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The APWA Reporter, the official magazine of the American Public Works Association, covers all facets of public works for APWA members including industry news, legislative actions, management issues and emerging technologies.

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On the cover: Green Street example on Hillside Boulevard in the Town of Colma, Calif., 2015 Small Cities/Rural Communities Project of the Year, APWA Northern California Chapter (photo credit: CSG Consultants, Inc.)
Engineering and technology are with us always

Brian R. Usher, PWLF
APWA President

It does not take much insight to observe that technology is deeply embedded in almost every aspect of life today, and certainly is central to what we do in public works. And while one definition says engineering uses science and technology to get things done, we use the word more broadly to refer to artfully or skillfully making things happen—a number of political campaign managers are hoping to engineer a victory in November, for example. It should be no surprise then that Engineering and Technology would be one of APWA’s Technical Committees, or that this committee’s work touches on just about everything we do.

The Engineering and Technology Committee’s (E&T) basic mission is to encourage the increase, sharing, and application of knowledge about technology and advancing practices in public works. The committee’s work—directed at how we do business in our APWA activities as well as in our public works—is part of APWA’s efforts to develop and support our members and the other people, agencies, and organizations that plan, build, maintain, and improve our communities.

When it comes to engineering and technology, change seems to be just about the only thing constant. Many of us can remember that personal computers first became commercially available (as kits you had to assemble yourself) in the 1970s. The first handheld mobile telephone equipment showed up at about the same time. Today most of us have in our pocket or purse a cell phone that can far outperform both of the earlier devices combined. Fiber-reinforced polymers, LED lighting, SCADA systems, photovoltaic cells, e-mail, and artificial turf are just a few of the other products of engineering and technology that have changed public works practices during the past forty-or-so-year career of any of us who might be approaching retirement. And there is no reason to think that others just now entering public works cannot look forward to similarly exciting changes in the future.

On the other hand, some older technologies still have value. While you can download and read this message on your handheld device, a print-on-paper copy of the APWA Reporter still arrives at members’ homes or offices via U.S. Postal Service delivery. Magazines as a communications medium date to the eighteenth century, and postal services were initiated about 300 years before that.

In this issue of the Reporter you will find articles on both technologies new to public works—or newly understood to be problematic—and ideas that may help you more artfully or skillfully do your work. The use of unmanned aerial vehicles (UAV), commonly known as drones, is a particularly important example. UAVs may be quite large, but small ones have already been outfitted with cameras and used for bridge inspection and mapping the extent of damage in areas affected by flooding or landslide. Inappropriate or irresponsible use of drones, however,
Engineering and technology play big roles in public works’ support for public health and safety, of course. Mitigating risk—from potential flooding and toxic or hazardous materials in the environment, for example—always produces topics of interest.

Improving the efficiency and effectiveness of how we work and the performance of our agencies and systems as providers of service to our communities is another perennial source of discussion. Good leadership and management are essential to using engineering and technology well to make these improvements. It’s a never-ending challenge.

The first of the Star Wars movies was released in 1977, about the same time as PCs and cell phones, and we so far have seven of the promised nine episodes. In addition to adventure and romance, these films present a diverse range of cities and villages populated by human, humanoid, and other-shaped creatures. I doubt that many people in the audiences think about it, but even the dustiest, most remote outposts seem to have water supplies, transport access, waste management (other than the occasional abandoned carcass of a huge starship), and power. I conclude that the writers, set designers, and computer graphic animators recognize (albeit perhaps subconsciously) that public works practitioners will still be doing their jobs, using engineering and technology...a long time ago in a galaxy far, far away.

“*The best way to predict the future is to invent it.*”

– Alan Kay, American computer scientist, and president of the Viewpoints Research Institute

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**Mission Statement:** The American Public Works Association serves its members by promoting professional excellence and public awareness through education, advocacy and the exchange of knowledge.

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Public Works and Cybersecurity

Tracy Okoroike
Government Affairs Associate
American Public Works Association
Washington, D.C.

Cyber systems control much of our country’s traffic management, water and sewage treatment facilities, emergency services and communications, as well as other critical infrastructure. Because public works agencies own, design, build, plan, operate, and maintain these critical infrastructure systems and value their security, these cyber systems must be resilient to the increasing threat of terrorism, and natural or technological disasters. Managing the risks of these cyber systems is key to ensuring that communities are capable of handling emergency situations and daily operations. The current Presidential Policy Directive on Critical Infrastructure Security and Resilience (PPD-21), established in 2013, recognizes the vital role of public works in critical infrastructure security and resilience.

