineers.org). Please visit the NHI website at [www.nhi.fhwa.dot.gov](http://www.nhi.fhwa.dot.gov) or contact them at 703/235-0500 for additional information on the prerequisite course requirements.

**Registration Deadline: Friday, February 26, 2016**

**Registration Fees: \$3,000 Members, \$3,600 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-served 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/NHI\\_In-Service\\_2016](http://bit.ly/NHI_In-Service_2016). 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. There are no refunds for no shows or for registrants who cancel after March 4, 2016, including those that due so due to failure to take one of the prerequisite courses.



## FHWA-NHI-130110 Tunnel Safety Inspection

**Monday, April 18, 2016 – Friday, April 22, 2016**

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

This five-day course is highly interactive and builds upon participants' prior knowledge of tunnel and/or bridge inspection. The course covers the entire breadth of knowledge necessary to manage or execute a successful tunnel inspection based on the National Tunnel Inspection Standards (NTIS), Tunnel Operations, Maintenance, Inspection and Evaluation (TOMIE) Manual and Specifications for the National Tunnel Inventory (SNTI). During the course, the instructor will lead participants through a series of case studies, concluding with a virtual tunnel inspection that takes place in a computer-simulated, 3D environment.

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, March 18, 2016. Please forward your prerequisite certificate in the form of a PDF document to [bsces@engineers.org](mailto:bsces@engineers.org). Please visit the NHI website at [www.nhi.fhwa.dot.gov](http://www.nhi.fhwa.dot.gov) or contact them at 703/235-0500 for additional information on the prerequisite course requirements.

**Registration Deadline: Friday, March 18, 2016**

**Registration Fees: \$2,200 Members, \$2,650 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-served 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/NHITunnelSafety\\_4-18-16](http://bit.ly/NHITunnelSafety_4-18-16). 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. There are no refunds for no shows or for registrants who cancel after March 18, 2016, including those that due so due to failure to take one of the prerequisite courses.



## FHWA-NHI-130110 Tunnel Safety Inspection

**Monday, June 20, 2016 – Friday, June 24, 2016**

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

This five-day course is highly interactive and builds upon participants' prior knowledge of tunnel and/or bridge inspection. The course covers the entire breadth of knowledge necessary to manage or execute a successful tunnel inspection based on the National Tunnel Inspection Standards (NTIS), Tunnel Operations, Maintenance, Inspection and Evaluation (TOMIE) Manual and Specifications for the National Tunnel Inventory (SNTI). During the course, the instructor will lead participants through a series of case studies, concluding with a virtual tunnel inspection that takes place in a computer-simulated, 3D environment.

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, March 18, 2016. Please forward your prerequisite certificate in the form of a PDF document to [bsces@engineers.org](mailto:bsces@engineers.org). Please visit the NHI website at [www.nhi.fhwa.dot.gov](http://www.nhi.fhwa.dot.gov) or contact them at 703/235-0500 for additional information on the prerequisite course requirements.

**Registration Deadline: Monday, May 23, 2016**

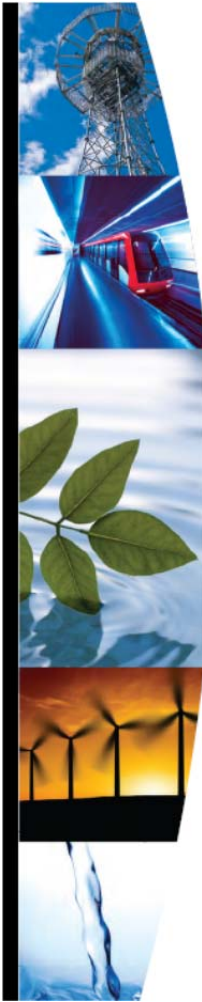
**Registration Fees: \$2,200 Members, \$2,650 Non-Members**

**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-served 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/NHITunnelSafety\\_6-20-16](http://bit.ly/NHITunnelSafety_6-20-16). 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. There are no refunds for no shows or for registrants who cancel after March 18, 2016, including those that due so due to failure to take one of the prerequisite courses.



## 2016 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.

### 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 May 1, 2016.** The winner will be announced at the BSCES Annual Awards Dinner event in the Fall of 2016. Entries may be submitted electronically to [wognibene@engineers.org](mailto:wognibene@engineers.org).

### 2015 BSCES Sustainability in Civil Engineering Award Winner

The 2015 award was presented to the City of Cambridge for its **Alewife Stormwater Wetland** project, which embodies the concept of multi-use and sustainable infrastructure. The project was originally conceived as a concrete storage tank to serve a 420 acre neighborhood as a result of court-ordered combined sewer separation. Through broad stakeholder involvement, the project transformed into an “environmental miracle” that restored wildlife habitat and added features for the general public’s use and improved quality of life.



