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July 28, 2014

To: City Councillors, City of Cambridge
Re: Carlone Policy Order O-4
Benzan Policy Order O-27

I urge the council to adopt these two policy orders to support protection of the Silver Maple Forest.

Regulations are not keeping up with climate change reality in our region: DEP uses a 1961 guideline to require that development projects handle stormwater from a 24-hour 100-year storm. The proposed project was designed to accommodate 6.5 inches of rain, an event now known to occur every 30 years instead of every 100 years. The 24-hour 100-year storm event on this site is now known to be over two inches more severe than was assumed prior to significant reports issued by the Northeast Regional Climate Change Center (NRCC) in 1993 and 2011. The 24-hour 100-year storm is now understood to be 8.8 inches, ~~not 6.5~~ not the 6.5 inches estimated in 1961.

Scientists now have 50 additional years of precipitation data and understand better how to model extreme precipitation events: severe storms are now known to have dramatically changed for the worse. It is evident by observation that the very tall Silver Maple Forest currently absorbs the increasing stormwater and prevents it from running into the man-made channel known as Little River running from Little Pond in Belmont to Alewife Brook in Cambridge. For example, during

today's flash flood - a one inch storm of short duration. The ditches on Acorn Park Drive by the forest were dry, but those away from the forest were full of water.

With the re-authorization of the Tri Community Flooding Board of Arlington, Belmont and Cambridge, the city has a unique opportunity to fund flood mitigation projects in any of the three towns.

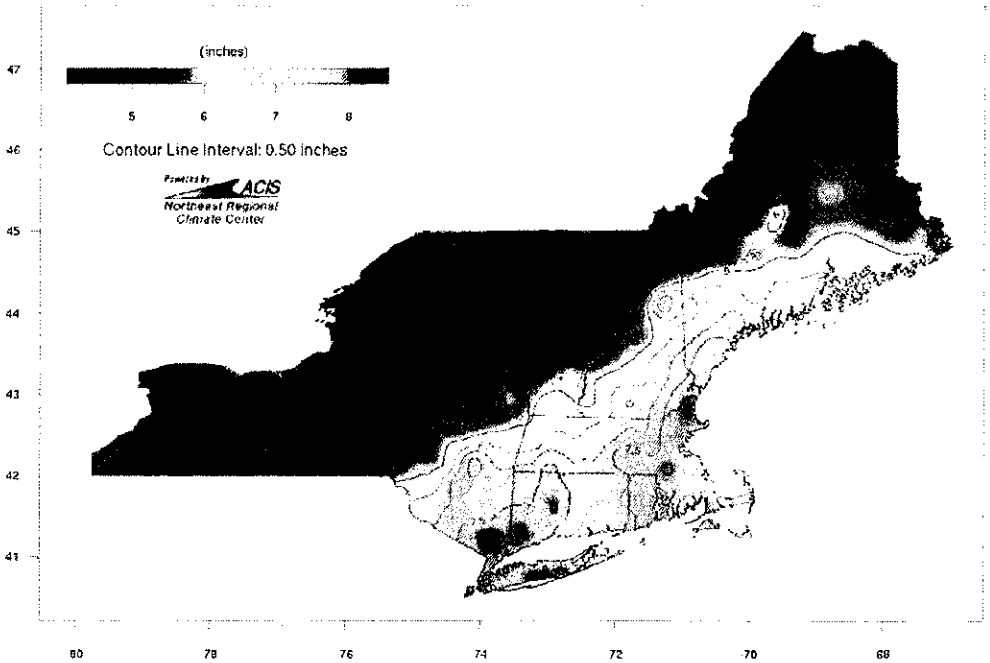
At this late stage in the permitting process, Carlone's Policy Order 04 could play an important role in convincing the current owner that enough public and private funds could be raised that a conservation transaction for preservation of the forest would be at least as profitable as the current development path he is pursuing. The residents of the three thousand new units under construction or planning in the last 5-10 years would thank you just as we thank Frederick Law Olmsted and planners who gave us the Alewife Reservation over a hundred years ago. It could help to convince the owner to enter into such a negotiation with Trust for Public Lands, for example, which would in turn convince others at the state level. In order to protect the water quality of Little Pond and Little River and Alewife Brook, the wildlife habitat on Alewife Reservation, and the health and safety of my Precinct 8 constituents and other residents in low-lying areas of Arlington, Belmont, Cambridge, please support Policy Orders 04 and 27.