PPD-21 establishes a national policy on critical infrastructure security and resilience. It also clarifies the critical infrastructure-related functions, roles, and responsibilities across the federal government. PPD-21 establishes clear guidelines for information sharing and effective collaboration between the federal, state, and local governments. State and local government entities, including public works agencies, are critical stakeholders in national cybersecurity efforts. Local and state governments run programs overseen and funded by federal agencies, and frequently manage confidential data. It is essential that the federal government collaborates with the state and local levels to effectively share threat information and provide adequate technical support to protect computer networks and other related critical infrastructure.

Successfully engaging with state and local government is also crucial to effective recovery from a cyberattack. Public works agencies play an essential role in preventing, mitigating the effects of, and recovering from natural and man-made disasters including cyber security attacks. Because public works personnel are responsible for repairing and restoring critical infrastructure systems (water, sanitary sewer, stormwater, and other utilities) damaged during a cyberattack, making certain that local, state, and federal resources have been integrated well in advance will help to ensure response during this type of event is as seamless as possible. In addition to an effective federal partnership with state and local governments, PPD-21’s clear national cybersecurity guidelines help public works agencies better maintain the resiliency of their infrastructure systems. Public works agencies design routine operations and emergency management plans around what is needed to protect and sustain a specific infrastructure system. Therefore, national best practices improve public works’ ability to manage cyber risk for critical infrastructure systems.

Cyberattacks have the potential to damage our nation’s critical infrastructure systems and are just one of the many emergency hazards facing our nation. Damaged or corrupted cyber systems can cripple the essential operations of everyday life such as commerce, finance, transportation, utilities, communications, public safety, and government functions. Public works agencies, regardless of size or location, must be capable of addressing the evolving threat. The importance of effective local, state, and federal government collaboration, along with clear national guidelines, such as those outlined in the 2013 Presidential Policy Directive on Critical Infrastructure Security and Resilience, will help to ensure that our nation’s critical infrastructure remains resilient.

Tracy Okoroike can be reached at (202) 218-6702 or tokoroike@apwa.net.
Each year, the CPWA Board of Directors meets in Ottawa to identify policy and advocacy issues and to build relationships with other stakeholder associations, government agencies and Parliament. This year, CPWA met jointly with the International Federation of Municipal Engineering (IFME) on April 18. On April 19, CPWA met with the Honourable Judy A. Sgro, Chair of the House of Commons Standing Committee on Transport, Infrastructure and Communities, as well as staff from Infrastructure Canada, including John Brodhead, Chief of Staff to the Minister of Infrastructure and Communities. From left to right: Steve Blayney, CPWA Director, Manitoba Chapter; Anne Jackson, Director of Sustainability and CPWA Advocacy, APWA/CPWA; Craig Kennedy, CPWA Representative, Newfoundland & Labrador Chapter; Andrew Stevenson, CPWA Director, Saskatchewan Chapter; Kealy Dedman, CPWA President, Ontario Chapter; Scott Grayson, Executive Director, APWA/CPWA; Don Morehouse, CPWA Director, Atlantic Provinces Chapter; Deryk Lee, CPWA Representative, British Columbia Chapter; Richard Stinson, CPWA Director, Region I, Liaison to CPWA; and Darwin Durnie, CPWA Director, Alberta Chapter

The Engineering & Technology (E&T) Committee is one of APWA’s most wide-ranging Technical Committees. The E&T Committee works to encourage the increase, sharing, and application of knowledge about technology and advancing practices in public works, pursuing APWA’s mission to develop and support the people, agencies, and organizations that plan, build, maintain, and improve our communities. The committee sponsors technical sessions at PWX each year, provides informative articles in the June issue of the APWA Reporter, and sponsors Click, Listen & Learn programs.

At PWX in August, the E&T Committee will sponsor three sessions:

- Minnesota 2050 Initiative – Minnesota’s Response to Infrastructure Neglect

Rita J. Cassida, P.E.
Professional Development Program Manager
American Public Works Association
Kansas City, Missouri
At the invitation of Bert Tracy, Golden Valley, MN Public Works Maintenance Manager, APWA Executive Director Scott D. Grayson toured their Public Works Department and had the opportunity to try out some of their equipment.

The E&T Committee sponsored a Click, Listen & Learn with the Asset Management Task Force entitled Infrastructure Asset Management, More than just Managing Assets. It is available in the APWA Members’ Library.

In addition, the committee has been developing articles for this edition of the Reporter. Articles submitted or sponsored by the committee include:

- “Drones as a Tool for Bridge Inspection” by Jennifer Zink, P.E. and Barritt Lovelace, P.E.
- “Flood Mitigation for Blair Water and Wastewater Treatment Plants” by Al Schoemaker
- “Green Streets – Getting to Efficient, Effective, and Affordable” by Matthew Fabry, P.E.
- “Leadership by Discipline – Engineering and Technology” by Andrew Lemer and Brian Coopman

To make new technology more accessible to members, E&T members actively scan emerging new technology that could improve public works practice and to encourage thinking about future best practices, 5 to 10 years hence. Brief items appear in the Reporter in the “Imagination to Innovation” column written by Andrew Lemer, Ph.D. The E&T Committee has formed a Subcommittee on Underground Infrastructure Asset Technology. Chris Koenig is the Chair of this subcommittee.

