

The Crystal Bridges Museum of American Art from Below Grade

Andrew C. Baxter, Schnabel Engineering, Inc.

In November 2011, the Crystal Bridges Museum of American Art opened in Bentonville, AR. The museum is the brainchild of Wal-Mart heiress Alice Walton, and is described as having one of the world's best collections of American art. Our speaker for the November dinner meeting will describe subsurface elements and challenges of the museum's design.

The geometry of the valley site for the Crystal Bridges museum of American Art generated critical horizontal loading combinations that were beyond simple foundation designs. Several of the structures are externally loaded on one or two sides by earth and open on the remaining sides, generating significant unbalanced lateral loads. At the foundation level the sub-grade varied from intact competent limestone to residual stiff silts and clays. Two cable



suspension bridges crossed the ponds in the center of the complex and were tied down to the underlying limestone.

A micropile designs scheme for the perimeter foundation walls was developed to safely resist these large lateral loads, while making it possible to easily adapt to the widely varying geotechnical conditions across the site. The micropile arrangements varied from a simple vertical micropile arrangement on rock to complex battered micropile patterns that were suitable for thicker overburden locations and were designed using numerical techniques. Lateral load tests

not only confirmed the design parameters of the dowel micropiles, but also revealed previously unknown aspects of soil structure interaction between the micropile foundation system and the surrounding medium. The bridge abutment foundations required staged post-tensioning with critical detailing for corrosion protection. The presentation will also discuss how the utilization of micropiles and tie-downs provided significant advantages with respect to other foundation schemes while limiting engineering and construction risks.

Andrew C. Baxter provides lead engineering as well as project and construction management for geotechnical designs at Schnabel Engineering. His related experience is in specialty foundation, excavation support, soil and rock slope, and other subsurface structure designs. Andy's work experience in engineering geology and geophysics provides an extensive background in understanding the soil structure interaction. He has an undergraduate degree from Virginia Tech and a graduate engineering degree from Drexel University. Andy is a Licensed Professional Engineer and Geologist. He is also a member of the Deep Foundations Institute; ADSC, International Association of Foundation Drilling; Post Tensioning Institute; and ASCE's Geo-Institute.

Please join us for what promises to be a fascinating National Capital Section (NCS) meeting on **Tuesday, November 19**. The meeting will be



held at our usual meeting place, the Hilton Arlington, at 950 North Stafford Street, Arlington, VA, on the second floor in the Gallery Ballrooms. Parking is available at the hotel (\$8), at the Ballston Mall garage (\$1 after 6 p.m.), and on the street (free after 6 p.m.). This location is in the same block as the Ballston Station on Metro's Orange Line. Registration and networking will be from 6 to 6:45 p.m., followed by dinner. The program will conclude by 8:30 p.m. The cost will be \$10 for students, \$45 for those preregistering, and \$55 for walk-ups as space allows. **Please RSVP by November 13.** Click [HERE](#) to register. For questions, please contact Ranjit Sahai at president@asce-ncs.org or 703-994-4849.

Please note that because the NCS is charged for each meal guaranteed, those who register but are unable to attend *will be charged the full registration fee*. We welcome "walk-up" attendees, including any registrations made after the guarantee is given to the hotel. However, the cost for "walk-ups" is higher because the Section is charged accordingly by the hotel for late registrations. ■

President's Corner

While interacting with members of our Younger Member Group at their annual Planning Meeting on September 4, I identified one issue as being the most relevant to those contemplating greater involvement at the Section level. That issue is perhaps best presented



as a question: *If I am already too busy with work and life in general, how can I participate at the ASCE Section level to help better myself professionally and personally?* I answer this question below.

Sections and Branches of ASCE are volunteer-run organizations with a budget determined in part by the number of dues-paying members that fall in their geographical area. Your Section dues, fees for attending meetings, and sponsorships determine the budget available to accomplish what the Section needs done:

- Make a difference in the community;

- Provide networking and educational opportunities for members;
- Increase interest in civil engineering among kids; and
- Provide low-risk but high-value leadership opportunities for members.

ASCE helps its Sections and Branches by empowering its volunteer leaders with relevant information and other resources.

