

Designing Resilient Coastal Structures using "Risk-Informed Decision Making"

by Daniel C. Stapleton, PE, Principal, GZA GeoEnvironmental, Inc. and Member ASCE, COPRI

Coastal structures have a major role in the protection of shorelines, property, critical infrastructure and cultural and recreational resources, as well as providing access to the water. Currently, for most coastal structures such as piers, breakwaters, revetments and seawalls, there is limited regulatory guidance in the United States relative to the appropriate level of flood risk (i.e., storm surge and waves) that should be considered during design. As such, these structures are often designed without a thorough understanding of risk. Not quantitatively considering risk can result in an inefficient design and, as a result, may or may not perform satisfactorily and/or require unanticipated maintenance and repair. This situation will be further exacerbated by the effects of climate change, including sea level rise and increase in storm intensity and/or frequency.

"Risk-Informed Decision Making" (RIDM) has been adopted by several federal agencies, including the US Army Corps of Engineers. This

article demonstrates the use and benefits of a simplified version of RIDM for design of typical coastal structures with a focus on resiliency.

"Risk" is defined as:

Risk = Hazard Probability x Consequence

Simply, "Risk" is the product of the likelihood (i.e., the probability) of a flood event (e.g., storm surge, waves and wind) occurring and the consequences (i.e., effects) of that flood event occurring. Applied to the design of coastal structures, the hazards include the relevant components of the coastal flood event, including storm tide elevation, wave height and period, and wind intensity and the duration and change over time (i.e., time series) of each of these.

Using RIDM, the flood hazards are characterized probabilistically, typically in terms of both the annual exceedance probability (AEP) and the structure life-cycle exceedance probability (LEP). An example of this is the FEMA 0.01

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President's Report

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



As engineers we tend to like numbers and rankings so here are some to consider. Thirteenth—that is where the World Economic Forum Global Competitiveness Index has ranked the United States for the general state of its infrastructure (transportation, communications, and energy). Over the past decade, the quality of our roadway infrastructure has fallen from seventh to fourteenth. These rankings could be worse, but the problem is that our rankings have dropped and the needed investment to stop this trend is not in sight.

The 2013 ASCE Report Card states that spending an additional \$1.6 trillion, in 2010 dollars, is needed by 2020 to improve the quality of the country's infrastructure from "poor" to "good." A new report card will be published next spring. The United States spends 2% of its GDP on infrastructure investment in comparison to 9% and 5% in China and the EU, respectively.

Part of the problem is that the federal gas tax, which provides most of the funding for federal spending on roads, has been fixed at 18.4 cents per gallon since 1993. Over that period the

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price of construction materials and wages of construction workers have both risen by more than 75%. Thus the financial burden has shifted to states and municipalities to fund infrastructure improvements.

Massachusetts increased its gas tax by three cents per gallon in 2013 (although the indexing component was rejected in 2014). This modest increase was the first time since 1991 that lawmakers had raised the gas tax. If the state's tax had kept up with inflation since then, it would be 37 cents per gallon, rather than the

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Coastal Structures and RIDM

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AEP (the 100-year return period flood, referred to as the Base Flood Elevation) defined in FEMA Flood Insurance Studies (FIS) and Flood Insurance Rate Maps (FIRMs). The Base Flood Elevation (BFE) is the flood event that has a one in 100 chance of being equaled or exceeded in any given year, and is the flood that is used for establishing national flood insurance premiums. Note that the probability of a flood equaling or exceeding the BFE (or any AEP) is cumulative over multiple years. For example during the life of a structure (say 30 years), the likelihood of equaling or exceeding the BFE during the life of the structure (i.e., the life cycle probability) is about one in four (i.e., 26%).

Using RIDM, the flood hazards are characterized over a range of probabilities. For most coastal structures the hazards are characterized for a cumulative frequency curve defining flooding ranging from the two-year return period to the 500-year return period. However, for highly critical coastal structures or structures requiring very large capital investment, the structures may warrant design for much lower probability flood events (e.g., the 10,000-year return period). To design for climate change, the cumulative frequency curves are also developed for different time horizons within the proposed structure life and for different sea level rise scenarios.

The effects (or consequences) are determined for the flood conditions associated with the full range of the flood cumulative frequency curve. These effects include the environmental loads on the structure as well as the costs associated with direct and consequential damages resulting from floods exceeding a specific flood risk level. In benefit-cost analyses performed using RIDM, preventing these costs from occurring is considered a “benefit.”

RIDM is used as both a design tool and a decision-making tool. As a design tool, it establishes the environmental load conditions and corresponding structure performance for several different levels of risk, for the structure as a whole and for the individual structure components. This provides the basis for the designer to identify system weaknesses during different flood risks and incorporate elements into the design to create structure resiliency. It also allows the facility user to incorporate varying levels of preparedness actions to limit the exposure, risk of damage, and operation recovery

into the design and decision making process. For example, using RIDM a pier would be designed to be operational for a certain minimum risk level (say, the 100-year return period) but also be designed to be structurally resilient during more extreme (lower probability) flood events through the incorporation of additional bracing, breakaway or removable decking, additional scour protection, etc., with minimal addition in construction cost. The structure resiliency would be confirmed by evaluating the structure response under environmental loads associated with lower probability flood events. To put this in perspective, a “resilient” pier designed to be operational up to a 100-year return period flood, would have readily survived without damage during a storm like Superstorm Sandy which had a return period on the order of 300 to 400 years in the Connecticut, New York, New Jersey area. In contrast, post-Sandy observations identified numerous destroyed and damaged piers.