At the February Combined Meeting, the E&T Committee identified strategic topics that the committee will be working on in the next few years. The topics are:

- Asset and Knowledge Management
- Capital Program Delivery and Development Tools
- New and Emerging Technologies and Evaluation
- Education and Research
- Data Collection, Management, and Use
- Leading Practice Examples

As the committee looks to the future, it is their hope to serve as a resource to chapters and members. With a diverse committee makeup which includes representation from the public, private and education sectors, it is the mission of the committee to serve the needs of members. As always, the committee welcomes any thoughts and comments.

The current members of the Engineering and Technology Technical Committee are:

- Dr. Andrew Lemer, Senior Program Officer, Transportation Research Board of The National Academies of Sciences, Engineering, and Medicine, Washington, D.C.
- Mr. Todd A. Blomstrom, Assistant Director, Transportation & Public Works Department, Infrastructure Design and Construction, Fort Worth, TX
- Mr. Chris Koenig, Senior Project Manager, HDR Inc., Omaha, NE
- Ms. Joline McFarlane, Asset Management Specialist, City of Airdrie, Alberta
- Ms. Katherine Sheehan, P.E., Associate Engineer, CSG Consultants, Inc., Foster City, CA
- Ms. Ravyn Whitewolf, Public Works Director, Blaine, WA
- Mr. David L. Lawry, P.E. (Board Liaison), Director of Engineering and Public Works, Schaumburg, IL
- Ms. Rita Cassida, P.E. (Staff Liaison), Professional Development Program Manager, American Public Works Association, Kansas City, MO

Rita Cassida serves as the liaison to three of APWA’s Technical Committees: Engineering and Technology, Transportation, and Utility & Public Right-of-Way. She can be reached at (816) 595-5222 or rcassida@apwa.net.
As the Council of Chapters’ second year comes to a close, each member of the Council has worked hard in making this program a success for years to come. The Council of Chapters continues to work at the grassroots level, while making a difference in empowering chapters in finding creative ways to support APWA’s strategic plan. Our delegates and alternate delegates from across the country have been an instrumental group in advising the Board of Directors and staff in ensuring that the members’ experience is the organization’s first priority. From assisting our Board of Directors in selecting our new Executive Director to assisting our Government Affairs Department on the Hill, the Council of Chapters is continually making their mark within the organization. Here are a few highlights from our Council of Chapters committees’ initiatives throughout the last two years.

The **Advocacy at the Chapter & Local Level Committee** has been working tirelessly in developing strategies to encourage our members to become advocates for APWA by researching effective ways to educate our members about the importance of serving as an APWA advocate for our organization and within their local area.

The **Awards Review Committee** is currently reviewing APWA awards that accurately reflect the ever-changing public works professional, which reflects the current standards for recognition for individuals and companies.

To bring clarity to the complex nature of infrastructure financing, the **Infrastructure Financing for the Future Committee** is developing a glossary of terms to better define the understanding of financing and funding mechanisms. Additionally, the committee began compiling a list of examples of the various approaches to infrastructure financing and funding taken by various jurisdictions represented by our membership.

As we approach the revamping of the APWA International Public Works Congress & Exposition, which is now known as Public Works Expo (PWX), the **PWX Review Committee** is planning various ways to conduct onsite peer-to-peer surveys to get candid feedback from event goers regarding their experience at PWX 2016.

The **Chapter Capacity Building through Mentoring Committee** has decided to take an aggressive approach to chapter mentoring in four areas, which include Chapter Best Practices, Chapter Finance Management, Chapter Leader Forum and the Chapter Mentoring Catalog. Earlier last year, the committee introducing the Chapter Mentoring Catalog, which was designed to give chapter leaders examples of success programs created by chapters to implement within their area. As the chapters move to a new fiscal structure, the Chapter Finance Management subcommittee was developed to be a sounding board to APWA National as financial changes are introduced to chapters. Lastly, the Chapter Leader Forum subcommittee is responsible for developing the forum available to chapter leaders at PWX, which is designed for networking and program exchange among APWA leaders.

The **Donald C. Stone Marketing and Promoting Committee** helped develop the marketing packet for chapters to present to their members about the benefits of the DCS program to all our members. This informational packet was introduced to members in January of this year.

The Council of Chapters and its members will continue to be an undeniable force as an advocate, liaison and resource to APWA at the local and national levels. However, the Council is a great reminder that success of APWA comes in numbers.