Every year, ASCE holds its annual "Presidents and Governors Forum" where newly elected Presidents and Governors of its Sections/Branches and Regions come together and share ideas. It's a high-energy and valuable 2-day event that runs all day Sunday and half-day the following Monday in the third week of September. This year, Sara DeGroot and I attended the Forum on behalf of NCS and we came away with an incredible experience and ideas worth nurturing. Participation at the ASCE Section level

affords you many such opportunities that can help you professionally and personally.

Last month, Mr. Scott Harrison's presentation on the first LEED Gold garage rehabilitation project at the U.S. Capitol showcased the value hydro-demolition technology delivered to the project and what it took for the project to earn Gold!

This month, our Section Meeting will focus on micro-piles and tie-backs used for the foundation of the "Walmart Museum." I encourage you to browse <http://crystalbridges.org/about/architecture/> to appreciate the architectural beauty of and inspiration for the marvelous building. I look forward to seeing you over dinner on November 19th.

Ranjit Sahai

Ranjit S. Sahai, P.E., F.ASCE
President, ASCE-NCS

NCS Past President Chairs H&HC

Henry Petroski, noted author and professor of engineering at Duke University, is stepping down as Chairman of the ASCE's History & Heritage Committee (H&HC). NCS Past President Bernie Dennis was appointed to replace him beginning October 1, 2013. Bernie has been an active member of the H&HC since his appointment to the committee in 2000 by then incoming ASCE President Delon Hampton.

Bernie will be the fifth Chairman of the Committee, having served as

Vice-chair for Henry during his 11-year term. Interestingly, Bernie is the third Chairman to be selected from the NCS. The first two were Gail Hathaway and Neil FitzSimons, both of whom were instrumental in getting ASCE to launch its national History & Heritage program in 1964.

Bernie looks forward to heading the national H&HC and to supporting its mission to enhance the knowledge and appreciation of the profession's history and heritage.

Bernie will continue to be active in the NCS, serving as Chairman for our Scholarship Trust, as a member of our Section H&HC, and as a member of our Structural Engineering Committee. ■



Newsletter

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**January 2014 Issue Deadline:
December 8, 2013**

To Submit Articles:
newsletter@asce-ncs.org

Address Changes:
Call 1-800-548-ASCE, e-mail member@asce.org, go to <http://www.asce.org>, or write:
ASCE – Membership, 1801 Alexander Bell Drive, Reston, VA 20191. Remember to include your membership number.

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Committee Chairs

Please refer to the NCS website at <http://www.asce-ncs.org> for a current list of NCS committees and chairs.

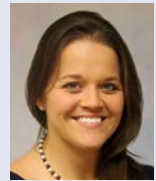
What Does it Mean to be a Member of the NCS Board?

Editors Note: This issue's column was prepared by Sara Guerrero, who has served on the NCS Board of Directors (BOD) as Webmaster and Director (2011–12) and Director (2013–14).

Being a member of the NCS BOD has provided me with many opportunities to brush up on my professional networking as a younger member, and has also provided a variety of fun opportunity to participate in many activities and events with colleagues in other civil engineering disciplines. I have developed my leadership skills while sharing ideas with the Section, and broadened my engineering knowledge base by working directly with others in different parts of the industry.

About Sara:

Project Manager for Facility Engineering Associates (FEA), P.C., based in Fairfax, VA, which provides engineering consulting services specifically related to the repair and restoration of existing buildings throughout the United States. Sara has worked with FEA since graduating with a B.S.E. degree in Civil Engineering from Duke University, and is a registered Professional Engineer in Virginia.



Technical Council on Forensic Engineering's Fall 2013 Committee Meetings

November 15–16 in Reston, VA

Authorized in July 1985, the Technical Council on Forensic Engineering (TCFE) applies engineering principles to the investigation of failures or other performance problems. The investigations may involve testimony on the findings before a court of law or other judicial forum, when required. Failures are not all catastrophic, such as when a building or bridge collapses, but include facilities or parts of facilities that do not perform as intended by the owner,

design professional, or constructor. The purpose of the TCFE is to develop practices and procedures to reduce the number of such failures, to disseminate information on failures and their causes, to provide guidelines for conducting failure investigations, and to provide guidelines for ethical conduct in forensic engineering.