RIDM is also a powerful decision-making tool to help owners both understand their risk and determine the optimal level of investment in the structure, since it supports the development of comprehensive benefit-cost analyses. The fundamental (and critical) difference of RIDM relative to traditional benefit-cost analysis is that the benefits (i.e., the prevented consequences) are defined probabilistically using Monte Carlo analyses. The benefits and costs are typically defined on both an annual and life-cycle basis. Everything else being equal, the optimum investment in the structure is defined as the point at which the benefits exceed the investment.

While this (or similar) approach has been used over the last 10 to 15 years for critical structures, RIDM is equally beneficial for more common projects (ports, marinas, sea walls, etc.). Most importantly, the cost to incorporate RIDM into the design process has dropped dramatically over recent years. This is primarily due to:

- the availability of regional probabilistic flood analyses, such as that developed by the USACE (e.g., the North Atlantic Coast Comprehensive Study) and by FEMA;
- the advancement and ease of use of numerical storm surge and wave hydrodynamic models (such as ADCIRC and SWAN), which can be applied using computationally efficient, local high resolution model grids with boundary condition input from the regional data sources identified above; and
- The availability and ease of use of risk analysis software (such as @Risk™).

Coastal Storm Risk Management and Emergency Preparedness

by Timothy S. Hillier, PE, Vice President, CDM Smith

Created in 2000, the Coasts, Oceans, Ports, and Rivers Institute (COPRI) is a semi-autonomous institute of the American Society of Civil Engineers. COPRI serves as a multidisciplinary and international leader in improving knowledge, education, development, and practice of civil engineering and associated disciplines in the sustainable management of coastal, ocean, port, waterway, riverine and wetland resources for the benefit of society. COPRI serves its members and society by uniting the disciplines working to sustainably develop, protect, and restore coasts, oceans, ports, waterways, rivers and wetlands; integrating the key stakeholders into decision making processes; and influencing public policy. Amongst the multiple challenges facing the members of COPRI and our nation, none are more pressing than coastal storm risk management, and the associated emergency preparedness needs associated with managing that risk.

As a nation, our dependence on the coast and ports continues to grow. According to the National Oceanographic and Atmospheric Administration, the US counties that are adjacent to the coast contributed \$6.6 trillion to the nation's gross domestic product (or roughly 45% in 2001). By 2020, up to 134 million Americans are expected to reside in coastal communities. Concurrent with population growth and the existing dependency on coastal resources is an increasing risk of coastal flood events. Climate Central forecasts that by 2050 coastal flooding in the US could cost the nation \$50 billion annually. As coastal flooding continues to increase, it will be the professionals of COPRI who will be tasked with mitigating the risk it poses to the people and economies of our national shoreline.

It is common to look at emergency preparedness to coastal storm events in a cyclical approach:

Prepare -> Respond -> Recover -> Mitigate. In fact, an effective approach to hazard reduction is not so linear. However, the four components of the cycle provides a framework to consider the activities necessary to reduce our coastal risk. As we prepare for coastal flood events, it is necessary to understand the risk that coastal populations and infrastructure face. The Federal Emergency Management Agency (FEMA), as part of its Risk Mapping, Assessment and Planning (Risk MAP) program is in the process of updating coastal Flood Insurance Rate Maps for much of the New England coast. The one-percent-annual-chance Special Flood Hazard Areas reflected on these maps offer a dataset to evaluate the potential for flood inundation at a local level. Tools combining engineering assessments and geospatial analysis also exist to evaluate the risk (e.g., building inventory) within the flooding limits. Once the risk is well understood, preparedness steps can be taken to reduce impacts to citizens and infrastructure.

In the immediate aftermath of an event, the response phase of the emergency preparedness cycle is initiated where the primary objective is the safety of those impacted. During response, the evacuation of people in the disaster impacted area and the supply of shelter and medical care is critical. Stabilizing key infrastructure to support these efforts may be a requirement. After the safety of the survivors is assured, damage assessments by engineers will commence. Additional data capture efforts, such as high water marks and structural stability assessments, can provide useful information for future actions to increase disaster resilience.

The recovery process starts as response activities wind down. Those economic dependencies require that industry start back up as soon as possible during the disaster. The survivors are

driven to resume their normal lives as quickly as possible. However, the recovery process offers the opportunity to rebuild resiliently and reduce risks from future events. Initiatives like Rebuild By Design, launched by US Housing and Urban Development and support by the Rockefeller Foundation in the aftermath of Hurricane Sandy, bring together multidisciplinary teams and civic leaders to develop resilient solutions for recovery. Achieving a balance between the short-term need to return to normal operations and the long-term benefits of thoughtful redesign is a challenge that will require tailored solutions.

Although it is the fourth component of the emergency management cycle, mitigation should be incorporated continuously to be effective. Often investment in mitigation design and planning is a challenge to identify due to other civic priorities. However, it has been estimated that \$1 of mitigation investment results in \$4 of reduced damages. FEMA provides the Hazard Mitigation Grant Program which offers funding to help communities implement hazard mitigation measures following a presidential major disaster declaration. FEMA also provides the Pre-Disaster Mitigation Grant Program to assist states, territories, federally-recognized tribes and local communities in implementing sustained pre-disaster natural hazard mitigation programs. Support from the federal government to these activities is unlikely to be sustainable. States and local communities will likely need to make these actions a priority if mitigation is to continue.