To learn more information about the Council of Chapters, please contact Sharica Ware at (816) 595-5259 or sware@apwa.net.
Recreational activities in and around Minneapolis

Jeff Oliver, P.E.
City Engineer
City of Golden Valley, Minnesota

Now that you’ve decided to attend the APWA PWX is Minneapolis this August, it’s time to start thinking about some of recreational opportunities that will enhance your trip. If you enjoy golf, fishing, working up a sweat with a little exercise or even a leisurely craft beer, there is an event for you in Minneapolis!

Golf
Enjoy a summer day in Minnesota with a round of golf at The Meadows of Mystic Lake on Saturday, August 27. Located just a few miles from where the pros will be competing in the Ryder Cup, this nationally acclaimed public golf course offers a unique, challenging, and scenic golf experience including lakes, waterfalls, streams, and sculptures throughout the course.

Fishing
If wetting a line is more your style, make sure you enjoy a true “Up North” experience, a guided fishing trip on Mille Lacs Lake on Saturday, August 27. Located 1.5 hours to the north, this lake is one of the state’s best fishing waters, with the opportunity to fish for walleyes, perch, northern pike and small mouth bass. A box lunch will be provided and we'll stick around for dinner at Twin Pines Resort after an afternoon on the water. Fishing gear will be provided, or feel free to bring your own.

Craft Brewery Tour
The microbrewery scene is thriving in Minneapolis! Take advantage of your love of beer, relax and enjoy a “guided” tour of three of our finest microbreweries on Saturday, August 27. The afternoon includes a flight of brews at each stop, and transportation is provided. The final stop will be at the Surly Beer Hall, the new “Destination Brewery” in Minneapolis, where you can extend the afternoon with dinner and great beer and catch the light rail or a cab back to your hotel.

Tennis
If spending an afternoon playing tennis appeals to you, sign up to play at the University of Minnesota’s Baseline Tennis Center on Tuesday, August 30. After playing a few leisurely matches of doubles, relax and enjoy
the social event at the Loring Pasta Bar, a short walk away in the unique Dinkytown area.

**Fun Run**
Enjoy the scenery of downtown Minneapolis with a fun run along the banks of the Mississippi River on Tuesday morning with a 5K fun run. The route includes impressive views of downtown, the U of M campus, the historic stone arch bridge, historic grain mills and natural beauty that is unique to a major metropolitan area. Your registration includes a commemorative tee shirt and goodies at the finish line.

Summer in Minnesota offers some great weather and a chance to relax in the great outdoors. Take advantage of the opportunity and take part in one of these recreational events and make your PWX experience even better. More information on the events is available on the APWA PWX web page when you register.

Jeff Oliver can be reached at (763) 593-8034 or joliver@goldenvallengov.
Connecting through the Emerging Leaders Academy

Karen Kase, PWS, CPESC
Natural Resources Manager
Hampton, Lenzini and Renwick, Inc., Elgin, Illinois
Member, APWA Emerging Leaders Academy

The APWA Emerging Leaders Academy (ELA) is described as a national program encouraging professional growth through a strong network of peers. Our class, the ninth since the creation of the ELA program, absolutely found this to be the case. Last August, nearly a hundred public works professionals applied for the program, a year-long, intensive series of individual and group projects designed to teach the best practices of leadership and management led by Sue Hann and Diane Linderman. The applicants were scattered throughout the U.S. and Canada, and posted a diverse set of backgrounds and areas of expertise. The ELA selection committee diligently reviewed the applications looking for a select few to become the next generation of leaders of the public works profession.

By September, sixteen applicants were selected. All sixteen that were chosen to be part of this year’s class likely had similar feelings of excitement, relief, and then more excitement once the program started. The reality of being part of this unique experience came to light when we all met face-to-face for the first time last November in Kansas City, Mo., for the Emerging Leaders Academy retreat.
With the exception of some lost luggage (resulting in Ryan being hilariously attired throughout the weekend), we cannot say enough how valuable and seamless our experiences were at APWA headquarters in Kansas City. Generally at complex events like the retreat, with people coming in from all over North America, there can be some challenges and issues. The coordination and scheduling of the week-long retreat was completed perfectly by APWA staff and their hard work was much appreciated. A special thanks to Becky Stein, Mabel Tinjacá, and Danni Altman-Newell for organizing such a fantastic retreat.

From the beginning, the program material has consistently been applicable, helpful and timely to the challenges we face as public works professionals. It is as if we chose the discussion topics based on our current career challenges. The material covered at the retreat was no exception, providing connections and common ground that we never would have found otherwise. For two days we discussed a variety of leadership topics in the context of public works. As a group, we shared leadership experiences ranging from field to management staff and gained instrumental knowledge from one another to take back to our organizations.