# Camp Lecturer Discusses Extreme Precipitation in the Northeast US

*by Bruce Jacobs, PE, HydroAnalysis, Inc. and Chair, ASCE Environmental & Water Resources Institute Boston Chapter*

Dan Zarrow of the Northeast Regional Climate Center (NRCC) at Cornell University and the New Jersey State Climate Office at Rutgers University was the featured presenter at the EWRI Boston Chapter-sponsored 2014 Thomas R. Camp Lecture where he discussed trends in precipitation data in the northeast United States. The title of his talk was "Extreme Precipitation in the Northeast US in a Changing Climate." To this day, much engineering design related to the handling of stormwater relies on the return event, precipitation depth maps in the National Oceanic and Atmospheric Administration (NOAA) rainfall frequency atlas known as Technical Paper 40 (TP-40) that was published in 1961. An updated regional extreme rainfall atlas was published in 1993 by the Northeast Regional Climate Center at Cornell University, although the older TP-40 remains the gold-standard in most engineering design. A new rainfall atlas has been under development by the National Oceanic and Atmospheric Administration (NOAA) for some time, although the atlas for northeast US is not scheduled for publication until late 2015. The NRCC was asked by the Natural Resources Conservation Service (NRCS) to compile an updated extreme precipitation atlas for the northeastern US. In 2011 the NRCC released the results of that effort as a web tool. This 2011 NRCC rainfall atlas was the focus of the Zarrow talk.

**Extreme Precipitation Estimates (one-day, 100-year return period)**




The trick of estimating the rainfall depth of a particular return period (like say the 2-year, 10-year, and 100-year return periods) is to compile a list of the largest events in a station's period of record, to fit them to a probability distribution, and then to evaluate the depth for any particular return frequency based on the selected distribution. To remove inconsistencies and account for elevation differences, the actual process of compiling a precipitation depth map for a particular return period involves additional steps including the mapping on a regional grid and smoothing of the mapped depths. The fundamental process has changed little since the publication of TP-40. What has changed is the availability of an additional five decades of rainfall data. The release of the new atlas is of particular interest given the increases in extreme event precipitation depths noted anecdotally and forecast by global climate models. These increases are of course largely the result of the accumulation of carbon dioxide in the atmosphere.

The map above shows the resulting precipitation depths of the one-day, 100-year return period event. The general trends of increasing depths to the south and east and orographic effects are largely the same as shown in the TP-40 rainfall atlas.

Zarrow zeroed in on local changes to the estimated extreme event statistics. In Boston, for instance, the two-year return period, one-day storm increased from 2.8 inches in TP-40 to 2.9 inches in the NRCC atlas. The 100-year, one-day event increases from 6.0 inches in TP-40 to 7.4 inches in the NRCC atlas. Similar trends were noted for other Massachusetts towns.

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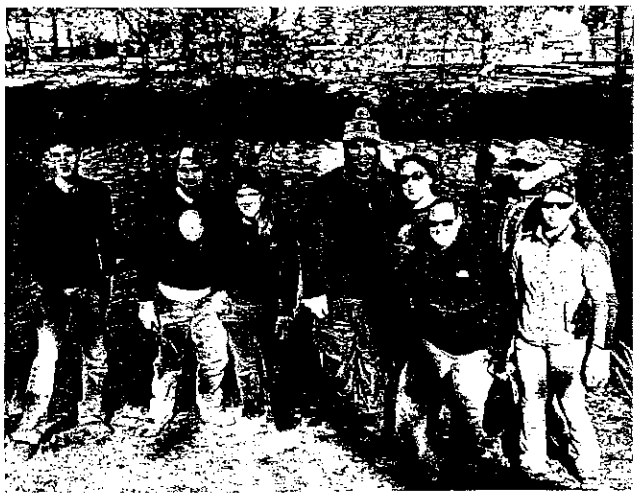
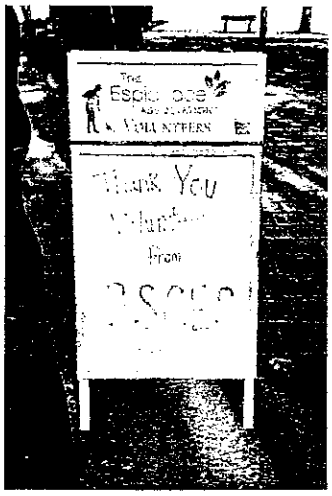
## Digging In for a Cause

*by Alyson Stuer, EIT, Structural Engineer, C&C Consulting Engineers, LLC*

As the springtime approaches, the work of the BSCES Younger Member Group (YMG) is starting to bloom! Back on October 26, 2013, nine volunteers from the BSCES YMG joined other local volunteers on the Esplanade to plant flowering bulbs for the spring. Volunteers worked hard as part of the 'Drop-In' Saturday efforts, providing the Association's Horticulturist, Ozzie Bateman, with the equivalent of multiple full-time employees' help year round. This is one of many opportunities that allows for the rejuvenation of the esplanade area with specific projects varying throughout the year.