Emergency preparedness considerations have a place in the engineering of coasts, oceans, ports, and rivers. The ASCE COPRI Boston Chapter is a forum for professionals in the

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FEMA Grant Money Available for Mitigation Projects

by Peter A. Richardson, PE, LEED AP, CFM, ENV SP, Vice President, Green International Affiliates, Inc.

The Massachusetts Emergency Management Agency (MEMA) and Massachusetts Department of Conservation and Recreation (DCR) administer several Federal Emergency Management Agency (FEMA) Grants in the Commonwealth. Two of these grant programs, the Pre-Disaster Mitigation Grant (PDM) Program and the Flood Mitigation Assistance (FMA) Program, still have funds available for 2016. The PDM and FMA Grant programs are federally-funded and are part of FEMA's Hazard Mitigation Assistance (HMA) program. PDM and FMA grants provide opportunities for communities to reduce, minimize, and/or eliminate potential damages to property and infrastructure from natural hazard events.

State, tribal organizations, and local governments are eligible to apply for these grants as sub-applicants. For projects that benefit individual home or business owners, the local government must be the sub-applicant. To be eligible for project grants, sub-applicants must have a locally adopted and FEMA-approved Local Natural Multi-Hazard Mitigation Plan by the

application deadline. Mitigation Projects that are eligible for grants must result in a reduction to natural hazard damage and include: stormwater drainage and culvert improvements; floodplain and stream restoration; flood control, diversion, and storage; property acquisition; slope stabilization; infrastructure protection; aquifer storage; seismic and wind retrofits; structure elevations; and more. Also, as a result of *Executive Order 13653—Preparing the United States for the Impacts of Climate Change*, FEMA funds are encouraged to be used for climate resilient mitigation activities.

Applications for mitigation projects under the PDM and FMA grant programs are required to be submitted via eGrants by May 25, 2016 at 3:00 PM and must include a formal Benefit-Cost Analysis (BCA). Following are highlights of each of the FEMA grant programs:

Pre-Disaster Mitigation (PDM) Grant Program

- Nationally competitive grant program
- PDM funds available for all-hazard

mitigation projects, including Climate Resiliency and planning

- \$90,000,000 available nationwide
- Private Non-Profit organizations are not eligible for PDM grants
- A 25% non-federal cost share required on all grant awards
- Each state is limited to a total of 18 sub-applications
- \$4,000,000 limit on project budgets (Federal share)
- 36-month maximum period of performance

Flood Mitigation Assistance (FMA)

- Nationally competitive grant program
- Authorized by the National Flood Insurance Reform Act of 1994 to reduce/eliminate NFIP claims
- \$199,000,000 available nationwide
- Private Non-Profit organizations are not eligible
- Federal share may exceed 75% for Repetitive Loss/Severe Repetitive Loss (RL/SRL) structures
- Funds available for "flood related" hazards only, with preference RL/SRL structures
- 36-month maximum period of performance

President's Report

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24 cents it is today. Just last year, twelve states chose to increase their gasoline taxes. Since most states tax by the gallon purchased, tax revenues have been adversely impacted by the increased popularity of hybrid vehicles.

In December 2015, Congress passed the *Fixing America's Surface Transportation (FAST) Act* to fund highway spending until 2020, having previously relied on a series of short-term compromises. This provided some additional revenues and encouraged states to invest by removing the risk that federal funds would suddenly dry up, causing projects to be cancelled.

These are steps in the right direction but they are small steps and not the clear decisive actions needed to address the looming problems associated with our aging infrastructure. As successful as the Commonwealth's \$3B Accelerated Bridge Program (ABP) has been, the funding will be ending. Currently approximately 8% of the bridges in Massachusetts are structurally deficient but as bridges are repaired,

others continue to age with resulting declines in structural integrity. Many of these structures were constructed as part of the Interstate Highway System during or soon after the Eisenhower administration. They are larger-span and width bridges (and likely more expensive) and provide the critical connections for commuters, commerce, and services. Some form of the ABP needs to be continued to ensure the Commonwealth's assets are properly maintained

Similarly, the Massachusetts Water Infrastructure Investment Commission determined that over the next twenty years an additional \$10.2B is needed for drinking water, \$11.2B for wastewater, and \$18B for stormwater. While efforts have been made to bring attention to this funding gap including H. 657, *An Act Relative to Municipal Assistance for Clean Water and Economic Development Infrastructure*, we are far from where we need to be.

The BSCES Government Affairs & Professional Practice Committee has been actively involved

with this and several other advocacy efforts. They just released a BSCES report documenting many of their findings. I encourage you to read *Infrastructure: Worth the Investment* and make an opportunity to share this with your colleagues. More resources can be found on the [Advocacy page](#) of the BSCES website.

In closing, I would like to thank all of our corporate sponsors, particularly this month's featured sponsor, GZA GeoEnvironmental, Inc. We are grateful for their support of BSCES and encourage you to read their featured article entitled *Designing Resilient Coastal Structures using "Risk-Informed Decision Making,"* which was written by Daniel C. Stapleton, PE. The Coasts, Oceans, Ports, and Rivers Institute (COPRI) Boston Chapter is our featured group and is chaired by Lauren Klonsky, PE of CDM Smith. They host a variety of events each year. I encourage you to read their featured article and to become actively involved with the group. To learn more about the COPRI Boston Chapter and the other technical groups [click here](#).