We also had the opportunity to appreciate the diversity of our class. We are all from very different areas of the continent (see map), regional accents were apparent, our favorite sports teams were rivals (Seattle Seahawks and San Francisco Forty-Niners), we were made up of Gen-Xers and Millennials, our group consisted of 11 males and 5 females, and our careers varied from administrators, managers and directors to utility supervisors and engineers. It’s amazing how sixteen people, ranging from Jacksonville, Fla. to San Luis Obispo, Calif., from small municipalities to a nation’s capital, can have so many shared experiences, trials and goals. Many of us don’t have a peer group with similar experience levels in our organizations, with the majority of our coworkers with over 20 years or under two years of experience in public works and other fields. Our discussion topics on issues frequently ended up with a few of our classmates
(self-named the “ELA Niners”) sharing similar experiences, how they handled it, and what they could have done better. Being a part of this expansive network of motivated individuals has been invaluable for each of us.

The connections with the greater APWA community were equally surprising and valuable. We had outstanding presentations by Sue Hann, Diane Linderman, Brian Usher, Larry Frevert, Dan Fenn and Brenda Viola. We were provided with a multitude of tools that will help us be successful in our careers. One of the highlights was a networking event, where we were able to meet and discuss current public works topics and get to know the APWA national staff and the Board of Directors.

At the retreat, we recognized that one of our biggest challenges moving forward in the program, in
particular on the group project, was connecting with one another given our geographical spread across North America. With technology, often the common question is, does it connect us or separate us? For our situation, we knew technology was going to be an important tool to help with that connection. Britt Elmore, the techie of the group, proposed creating a Google Plus Community as well as using Google Drive for collaborating on documents. Britt had created the community (ELA-Niners) before most of us had even disembarked from our plane rides from the retreat. It has been a great way to continue building our relationships—sharing photos from the retreat and interesting news stories and videos. (See “ELA Niners Community Site” graphic on page 12.)

Using the available collaboration tools has allowed us to create a virtual corporation of sixteen team members. We jointly formed a reference library of material that can be shared with one another. Also, we are able to work on documents simultaneously as three of us did when preparing this article. These tools have allowed us to overcome the geographic barriers faced by our group.

This year’s class is diverse in many ways, and as we continue to get to know each other, we recognize how our diversity has made us stronger as a team. Whether it’s in a group conference call, or a need to network with someone from the class on an organizational topic, the ELA has given us a rare opportunity to share insights on experiences from a variety of perspectives. Our class recognizes the importance of a strong, committed, professional network to provide outstanding public works services to our communities, which will be reflected in our upcoming project for the 2016 PWX in Minneapolis.

Lastly, we would like to thank our organizations, local chapters and mentors for their encouragement and support during our participation in the program.

Karen Kase can be reached at (847) 697-6700 or kkase@hlreng.com.
APWA’s CPII certification brings legitimacy to the construction inspection craft

Travis Vickers, CPII
Inspector
Provost & Pritchard Consulting Group
Fresno, California

At Provost & Pritchard, many of our clients are small rural communities and special districts, usually with only one employee who manages everything from reading water meters to operation of sewer and water treatment facilities. For capital projects, our job in the Construction Management Department is to provide oversight of the construction work and provide the Owner/District with construction support services. In California, many special districts choose to self-inspect or hire inspectors with special knowledge or skills related to their particular project or district. Historically, an individual would need a Professional Engineer’s license to perform actual public works inspection; however, APWA’s Certified Public Infrastructure Inspector program has provided legitimate credentials to the work we do in the field.

As you may well know, things are forever changing in the public works construction industry with regards to equipment and project materials that are being utilized. Having a wide range of exposure to different types of construction will help you gain the experience needed to obtain the CPII certification and assist your clients and the public in successful completion of public works construction projects.

I have been involved in the public works industry for approximately 15 years. I started my career in public school construction and then through the normal course of business started getting involved more and more in public works and road construction.

After qualifying for eligibility, I prepared to take the test by reviewing the recommended reading material provided by APWA. I concentrated on the items that I was least familiar with first, such as construction of ADA facilities, and then navigated the recommended reading list until I was comfortable with the subject matter. It was helpful when preparing for the exam to identify what work I had the least experience in and learn as much as I could about those subjects.

Knowledge about other work that was not typical for my particular area or what I typically work on was something that I enjoyed learning about during the certification process. I think most would be surprised to know that in the flat Central Valley of California, there is a large variety of construction projects that would have similar traits as projects in larger metropolitan areas. In California, whether you’re in the Los Angeles area, San Francisco Bay area or in the Central Valley, every agency has to be in compliance with state requirements for storm drainage, sewer and water systems that serve the public’s needs.

Provost & Pritchard serves many clients throughout the state. Obtaining the certification has allowed our firm to look at other projects outside our...
normal course of business. Even though we specialize in certain areas of public works design and construction, there have been opportunities to work on projects that are not in a particular discipline. Inspection of water treatment facilities, road construction, bridge construction, sewer treatment facilities, groundwater recharge basins, water transmission main projects, well projects, sewer lining, and ADA sidewalk improvements are just some of the different types of projects we are involved in.