Read about the Alewife Stormwater Wetland in the [BSCES October Newsletter](#)

## **2016 ERNEST A. HERZOG AWARD**

### **CALL FOR PAPERS**

#### **BACKGROUND**

Ernest A. Herzog was a nationally recognized civil engineer. During his career, he served a term as president of the Boston Society of Civil Engineers Section and was also a fellow of the American Society of Civil Engineers (1987).

Mr. Herzog began his career with Spencer, White and Prentiss at the atomic energy facility in Oak Ridge, Tennessee. After World War II, he transferred to a Boston-based firm named Chas. T. Main Inc. Eventually, Mr. Herzog joined the firm of Alonzo B. Reed Inc. where he progressed into the highest role of president and remained in that role for 20 years thereafter.

While in the transportation field, Mr. Herzog was actively involved in the design and construction of the monorail used at the 1962 Seattle World's Fair. This monorail, which is still in use today, has served as the prototype for several other monorail systems including those at Disney Land in Anaheim, California, Disney World in Orlando, Florida, and one in Tokyo, Japan. In fact, Mr. Herzog was a strong and persistent advocate of a monorail system to serve Boston's south shore communities to relieve the traffic congestion on the Southeast Expressway.

In 1973, Mr. Herzog co-founded Herzog-Hart, a full-service engineering firm that specializes in the design and construction of research and production facilities for the pharmaceutical and process industries.

Mr. Herzog was well known for his generous support of and encouragement to young college students and young professionals just at the onset of their careers. He lectured at Tufts University, Dartmouth College, University of Massachusetts, and Northeastern University. He also wrote and published numerous papers, particularly concerning the effects of transportation systems on society.

In memory of Mr. Herzog's commendable career achievements, the Ernest A. Herzog Award was established to promote an awareness of and to recognize innovative improvements to infrastructure. This award is given annually to the author(s) whose submitted paper is chosen to best recognize innovation and awareness of infrastructure.

#### **PAPER GUIDELINES**

Submitted papers shall present an infrastructure project, innovation, or idea in which the author was actively involved in as an owner, advocate, engineer, or end-user. The paper must be well written and address specific benefits to current professional practices, lifestyle, and/or sustainability through the application of existing or innovative technologies or methods. Areas of application may include design, construction, operation, maintenance, management or financing of infrastructure components or systems.

#### **RULES**

- A.** The paper should be original and not be less than 2,000 words and not more than 6,000 words. The paper should clearly describe the project, innovation, or idea and highlight benefits to the current engineering and construction practices. Graphic material including photographs should be included to highlight specific areas of the project. The paper may have been previously published in a journal.

- B.** 3 copies of the papers shall be submitted to:  
BSCES/ASCE  
The Engineering Center  
One Walnut Street  
Boston, Massachusetts 02108-3616  
Attn: Boston Chapter TD&I  
Herzog Award Committee

An electronic copy should also be sent to [alyssa.marino@juno.com](mailto:alyssa.marino@juno.com)

**Deadline for submittal: March 15, 2016.**

- C.** The recipient will be invited to give a short presentation on the paper at the BSCES Transportation and Development Institute-Outreach Committee Spring Awards Celebration. Original papers may be submitted (with the author's permission) for publication in the BSCES Journal and for BSCES Annual Awards (celebrated in the fall of 2016).

## **REVIEWERS**

The BSCES Herzog Award Competition Subcommittee.

## **EVALUATION CRITERIA**

Topics for the papers shall be related to one or more of the 17 infrastructure systems defined in ASCE's infrastructure report card (see <http://www.infrastructurereportcard.org/>). Papers are evaluated by the reviewers on the basis of the following criteria:

- A.** Technical writing; organization, graphics, grammar, and technical accuracy (30%)
- B.** Benefits to the current design, construction, operation, maintenance, or financing practices of infrastructure (20%)
- C.** Innovation; uniqueness of concepts (10%),
- D.** Benefits to lifestyle of the general public or other end-users (20%)
- E.** Sustainability, life-cycle cost benefits, or cost effectiveness (20%)

## **AWARD**

The award presentation will be made at the BSCES Transportation and Development Institute-Outreach Committee Spring Awards Celebration on May 10, 2016. The recipient is required to present the paper at the awards dinner to a general audience that will include many non-engineers including middle and high school students. The recipient will receive a \$1000 award, a memorable plaque, and have the paper included in a future edition of the BSCES Journal.