The Impact of Potential Climate Change on Building Design

by Leyna Tobey, Student, Merrimack College and 2016 SGH Scholarship Winner

As is their custom, in conjunction with BSCES' annual Student Night, the principals of Simpson Gumpertz & Heger Inc. awarded the annual SGH Scholarship, which the company established to encourage undergraduate college students who strive for excellence and who aspire to a career in civil engineering. Among other things, applicants for the SGH scholarship are required to demonstrate their writing ability by submitting a one-page essay on a topic selected by the company. For 2016, that topic was: "Due to rising global temperatures, severe weather events are predicted to become more widespread in the future. These changes are likely to be seen within the design life of structures that exist or are being built today. Using a real project or projects (past, present, or one you imagine in the future), formulate an argument regarding how the potential impact of future changes in climate should be considered with current day buildings or in-progress designs." The following is the essay submitted by 2016 SGH Scholarship recipient Leyna Tobey.

It's 2016. It's election year. Leonardo DiCaprio finally won his first Oscar. The news is packed full of stories on presidential debates, sports teams, economic successes and failures... Amidst all of these more riveting, breaking-news topics, a seemingly irrelevant climate change story comes on and gets its 30 seconds of fame. Most people would tune out this story and disregard it—climate change is a long, boring process and we won't even be around to see its effects, right?

Wrong. And if you are a civil engineer thinking this, you are the most wrong of all. Rising global temperatures are influencing significant changes in weather patterns; hurricanes and blizzards are increasing in magnitude and occurrence and are causing endless damage to the structures our profession has worked hundreds of years to create. Even worse, this damage is costing the public millions upon millions of dollars and putting their safety and lives at risk. As civil

engineers, it's our job to address this issue and keep our communities safe.

Current building codes were created with the principle idea of safety in mind; they were made to prevent structural failure and ultimately loss of life. The problem, however, is that they fail to consider the measures that would limit damages caused by large storms. We must begin taking the potential of these natural hazards into account in new building designs, and we must find a way to adapt existing structures to withstand more powerful winds, flood waters, storms, and extreme temperatures.

Steps are already being taken to improve the resiliency of structures in places like New Orleans and New Jersey that have been hit by devastating hurricanes. Instead of waiting around for the next big storm, I believe that other at-risk cities need to be proactive. I envision a country-wide series of adaptation projects in all big cities susceptible to the effects of climate change; all it takes is one city to start a program, and if it proves successful, other places will follow.

Here in Boston, studies have already been conducted to identify the sections of the city most vulnerable to damage from flooding and rising sea levels. If we start increasing the resiliency of existing structures and incorporating these ideas into new designs in these areas, over time we can expand and do so for all of Boston. To do so, we should work towards designs which emphasize breakaway systems engineered to fail in a safe and economically repairable manner. We have the opportunity in Boston to start a trend for the rest of the nation to follow—a trend towards safety and decreased expenditures, because the fact of the matter is, we would spend way less money on making these changes now than we would on damage relief costs in the future.

Resilient designs need to be one of our top priorities. Their implementation, however, is

much easier said than done. The largest roadblock engineers will face in this pursuit will be getting everybody on board. Improving the resiliency of structures will require support from many groups including community members, business leaders, and government officials. What makes everything even more difficult is that our entire reasoning behind taking caution is based on predictions—no one knows for certain that storms will become more severe or that sea levels will rise. We are asking others to put their trust, time, and money into data patterns and statistical foresights. We need to convince people that it makes more sense to put a little work in and be safe than to ignore the potential issue and face the consequences.

Canon 1 of the ASCE Code of Ethics states that "Engineers shall hold paramount the safety, health and welfare of the public and shall strive to comply with the principles of sustainable development in the performance of their professional duties." Following this guideline, we civil engineers have an ethical obligation to do everything in our power to keep the public safe. We must be the leaders and advocates of the movement towards resilient designs in our practice.

All things said, if you are an engineer, the next time a climate change story comes on the news, you had best be paying attention. If you watched the Oscars and were able stay awake until 11:30 to see Leonardo DiCaprio's acceptance speech, you would have seen that he spent the majority of his time addressing the issue of climate change. He begged the audience to realize that it is imperative that action be taken immediately. And let's face it; if this topic is important enough for Leo to mention it in his long-time-coming Oscar acceptance speech, it's probably something worth considering.

It's 2016. It's time to be proactive and make a push for increasing resiliency in our infrastructure. We can't just sit around and wait for the next big storm to make a change—by then it may be too late.



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BSCES Member Profile: Anthony Puntin, PE, F.ASCE

by Bonnie Ashworth, Quincy, MA

BSCES wishes all the best to Executive Director Tony Puntin, who will be leaving at the end of June, after serving for five years. His background and experience prepared him to take on the multi-faceted job, although he recalls when he started, that he "didn't fully comprehend the depth and breadth of BSCES and its activities." With a membership of over 3,400 and many services and programs, BSCES is a complex organization.