Please join others interested in advancing forensic engineering at the ASCE's Headquarters in Reston for the

TCFE's Fall 2013 meetings. We will be meeting on Friday, November 15 (8 a.m. to 6 p.m.) and Saturday, November 16 (8–11 a.m.). With the primary meetings on Friday, attendees will have the opportunity to meet with ASCE staff who support the Committee's work.

For further information on the meetings, contact Michael Drerup, TCFE Executive Committee, at mdrerup@ctlgroupp.com or 917-623-0995. For information on the TCFE, click [HERE](#). ■

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2014 ASCE-NCS Awards Banquet

January 31 Nomination Deadline Fast Approaching!

The Annual Awards Banquet gives us the opportunity to recognize and celebrate local excellence in projects, engineers, and students who have contributed to our society and our community. Every year, the NCS presents a number of awards during its annual banquet. Recognized parties include our student scholarship award winners and members of the NCS who have achieved Life Member status.

The Section award candidates are nominated by the Awards and Nominations Committee which actively seeks recommendations from NCS committees and members. **All members**

are encouraged to nominate, either by e-mail or traditional mail, **members and/or projects for one of these awards**. The awards are granted by the NCS Board of Directors and are given at the Section's Annual Awards Banquet which will be held on March 18, 2014. These awards include: the Community Service Award, the Outstanding Civil Engineering Project Award, and the Meritorious Service Award.

A description of each award, the respective requirements, and additional information were presented on page 5 of the October newsletter. Click [HERE](#) to review this information.

Please submit all nominations to Qamar Kazmi no later than **January 31, 2014**.

Qamar A.O. Kazmi, P.E.
Chair, Awards and
Nomination Committee
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Consultants, Inc.
1300 Piccard Drive
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Nominations Sought for the 2014 ASCE-NCS Sustainability Award

January 31 Nomination Deadline Fast Approaching!

The ninth annual presentation of the ASCE-NCS Sustainability Award will recognize either private-industry outreach initiatives/projects or public legislation/programs in the metropolitan Washington, DC area that advance or promote the responsible and sustainable development of infrastructure, the built environment, or the conservation of natural resources. Last year (2013), the award recipient was the DC Government's Consolidated Forensic Laboratory building.

The award criteria and other requirements were presented on page 7 of the October newsletter. Click [HERE](#) to review this information. **Please note that the nomination deadline has been moved-up to January 31, 2014.**

The nominating individual must provide his/her name, affiliation, telephone number, and e-mail address with the submission. For more information or to submit a nomination, contact the Chair of the ASCE-NCS Sustainability

Committee, Alex Rosenheim, P.E., LEED AP, CCM, at tcc-sus@asce-ncs.org. This year's winner will be announced at the NCS Annual Awards Banquet on March 18, 2014. If you are interested in becoming involved with the NCS Sustainability Committee, contact Mr. Rosenheim. ■



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NCS Committee News and Updates

Sustainability Committee – Nominations are being accepted for 2014 Sustainability Award.

See article on page 4 of the newsletter. For additional information, contact Alex Rosenheim, CCM, ASCE-NCS Sustainability Committee Chairman, at tcc-sus@asce-ncs.org.

Automation Committee – Stories on the Web that Showcase the Role of Automation in Civil Engineering Projects.

Fog Detection System. In 2007, SR 99 in Fresno, CA, experienced heavy fog that resulted in an 81-vehicle pileup. A cutting-edge fog-detection and warning system is now in place to prevent such a mishap. Read more at http://www.ops.fhwa.dot.gov/publications/fhwa-hop12046/rwm05_california1.htm.



Younger Members Forum

Monthly Happy Hours. The NCS Younger Members Forum (YMF) holds monthly happy hours in either Arlington, VA, or Washington, DC. Happy hours are typically held the first

Wednesday of each month unless a holiday falls during that week. For the October happy hour, YMF members enjoyed delicious barbeque and drinks with fellow engineers at *Hill Country BBQ* in Washington, DC.