For what we do at Provost & Pritchard, APWA’s CPII certification is the only certification, outside of a Professional Engineer’s license, that brings legitimacy to the construction inspection craft. APWA is a nationally recognized organization that is a standard bearer for all things public works, so it made sense for me to attempt to obtain the inspectors certification from such a nationally respected organization.

My first piece of advice for obtaining the CPII certification would be to give yourself some time to make it through as much of the reading list as possible. For most of us it will be review of things we have knowledge in already. My second piece of advice would be to talk to some of the people who have the certification already and also talk to anyone who will answer questions about the subject matter that they are experts in.

I would highly recommend obtaining your CPII from APWA. It has helped legitimate what public works inspectors do on a day-to-day basis. Through obtaining a CPII many doors can be opened for you and may allow you to work on projects that you are passionate about rather than working on projects that you have to. It has been an exceptional tool to have and it could possibly give you additional career options you may not have had without the certification.

After researching many of the licensing or certification processes out there for public works inspectors, I chose APWA because of its national reputation for excellence and integrity and it has been one of the more satisfying achievements of my career.

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The unappreciated value of stakeholder input and outreach on projects

Dan Sailer, P.E., Assistant Public Works Director, Town of Castle Rock, Colorado, and member, APWA Small Cities/Rural Communities Committee; Caroline Kipp, Senior Community Relations Specialist, Town of Castle Rock, Colorado

While most of you may be thinking that this topic is associated with capital projects, stakeholder input and educational outreach on any project are often overlooked, or unappreciated components. A “lost art” or “unappreciated art.” Art and engineering are too far apart on the project spectrum, if they are on the same spectrum at all, right?

As an engineer who was formally educated in an engineering discipline, my studies did not focus on the communication and outreach areas. I learned primarily through doing (or not doing in many cases), or seeking out self-improvement where I thought best. As a result, I underestimated the value and importance that good communication and outreach skills add to a project’s success. To borrow a line from the movie Field of Dreams, “If you build it, they will come.” I used to think that this was all that was needed for a successful project. This derived out of ego or ignorance, but either way, the result tended to be the same. Regardless of whether the project deliverable was good or not, ignoring stakeholder input and educational outreach left hurt feelings at best, and resentment at worst. And why shouldn’t it? I hadn’t valued, or underestimated, the perspectives of the very people I’m striving to serve.

If you share my philosophy that we are in a customer service business, then stakeholder input and outreach is an important focus area that project managers will want to spend some time building into their project efforts. You’re going to hear from your stakeholders either way. What I’ve learned is that if I spend some time on the front end to include efficient stakeholder input in the various project phases, and provide avenues for stakeholders to learn more about upcoming activities, I can significantly minimize the amount of negative feedback I’ll receive on the back end of a project.

I’ll take a simple example to illustrate this point. Like most cities, we have...
engineering standards associated with regulating the construction of new public infrastructure that will be built by private developers and turned over to the city for operations and maintenance. As developments in new areas occur, these standards need to be occasionally updated. So while our technical experts understand the logic and need behind a specific technical update, if we don’t engage the development community to learn about the impact of a potential change to their business practices, or keep them educated on the forthcoming changes, we are ignoring the needs of an important stakeholder in this change.

As an agency that values and focuses on improving our stakeholder input and outreach efforts on projects, I’ve come to notice very quickly the symptoms that arise when these are missing, or neglected. As a fast-growing community, we work with a variety of stakeholders from both public and private agencies. Each of these places a different value on stakeholder input and outreach. It’s very noticeable in the type of stakeholder feedback we receive when a project manager and his or her team do it well. While any skill takes practice to refine, I encourage project managers to first assess the importance they place on these two aspects. As with anything, don’t let fear of trying new things hold you back.

Well, a project manager could call in reinforcements (aka: public relations professionals), but if you don’t have one handy, here are a few guiding principles to get you started:

1. **Audience.** The first thing you should do is put yourself in the driver’s seat. Who are you going to impact? How will you impact them? Will there be road closures, or delays? Will a business be impacted?

2. **Information.** Now that you know your audience, what do they need to know? What might they be interested to know? Sure, project impacts on their lives and commute are a must. But is there a fun fact about the project you can share to keep it interesting? They probably don’t need to know technical
Think about how you would explain your project to that one friend in college who studied liberal arts.

3. **Amount of info.** Think about your regular day. You may have kids to transport to school and activities, a boss to manage, a workout to fit in, laundry to pick up, etc. You only have a small bandwidth for information. That’s true for your audience too, so KISS (keep it short and succinct).