Tony is a registered professional engineer in New Hampshire, Massachusetts, Maine, and Vermont as well as a Design Build Institute of America Professional. He graduated from UMass Amherst in 1992 with a BS in civil engineering. He went to work at MassDOT District 1 where he served as a design engineer until 1995. He was then hired by Holden Engineering as project engineer for NHDOT's final design project on the I-93 exit 13 in Concord, NH.

Tony joined the Louis Berger Group, Inc. in 1998 and worked there for 16 years on a variety of transportation and civil projects. Those who travel to and from New Hampshire will appreciate the widening of I-93 in the Salem-Manchester, NH corridor. Tony served as the project manager for the final design of the reconstruction, which included widening an eight-mile stretch of the roadway and replacing 19 bridges.

In his role as group manager, he was involved with three design-build projects. He was project manager for the Piscataquis Bridge replacement in Howland, Maine. He was also project manager for the reconstruction of three miles of Route 125/136 in Freeport, Maine. Another design-build project was highway reconstruction and bridge replacement on US Route 3 over the Everett Turnpike in Bedford, NH. Tony was the quality assurance manager for the final design and construction phases.

He was a design engineer on the team providing technical advisory services for Route I-4 corridor improvements in Orlando, Florida. Tony served as project manager for roadway review and construction services for a number of New Hampshire towns, ensuring that projects conform

to regulations, standards, guidelines, and good engineering practices.

Tony took on a new challenge when he joined Beta Group, Inc. in 2014 as the associate responsible for expanding the company's operations into Northern New England. He established a new office focused on growing a client list from municipalities and state agencies, to provide civil engineering design services for roads, bridges, water and sewer, asset management and landscape architecture. Tony has served as an adjunct professor at Merrimack College, teaching the junior/senior level course Professionalism and Ethics for civil engineering students for the 2015 and 2016 spring semesters. He also was retained by the University of New Hampshire as the Industry Advisor for the civil engineering Capstone class.

BSECS brought Tony on board as executive director in 2011; he was charged with developing a more robust professional and technical program for members and a priority was placed on providing membership benefits and focusing on new members. His background in dealing with governmental entities and his relationship with ASCE (volunteering on the National Board of Direction, serving as president of the New Hampshire section, participating in Fly-In programs, and being on several committees) were seen as assets he brought to the position. He is broadly responsible for the overall leadership and management of BSCES, executing policies, implementing the strategic plan, and managing finances in accordance with decisions of the Executive Committee and the Board of Government. As executive director, he is the face of BSCES, serving as an advisor to industry, academia, government, and the public. You have probably seen him at a wide range of events.

Tony will tell you that every initiative and program of BSCES is a team effort between the staff at The Engineering Center Education Trust and volunteers. "What we do, can't be accomplished alone." Among the things accomplished are many opportunities for members to participate in activities and events ranging from social and networking get-togethers



Tony Puntin, a familiar face representing BSCES, will be leaving his post as executive director at the end of June.

to professional development and technical training. A recent and successful initiative has been the sponsorship program, with over 20 firms participating at different levels. Tony noted, "It's nice to know that so many companies find value in being associated with BSCES."

"...best professional experience I could imagine," is how Tony sees his tenure as executive director of BSCES. He meets with civil engineers of all levels from across Massachusetts and interacts with public officials and the media to further an understanding of the profession and the need to invest in infrastructure; no small concern these days. He finds his day-to-day conversations with those passionate about the profession and BSECS very rewarding. He reflected that almost every aspect of his role has been rewarding, challenging, and fun. "Most, if not all, of my tasks are different from those typically experienced in the engineering industry."

Tony's one-word answer to a question about any events, people, or programs that stand out in his

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BSCES Member Profile: Anthony Puntin, PE, F.ASCE (continued from page 6)

memory is "Thinkfest," which he described as a madhouse; organized chaos with kids running all over trying to make sure they didn't miss out on any activities. "I was able to really appreciate the influence that BSCES and our volunteers can have on our community."

He's "grateful to have been a part of BSCES for the past five years." The presidents of BSCES during that time have appreciated his work, and their comments offer further insight. Steve Rusteika (2011-2012) recalled: "When we embarked on the process to engage a dedicated executive director for BSCES back in late 2010/2011, we were not sure what candidates would apply or if any qualified candidates would apply. I was very pleased that someone I've known for many years, Tony Puntin, was interested and ready to be our first executive director. Tony brought energy, commitment, foresight, integrity, and a strong connection to ASCE to the position. I could not be any happier to have worked with Tony over these past five years. He will be missed by many, especially me. Thank you."

Peter Richardson (2012-2013) wrote: "As executive director, Tony brought a new level of energy to BSCES, especially with the ASCE student chapter members, many of whom will be the future leaders of our society. Also, Tony's relationship with ASCE leadership established new lines of communication with Reston that were tremendously helpful with our constitution and bylaws updates."

Reed Brockman (2013-2014) added his perspective: "With Tony as executive director, the organization has grown in so many positive ways. Not only is BSCES able to bring its membership far more educational and networking opportunities now, but also great strides have been made to bring about a better understanding among the public and our elected officials regarding our infrastructure and the civil engineers behind it. Tony is truly proud of being a civil engineer and it exudes from him in everything he does. We will miss him. He is leaving behind a great legacy and path towards an equally great future. Thank you, Tony!"