The next Happy Hour will be held at a location to be determined in Arlington, VA, on the evening of **Wednesday, November 13**. Watch for event details in the near future! Join younger members from the area for free appetizers and drink specials. For additional information, contact Sonja Hinish at SHinish@wje.com.

If you would like to become more active with the YMF or would like more information on its events, contact the YMF President, Jordan Pitt, at wjpitt@mbakercorp.com or ncsymfpresident@gmail.com.

Younger Member Professional Development Meeting. Because of the P.E. Exam schedule and the Federal Government shut-down, the October 2013 ASCE-NCS Younger Members Professional Development

Meeting has been **RESCHEDULED to January 15, 2014**.

Join the YMF from 6:30–8:30 p.m. at McCormick and Schmick's (901 F Street NW, Washington, DC; mccormickandschmicks.com) for a presentation on *Land Planning in 3D – How GIS Technology is Shaping Our Future Cities*. Our speakers will be Aelisa Carr, P.E. & CFM, and Gore Bolton, P.E. & PLS, both with AMT, LLC. This discussion will focus on the effects of building heights within urban areas as the new creation of city skylines. Our presenters will offer insight into what other cities around the world are doing, and how technology is allowing stakeholders to model a look forward. They will share their experiences in working with this technology on recent projects, and the future of city planning.

For more information about the ASCE-NCS Younger Member Professional Development Meetings or if you would like to suggest a presentation topic, please contact Paul Parfitt at pparfitt@wje.com or David Smith at dsmith@amtengineering.com. ■



DISCOVER ENGINEERING

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Genetic Cloning versus Computer Virtualization

by Ranjit S. Sahai, P.E., F.ASCE

Though genetic cloning and computer virtualization may, on the surface, look like they accomplish the same thing (i.e., create copies), there are significant differences. The obvious difference being that one deals with life and all that goes with it, while the other deals with inanimate information. In this article we focus on two concepts: time and value.

Cloning life requires nurturing throughout the natural timeline of the life being cloned. Cloning digital assets, such as software functionality and data (e.g., engineering plans you develop over the course of months or even years) does not require you to go through their natural timeline of development. In other words, it requires about 3 years for a cloned sheep to reach its most productive time in life (<http://www.sheep101.info/sheepbasics.html>). In contrast, you can clone productive digital assets almost instantly because you don't have to develop them from scratch.

This fact has huge business continuity ramifications. Why? Because the functionality of digital hardware, such as computers and servers along with the software and data on them, can now be virtualized to function with no discernable difference from a computer user's perspective.

If your business would suffer during the time its servers and/or computers were down, doesn't it make sense to implement solutions that can remove



Photo credit: iStockphoto.com - By: coveart_dion



Cloning of sheep takes time; cloning of computers is almost instantaneous.

that suffering almost instantaneously? Hardware virtualization technology has now become pervasive. Bringing online within a network, replicas of functioning business-critical hardware that may have failed no longer needs resources of behemoth organizations. Even very small firms can now implement these business continuity solutions.

Timeless Ways to Grow Business with Technology

Did you find this information helpful? If so, make it a point to watch for similar information that will come your way monthly in NCS' **Business & Technology Corner**. If you simply can't wait for the monthly installments and wish to get your hands on all the tips at one time, ask for the booklet

"Timeless Ways to Grow Business with Technology." To request a copy of this valuable, no-cost resource, visit <http://www.rcare-solutions.com>.

About the Author

Ranjit has been writing on and teaching computer topics since 1987 and has authored several books on CAD. His next book, *The Silent Motor* (thesilentmotor.com), is on success in life and business. He is the founder of RAM Corporation and the 2013-14 President of the ASCE-NCS. He welcomes comments and feedback via e-mail. You can e-mail Ranjit at president@asce-ncs.org.



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October Meeting Recap – The U.S. Capital’s East House Underground Garage Rehabilitation

October’s meeting featured a summary of an award-winning civil engineering project on one of Washington, DC’s iconic buildings. The difference this month was that the project involved the restoration of the structure rather than its original construction. Scott Harrison, P.E., President of Restoration East LLC, presented the details of the renovation of the U.S. House of Representatives east parking garage.

The project was recognized by the



Scott Harrison, President of Restoration East LLC, addresses the October meeting.