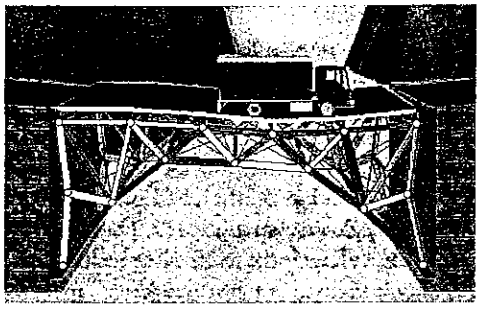

Throughout 2013, volunteers worked to not only plant the gardens, but prepare the soils for new areas to be cultivated. Members of the BSCES YMG quickly realized the difference between the prepared beds, which were filled with an assortment of bulbs, and the areas that were unprepared for the scattering of daffodil bulbs. Adding to the already difficult soil conditions, volunteers had to dig deep enough so that the resident squirrels wouldn't seek out the bulbs as a meal. Volunteers worked hard with varying creativity, success levels, and challenges, including bulbs rolling into the river and trowels being broken.

The horticulturist explained that the majority of the planting being completed during the fall weekends consisted of daffodils for remembrance of the Boston Marathon Bombing. This was inspired by Boston Daffodil Days from last year and has extended into the communities along the marathon route. Before it has passed, take a moment to stop and notice the springtime signs including the volunteerism of the BSCES YMG blooming!

## Winners of 14th Annual Ralph Salvucci Online Bridge Design Competition Advance to National Semi-Final Round

*by Alexander H. Bonnar, PE, Project Manager, McNamara/Salvia, Inc. and BSCES 2014 Online Bridge Coordinator*

Winners of the Ralph Salvucci Online Bridge Competition were celebrated at an awards dinner on May 14, 2014 at the Sheraton in Needham, MA. To compete, teams of one or two students in grades six through twelve designed a virtual bridge using free software. The Ralph Salvucci Online Bridge Competition is a local sub-competition of the national competition run by Engineering Encounters. While the local competition has concluded, three teams will advance to the national semi-final round to be held on May 30.



*Virtual Load Test of the first place design by Team "Dinner" comprising members Devin R. West and Jaimey E. Ross of McCarthy Middle School in Chelmsford, MA*

The local competition began January 13, coinciding with launch date of the 2014 Bridge Designer Software, and concluded March 31. Teams were able to submit designs once the bridge was able to pass a virtual load test.

The most cost-efficient bridge was the winner. The cost was determined by many different variables, such as material quantity, material type (high strength concrete, high strength steel), number of connections, site work, etc.

This year's local competition had 156 teams from 13 different schools. It was a close competition this year, with the top twenty designs within $6,500 of the winning bridge cost of $161,276.41 by Devin R. West and Jaimey E. Ross of McCarthy Middle School in Chelmsford, MA. The top 5 designs were from 5 different schools: McCarthy Middle School in Chelmsford, Tri-County RVTHS in Franklin, Malden Catholic, a homeschooled student, and Carver Middle School.

The national competition had 6,398 teams submit qualifying bridge designs. On the national level, teams were divided into two categories—Middle School grades 6–8, and High School grades 9–12. The top two local middle school teams, 1st place "Dinner" (West and Ross of McCarthy Middle School) and 5th place "Punk&Redneck" (Gavin M. Morey and Braden W. Froehlich of Carver Middle School) ranked 7th and 21st nationally, respectively, and qualified for the national semi-final round. The top local high school team, 2nd place "Syndicate Gamma" (Kevin A. Whitney and Nathan M. Weidman of Tri-County RVTHS) ranked 39th nationally and qualified for the national semi-final round as well.

The Ralph Salvucci Online Bridge Design Contest and the Awards Dinner are made possible by our sponsors: AECOM, Clough Harbor & Associates, CDM Smith, Gale Associates, New England Bridge Contractors, Northeastern University, Parsons Brinckerhoff, STANTEC, and Tufts University; the National Contest is sponsored by the ASCE.

More information about the contest can be found online at www.engineeryourfuture.org or http://bridgecontest.org.