Ali Touran (2014-2015) offered: "Tony has had so many contributions during his time as executive director at BSCES, especially his leadership role in representing us in events and with companies. What stood out for me and helped me, was his keen knowledge of the workings of ASCE in general. During the national conferences and events that I attended as president of the society, I always felt confident that I had reliable and knowledgeable support in Tony who knew everything and everyone at ASCE National and was ready with thoughtful advice if needed."

Ellen White, current BSCES president, summed it up well: "Tony has worked with five BSCES presidents, Boards of Government, Executive Committees,

various BSCES committees, countless volunteers, past-presidents, ASCE staff, and the TECET team. As BSCES has changed over the years, he was among the few who provided consistency. I am grateful for all of his hard work, enthusiasm, and dedication to our organization. With his support and leadership, BSCES continues to grow and become a stronger organization."

Tony will continue with his current role at BETA Group in the Manchester, NH office. He leaves BSCES confident that, "the Massachusetts engineering community and Massachusetts as a whole are very lucky to have the oldest professional engineering society in America representing it." All the best, Tony!



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Coastal Storm Risk Management and Emergency Preparedness

continued from page 3

industry to discuss and progress the field of coastal and riverine engineering. In the past several months, COPRI Boston Chapter has held several technical dinner meetings relating to coastal emergency preparedness. Within the last year, the program manager of resiliency at Massport delivered a talk to chapter members and others on Massport's efforts to prepare for

coastal floods, and actions that they are taking to mitigate coastal storm risks. The chapter also hosted an engineer from Woods Hole Group who discussed the extensive modeling efforts they performed to better understand coastal flood risks posed to Massachusetts' critical transportation infrastructure. COPRI Boston Chapter continues to recognize the

importance of Emergency Preparedness and support the growth and development of its members in this area of expertise. For more information regarding BSCES COPRI chapter, please contact COPRI Boston Chapter Chair, Lauren Klonsky (klonskyls@cdmsmith.com) or chapter chair nominee Ryan McCoy (rmccoy@parecorp.com).

The YMG Gets Technical with EWRI

by Alyson Stuer, Project Engineer, C&C Consulting Engineers LLC, and Vice-Chair Younger Member Group

On Wednesday May 4th the Younger Member Group (YMG) partnered with the Environmental & Water Resources Institute (EWRI) Boston Chapter for a technical lecture given by Massachusetts Water Resources Authority (MWRA) Executive Director Fred Laskey who divulged the history of the MWRA. In 2015 the MWRA celebrated its 30th year providing water and treating wastewater in Massachusetts. In these thirty years, the authority has worked to provide some of the best drinking water in the nation and cleanup to the regional beaches to the point they are cleaner than Waikiki. With Boston Harbor being one of the most polluted bodies of water that drew national attention and criticism, the MWRA has created a significant

improvement producing a vitality in the harbor that is sustainable.

Attendees enjoyed dinner followed by the lecture at Nitsch Engineering which generously provided the space and supplemented the menu to ensure low attendee costs drawing a crowd of nearly 50. Attendees were engaged by the storytelling style of the lecture that Mr. Laskey prepared. The event concluded with a discussion lasting over a half hour. The technical content mixed with a social atmosphere created a dialogue to highlight the MWRA in its success and also in its future. Be on the lookout for the YMG, which hopes to continue to add technical programming to their calendar with joint events.



Fred Laskey, Executive Director of the MWRA, enthusiastically answers audience questions.

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Recent News and Updates

New England Student Conference Recap

Over the span of three days in late April, 16 universities from throughout New England (and one from Canada) came together on a dreary Saturday for the annual ASCE New England Student Conference. Co-hosted by Northeastern and Wentworth, the conference is held to determine the representatives that will be invited to the National Steel Bridge and Concrete Canoe contests. The weekend was the culmination of months of planning undertaken by the student leaders of the conference: Corinne Bowers and Christine Lai from NEU and Jamie Grome from WIT. These three individuals were tasked with securing venues for competition, arranging for all meals and rooms, conducting an awards dinner, and finding over 10 judges for the competitions. Oh yeah, they had school work (including finals) too. A big congratulations to these three young engineers for a great event!

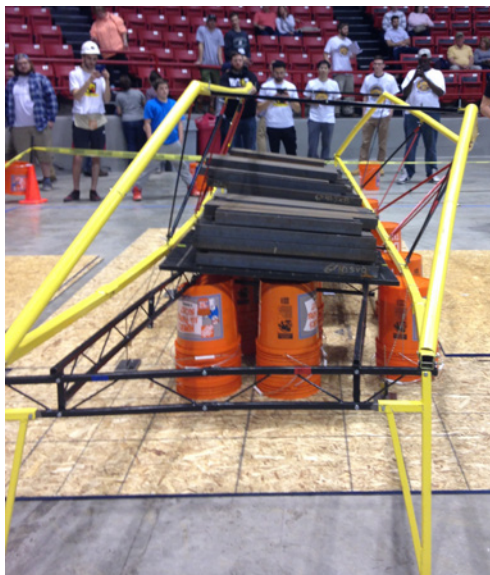
In addition to the building of the bridges and racing of the canoes, the teams for these contests are judged on the design presentation and the aesthetics of their product. The contest entries are more than just steel and concrete, more than welds and aggregates. These competitions teach the students about teamwork, project management, finances (i.e., fundraising), and scheduling. These are valuable skills that they will utilize throughout their career. Some bridges failed, some canoes were less than nimble on the course; but all who were involved learned many life-lessons through their participation in these competitions.