4. **Platforms.** How will you reach this audience with the information they need and want to know? In this modern age, our first instinct is to hit the web. Our world is full of electronic communication, and your organization’s website will be an important tool. But, sometimes, the best approach is boots on the ground. Don’t forget the importance of face-to-face communication. This approach helps those impacted realize a human is behind this project. If a naysayer gets the opportunity to know the project manager on a first-name basis, your troubles will likely be minimized.

5. **Project Plan.** If you typically formalize a project planning document, such as a project Charter, include Project Input and Community Outreach as steps to implement.

6. **Input.** Finally, how can you keep them a part of the decision making so they have buy-in? This can be a tricky one. Often, engineers truly do know best. After all, you went to school to do this for a living. But what can you ask for public feedback on? Maybe the construction schedule, or the route. Or, you can even just present the plan in an informal way as a check-in with your community. Sometimes, it takes a non-expert to see what experts can’t. And at the same time, you earn supporters and “key communicators,” who will pass your information along to friends and neighbors. This only works, though, if you follow up and tell people what you heard them say and how you will address their concerns.

And one final word on transparency. Don’t sugarcoat it. If your project will cause delays, or be an inconvenience, just say so! Be conversational, but also be forward and thankful for their patience.

Daniel Sailer can be reached at (720) 733-2470 or dsailer@crgov.com; Caroline Kipp can be reached at (303) 660-1380 or ckipp@crgov.com.
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What does diversity mean?

Dr. Ram N. Tewari, Pembroke Pines, Florida; member, APWA Diversity Committee and Projects of the Year Awards Committee

The very basic question is, what does diversity mean to you and why it is important to us? What is your answer? Think before you answer this simple question.

When this question was posed to APWA National Diversity Committee members, it produced several interesting answers: variety, uniqueness with distinct qualities, differences, respect for all ethnic cultures, inclusion, and so on. So it appears that diversity is an extremely broad term encompassing all the differences among us.

It was a common consensus that the broad definition of “diversity” refers to visible individual differences, such as race, gender, age, as well as differences that are not apparent at a first glance, including religion, ethnicity, ability status, sexual orientation, education and socio-economic status. Diversity is a dynamic term which has been evolving as our worldwide interaction grows.

Maya Angelou, poet, said it so well: “We all should know that diversity makes for a rich tapestry, and we must understand that all the threads of the tapestry are equal in value no matter what their color.”

As I was researching, I learned that every organization has its own diversity policy. For example, diversity as per Olmsted County (Minnesota) is an inclusive term that includes all the differences that distinguish individuals and groups from each other. To appreciate diversity is to recognize that the sum of different groups and individuals is a richer whole than the parts alone. It includes, but is not limited to: race, color, age, disability, creed, religion, national origin, gender, sexual orientation, marital status, class, and status with regard to public assistance. Also, culture plays a vital role because it represents shared attitudes, values, goals and practices.

Another such example is the City of New York City. It has several helpful publications (available on the City’s website) and has a Chief Citywide Diversity and Equal Employment Opportunity Officer (DEEOO). As per DEEOO, “Differences are to be valued not just tolerated. Compliance, alone, is a required action, not a value. The City of New York City values all our employees—they are our greatest asset.”

Vision and mission of organizations emphasized that diversity is an integral component to achieve success. CNN’s program reflecting diversity has been aptly named United Shades of America (USA). Media has embraced and incorporated diversity in their programming to reflect upon changes occurring in the U.S.

It has been reported that as of April 12, 2016, the United States has a total resident population of 323,341,000, making it the third most populous country (after China and India) in the world. Demographers predict that the U.S. will be a majority-minority country for the first time by the mid-2040s. Therefore, diversity impact is inevitable because of the changing demographics and globalization. It manifests in almost all economic, social, political, health, and other activities.

“No one can make you feel inferior without your consent.”

– Eleanor Roosevelt (1884-1962), First Lady of the United States (1933-1945); author; speaker; politician; activist for the New Deal coalition
We have been witnessing diversity’s gradual progression and its becoming an integral part of our lives. It has been acknowledged and proven recently that diversity is an omnipotent force (elixir) which is the key to success and well-being of any organization and community.

Diversity affects us either directly or indirectly—agencies (public and private), academic institutions, professional organizations, politics, economic, health, social, and other such diverse activities. Considering this, several agencies and organizations were contacted to find out (benchmarking) their diversity policy, its implementation, monitoring, and what are they are continually doing to bolster diversity in their agency/organization.