ASCE-NCS as its Sustainability Award winner in 2012 and by the International Concrete Repair Institute as its Project of the Year in 2012 in the parking garage category. The project was quite impressive in a number of aspects, but one that Harrison highlighted well was the fact that it is the only parking garage restoration project to earn the U.S. Green Building Council’s LEED Gold certification.

From the perspective of a concrete restoration project, the East Garage was formidable:

- 172,000 square feet (SF) of wall-to-wall hydrodemolition to a depth of 5 inches;
- 41,000 SF of 10-inch full-depth slab repair (where the pressurized water blew completely through the 10-inch slab);
- installation of 47 tons of new reinforcing steel;
- installation of 180,000 SF of urethane traffic membrane;
- installation of 1,450 lineal feet of fire-rated expansion joint flashing;

- installation of 44,000 SF of cementitious coating on foundation and vent shaft walls; and
- painting of walls, ceilings, and columns.

In addition to the concrete repair and waterproofing work, many other improvements were included in the project to address aging of the 40-plus year-old structure.

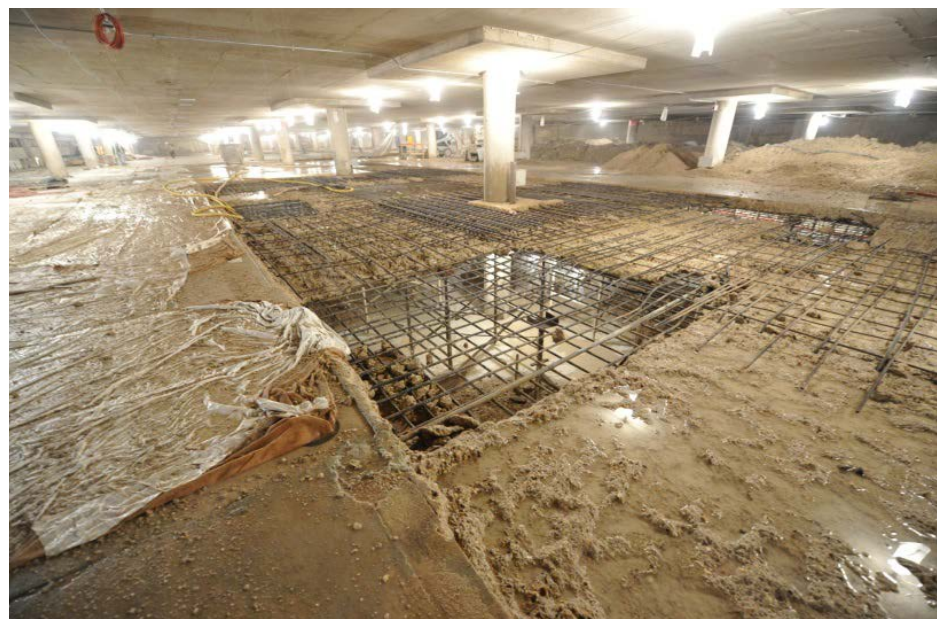
- Installation of a new high-efficiency steam-heat system
- Installation of a new state-of-the art LED lighting system
- Asbestos and lead paint abatement
- Installation of high-efficiency automatic faucets and waterless urinals
- Installation of new deck drains and a drain pipe system
- Modification of vehicular guardrails
- Replacement of garage pedestrian and stairway railings
- Refinishing of historic overhead garage entrance doors
- Replacement of metal doors and frames

Add to this that all the work took place in one of the nation’s most-secure areas and it makes for one impressive project. The schedule was also a significant challenge for Restoration East,

which completed the project ahead of the contract-required 1-year schedule.

Harrison introduced many in the audience to the intricacies and benefits of hydrodemolition methods of concrete removal. The lower dust levels, lower noise levels, and cost effectiveness of the hydrodemolition method made it suitable for the project. He also went into technical details on surface preparation of the concrete substrate (saturated, surface-dry condition versus bonding agent) and reinforcing steel with which many engineers outside the restoration business were unaware. Water treatment and debris disposal are major issues on a hydrodemolition project of this size. The project included many elements to ensure continued durability of the structure after the renovation and a long service life.