The final results for the Steel Bridge are:

1. Laval University
2. University of Connecticut
3. University of New Hampshire

The final results for the Concrete Canoe are:

1. Laval University
2. University of Rhode Island
3. Northeastern University



The Wentworth bridge failed just moments after being fully loaded.



The passing of the championship paddle from last year's winner, UMass-Lowell to this year's winner, Laval University.

Dream Big!

Shouldn't there be a movie about engineers and the projects they build? Of course there should! All around the world, engineers are pushing the limits of ingenuity and innovation in unexpected, imaginative, and amazing ways. Dream Big, a giant-screen film about engineering, will take viewers on a journey of discovery from the world's tallest building to a bridge higher than the clouds. Along the way, the audience will witness how today's engineers are shaping the world of tomorrow. Combined with educational programs at leading institutions worldwide, Dream Big is designed to inspire students to pursue careers in engineering. The movie began production in October 2015 thanks to the Bechtel Corporation, which has signed on as the film's presenting sponsor. BSCES is coordinating with ASCE for the premiere of Dream Big at a giant-screen theater in Boston during Engineers Week, February 2017.

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 over 900 "likes." The page is used to announce upcoming events, provides picture galleries of some of our signature events, and sometimes shows the lighter side of engineering. Almost 1,800 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.



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The Aldrich Center—where history and technology meet on Beacon Hill...



Two blocks from the State House and overlooking Boston Common, the newly refurbished Aldrich Center is the perfect venue for your next event. This historic building accommodates private functions, business meetings, and receptions for up to 75.

For information or reservations, contact
Rich Keenan, Aldrich Center Manager
at 617/305-4110 or rkeenan@engineers.org

Aldrich Center
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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.

SEI Boston Chapter & YMG Event

Wednesday, June 1, 2016

Bell in Hand Tavern

45 Union Street, Boston, MA

6:00 PM Registration, Refreshments
and Networking

7:00 PM Structural Engineering Feud

Structural Engineering Feud

Hosted by Brian Brenner, PE, Stantec

Come and join us for an evening full of networking and fun. The Structural Engineering Feud will include a Family Feud style contest with the questions based on structural engineering themes. You can choose to register as a team of five, have us assign you a team, or just come by as a spectator to meet some friends and have a few laughs!

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

Thomas R. Camp Lecture

Thursday, June 2, 2016

Wyndham Boston Beacon Hill

5 Blossom Street, Boston, MA

5:45 PM Social/Registration

6:30 PM Dinner

7:15 PM Presentation

Strategies for Managing 21st Century Water Challenges

Ken Moraff, Director of Office of Ecosystem Protection, USEPA

Ken Moraff, USEPA Director of Office of Ecosystem Protection, will talk about how challenges like climate change are impacting water management issues throughout New England. EPA New England has worked through some of these challenges with more holistic and comprehensive approaches to protect some of our most iconic resources.

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

Younger Member Group Volunteer Night

Friday, June 10, 2016

Arlington Street Church

351 Boylston Street, Boston, MA

4:45 PM – 8:00 PM

Friday Night Supper Program

Serve dinner with the Friday Night Supper Program (FNSP), which has prepared and served a free meal every week for over 30 years. The dinner is open to all, and many of the guests who are served struggle mentally and socially, FNSP aims to provide a restaurant-like experience with dignity and respect. YMG members will be helping to serve the three course meal and clean up after dinner is completed. Spots are limited, register early!

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

TECET Golf Tournament

Monday, June 20, 2016

Shaker Hills Country Club

146 Shaker Road, Harvard, MA 01451

9:30 AM Registration

11:00 AM Shotgun start

4:30 PM Reception

5:30 PM Dinner and Awards

Spring is officially here, so get your swing in gear! Register today for the 2016 TECET Golf Tournament! Help make this a great event while fostering the BSCES-sponsored The Engineering Education Trust's mission of supporting engineering through professional development, public awareness, and student outreach. This tournament features an 11:00 AM shotgun start, box lunch, contests, a reception, dinner, raffles, and awards. Register as an individual or as a group of up to four.

Please sign up online or complete and return the registration form included at the end of this month's newsletter to secure your spot(s).

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

Classifieds

Town of Needham, Massachusetts

PROJECT MANAGER—The Town of Needham is seeking a highly qualified and experienced professional to fill the position of Project Manager. This position functions as a part of the overall municipal team to ensure effective and efficient design and construction of municipal building projects. For further information on this position please refer to www.needhamma.gov/Jobs.aspx.



Stantec

Stantec's Boston office is looking for a Civil Engineer. Typical duties will include oversight, coordination and participation in the preparation of engineering drawings, calculations, reports and permit applications for land development projects.

Candidates that apply should have a Bachelor's of Science in Civil Engineering and 8–12 year's experience. Proficiency in AutoCAD and Civil 3D, experience with HydroCAD and experience in preparing Notice of Intent and Site Plan Review permit applications are all requirements. Massachusetts Professional Engineering licensure is highly desirable.