Of interest to many in the audience were the aspects of the project that contributed to it receiving the LEED Gold certification. The project included recycling of over 7,700 tons of concrete debris, 96 tons of steel, and used 14 percent blast-furnace slag in the concrete (a post-industrial recycled material). An air management plan and use of low-odor products were also aspects of the project that led to additional LEED points. The project’s original design targeted 53 points and the Silver certification level, but actually achieved 65 points to qualify for the Gold certification. ■



A section of poor-quality concrete in the parking garage deck which “blew through” during hydrodemolition.

November 13

The NCS Younger Members Group sponsors its monthly happy hour from 6–8 p.m. at a location to be determined in Arlington, VA. Join younger members from the area for free appetizers and drink specials. Look for an announcement as the event approaches with more details. For additional information, contact Sonja Hinish at SHinish@wje.com.

November 15–16

ASCE's Technical Council for Forensic Engineering holds its Fall 2013 Committee Meetings at the ASCE's Reston Headquarters. For further information, contact Michael Drerup at mdrerup@ctlgroup.com or 917-623-0995. (See newsletter brief.)

November 19

NCS monthly meeting at the Hilton Arlington. Andrew Baxter of Schnabel Engineering will discuss foundation challenges of the Crystal Bridges Museum of American Art (Bentonville, AR). (See newsletter lead article.)

December 2

Application deadline for ASCE's 2014 Legislative Fly-In. Plan now to be a part of this annual event on March 18-20, 2014, in Washington, DC, to learn about public policy issues affecting the profession of civil engineering and how you can influence the legislative process. For additional information, contact ASCE's Government Relations Department at 202-789-7850, or govwash@asce.org.

December 5–7

The DC Society of Professional Engineers will host the NSPE 2013 Northeast Regional Meeting & Mid-Atlantic Engineers Conference at the Loews Madison Hotel in Washington, DC. This event will provide a good opportunity to grab some additional Professional Development Hours before the end of the year. For additional information or to register, click [HERE](#).

January 6–10, 2014

The National Institute of Building Sciences hosts the second annual conference and expo, *Building Innovation 2014: Advancing Life-Cycle Performance*, in Washington, DC. The conference agenda will highlight NIBS activities and programs for developing innovative solutions for the built environment. For additional information or to register, click [HERE](#).

January 15

The NCS Younger Members Group will host a professional development meeting from 6:30–8:30 p.m. at McCormick and Schmick's (K Street NW location). Join Aelisa Carr and Gore Bolton (both of AMT, LLC) will discuss the effects of building heights on urban areas in creating new skylines and how cities around the world are handling new vertical development. (This event was RESCHEDULED from October 22, 2013; see newsletter brief.)

January 21

NCS monthly meeting at the Hilton Arlington. The tentative program calls

for a joint meeting with the American Water Resources Association on a water/wastewater topic. Additional information will be provided in January 2014 newsletter.

February 22

Discover Engineering Family Day at the National Building Museum in Washington, DC. Contact Dean Westman (dwestman@wrallp.com) or Emily Dean (dean.emilyanne@gmail.com) for further information or to volunteer.

June 1–5

ASCE's Environmental & Water Resources Institute hosts the World Environmental & Water Resources Congress 2014: *Water Without Borders*, in Portland, OR. For additional information or to register, click [HERE](#).

July 21–23

ASCE's Energy Division will host the Shale Energy Engineering Conference in Pittsburgh, PA, as a resource to present unbiased material to an informed group of industry professionals. For additional information or to register, click [HERE](#).

August 3–6

ASCE will sponsor the Pipelines 2014 Conference in Portland, OR, with the theme *From Underground to the Forefront of Innovation and Sustainability*. For additional information, click [HERE](#). Registration opens in February 2013.

Employment Clearinghouse

The ASCE-NCS provides the Employment Clearinghouse as a free service to its membership. The Clearinghouse allows members to post short notices for available positions or candidates seeking employment. All employers listed herein are equal opportunity employers. If you have questions, are seeking employment, or would like to post a position, please contact the newsletter editor at newsletter@asce-ncs.org or phone (703) 243-5298.

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