[CLICK HERE FOR MORE INFORMATION.](#)

Structural Engineering Feud

Based on Family Feud TV Show; but, with Structural Engineers

Hosted by not Richard Dawson or Steve Harvey

But, our very own Brian Brenner, PE

Associate, Stantec

Wednesday, June 1, 2016

Bell in Hand Tavern, 45 Union Street, Boston, MA

6:00 PM Registration, Refreshments and Networking

7:00 PM Structural Engineering Feud

Come and join us for an evening full of networking and fun. The Structural Engineering Feud will include a Family Feud style contest with the questions based on structural engineering themes. You can choose to register as a team of five, have us assign you a team, or just come by as a spectator to meet some friends and have a few laughs! Please indicate your choice during registration. For participants who wish to register as a team of five, one team member from each team must email Shahvir Vimadala (shahvir@yahoo.com) their team name along with a list of team members after completing their online registration. Winning teams will receive prizes.

Appetizers will be served. Cash Bar.

Registration Deadline: Friday, May 27, 2016

\$30 Members, \$40 Non-Members

\$25 Public Sector Members, \$30 Public Sector Non-Members

\$10 Student Members and Senior Members (65+)

Information/Registration:

Register to attend this meeting and pay by credit card online at http://bit.ly/SEIYMG_6116. 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 May 27, 2016 and no-shows will be billed.

2016 Thomas R. Camp Lecture ***Strategies for Managing 21st Century Water Challenges***

H. Curtis "Curt" Spalding

Administrator for EPA's New England Region (Region 1)

Thursday, June 2, 2016

Wyndham Boston Beacon Hill, 5 Blossom Street, Boston, MA

5:45 PM Social/Registration; 6:30 PM Dinner; 7:00 PM Presentation

Curt Spalding, USEPA Region One administrator, will talk about how challenges like climate change are impacting water management issues throughout New England. EPA New England has worked through some of these challenges with more holistic and comprehensive approaches to protect some of our most iconic resources.

Curt Spalding has extensive experience in the environmental protection field as an advocate, policy analyst and administrator. For almost 20 years, he served as executive director of Save the Bay in Rhode Island, a nationally recognized, 20,000-member environmental advocacy and education organization. Since joining the EPA leadership team in February 2010, Spalding has been leading a holistic approach to finding environmental solutions in New England. He's emphasized efforts in community engagement, sustainability, environmental justice and green economy.

This talk should be attended by anyone with an interest in Water Resources, Sustainability and Climate Change including civil engineers, architects, planners, state and municipal administrators.

Registration Deadline: Friday, May 27, 2016

\$90 Members, \$115 Non-Members

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

\$30 Senior Members (65+), Students

\$900 Table of 10

Information/Registration:

Register to attend this meeting and pay by credit card online at <http://bit.ly/EWRI060216>. 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 May 27, 2016 and no-shows will be billed.



Joe Adams, MWH Global

2016 Joseph C. Lawler Lecture Panama Canal Supersized

Joe Adams, MWH Global
President of Energy and Industry Division

Thursday, June 9, 2016

Fairmont Copley Plaza, 138 St. James Ave, Boston, MA
5:30 PM Social/Registration; 6:30 PM Meal;
Presentation to Follow

The expansion of the Panama Canal Locks is a construction and engineering marvel. The canal expansion utilized over 10,000 workers, more concrete than the Hoover Dam, and approximately 25 times the amount of steel used to erect the Eiffel Tower. Mr. Adams is the chairman of the Design Consortium for the Third Set of Locks which makes up \$3.2 billion of the \$5 billion dollar Panama Canal Expansion. The Consortium is composed of MWH Global, Tetra-Tech and Iv Infra from the Netherlands. He is a graduate of Worcester Polytechnic Institute, a member of the MWH board of directors, and has over 35 years of experience in engineering, construction, and project management.

If you are unable to make this year's Lawler Lecture, watch the History Channel's Modern Marvel titled "Panama Canal Supersized" for more information on this mega project.

Registration Deadline: Friday, June 3, 2016

\$110 Members, \$115 Non-Members

\$95 Public Sector Members, \$115 Public Sector Non-Members

\$95 Senior Members, \$45 Students

Tables of 8 are available for \$880 regardless of membership

Information/Registration:

Register to attend this meeting and pay by credit card online at <http://bit.ly/Lawler2016>. To register online for an event at the BSCES member rate you must login using your BSCES assigned username and password. If you do not know your BSCES member login information call 617/227-5551. To register multiple attendees, or to register by mail or email, download and complete a [BSCES Event Registration Form](#) and follow the submission instructions. Cancellations received after June 3, 2016 and no-shows will be billed.



Boston Society of Civil Engineers Section
American Society of Civil Engineers



BOSTON SOCIETY OF
CIVIL ENGINEERS SECTION

Volunteer Night!

Friday Night Supper Program

BSCES Younger Members Group

Friday, June 10, 2016

Arlington Street Church

351 Boylston Street, Boston, MA 02116

4:45 PM – 8:00 PM

Serve dinner with the Friday Night Supper Program (FNSP), which has prepared and served a free meal every week for over 30 years. The dinner is open to all, and many of the guests that are served struggle mentally and socially, FNSP aims to provide a restaurant-like experience with dignity and respect. Guests are taught the nutritional value of the food they are served and can receive clothing and basic toiletries. YMG members will be helping to serve the three course meal and clean up after dinner is completed. Spots are limited, register early!

Email BSCESYMGB@gmail.com to RSVP by Wednesday, June 1, 2016.



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.

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](#)