Common findings are below:

- Understanding and appreciation of the value of diversity in the U.S.
- Establishing an advisory council/committee and subcommittees to identify and focus attention on the specific needs and issues of an organization.
- Embracing and promoting diversity and its inclusion at all levels of the organization.
- Anti-discrimination and prohibition of harassment (e.g., racial and ethnic, sexual) policies.
- Recognizing ability in disabilities and providing desirable accommodations under the Americans with Disabilities Act.
- Diverse representation in the workforce, advisory boards, and committees. Systemic barriers identification to diversity and focus attention on the needs and issues of diverse population, discrimination, harassment, racism, ethnocentrism, cultural pitfalls, stereotypes, prejudice, communicating agency’s commitment of inclusivity, lack of proper training, equitable opportunity for participation of all people within organization, etc.

In the market there are several programs and applications to assist in hiring and to avoid job biases. For example, Wall Street Journal Report of September 30, 2015, has listed a few applications (Algorithm) to battle job bias: TEXTIO (textio.com), DOXA (doxascore.com), GENDERTIMER (gendertimer.com), INHERSIGHT (InHerSight.com), GAPJUMPERS (gapjumpers.me), ENTELO DIVERSITY (entelo.com/products/diversity/), ENTELO DIVERSITY (entelo.com/products/diversity/), and UNITIVE (unitive.works).

Public works staff should work closely with the Human Resources Department to implement diversity policy at each and every step and level.

I hope you have an answer to the question which was asked in the beginning. I am sure that you will say that diversity is a wide array of differences which are our greatest strength. The word “united” succinctly celebrates diversity and inclusion. So please get started now to lead your local APWA chapter and your agency to advancing, upholding, reaffirming, achieving and maintaining an inclusive environment free from discrimination and harassment. My best wishes for your success.

Dr. Ram Tewari can be reached at trnarayan1@gmail.com.
Recognize Your Leaders

**Nominator’s Name:** Karen Self, MPA

**Candidate’s Name:** Kenny Holloway

**Candidate’s Title:** Street Maintenance Division Administrator

**Candidate’s Agency/Organization:** Newport News Public Works

**Candidate’s City/State:** Newport News, Virginia

---

How long has the candidate been involved in the public works industry?
40 years

How long has the candidate worked in their current position?
9 years

Please describe the reason that the candidate is being considered for recognition.
The City of Newport News, Department of Public Works, Street Maintenance Division is responsible for snow and ice removal off of city streets. This can be challenging with a city running approximately 23 miles long, with 554.81 lane miles and several bridges/overpasses. More than five years ago, Kenny Holloway began researching the use of anti-icing programs. After attending an APWA Snow Conference, he decided to test a brine application. Brine is a liquid salt mixture applied to the roadway prior to a snow/ice event. Brine works immediately and is more effective in lower temperatures in comparison to rock salt. In addition, approximately 35% less salt is used with less waste as it is a liquid application that does not blow away.

For this testing program, Mr. Holloway partnered with a neighboring city that already was using brine. This partnership allowed Newport News to purchase the brine and fill up the truck brine tanks without investing in an onsite brine system. The next snow season, thanks to Mr. Holloway’s study, he was able to convince city management to purchase a brine truck. Over the following two years, an additional two trucks were acquired. Once the testing program ended, Mr. Holloway began the process of budgeting for and, eventually, purchasing an onsite brine system. This system includes brine tanks and the brine-making system.

How was the candidate’s leadership ideas/actions brought to the forefront?
By Mr. Holloway researching the pros and cons of a brine application and conducting a cost analysis, he was able to educate and inform the Public Works and other city management teams of the benefits of brine application before and, at times, during storms. By utilizing a testing program first, he was able to obtain facts and statistics which lined up with his initial research of a brine system.

Who did the candidate work with to help bring this idea/action forward?
Mr. Holloway worked with his division receiving input from supervisors and...
frontline professionals. This enabled him to make necessary tweaks in the system prior to coming to the table with the request to purchase an onsite brine system. In addition, he worked with Public Works management and the neighboring city that was instrumental in sharing their resources and experience in the use and application of brine solution for snow removal.

**Did the candidate experience any challenges when trying to implement this?**
The initial challenge was attempting to implement a new program in the City of Newport News. He relied upon the professionals within his division to begin the process, which included getting tanks installed on trucks, implementing a secondary containment system, acquiring needed funding, modifying the application to work more efficiently on the road surfaces, and training personnel to operate the equipment.

**Are there steps/processes that, when looking back, the candidate could have done differently to make this idea/action even more successful (lessons learned)?**
The benefit of implementing a test program before investing in an onsite system outweighed the potential investment and failure of the program. However, the Street Maintenance Division will continue to analyze the previous year’s application of salt brine to improve performance during the next winter season. The implementation of the onsite brine system for Newport News has brought many successes to include more efficient and effective snow and ice removal from city roadways.

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### 2016

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<td>June 23</td>
<td>Creating an Environmental Management System (Chapter 40 of the Public Works Management Practices Manual)</td>
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<tr>
<td>July 18-21</td>
<td>CSM, CPII and CPFP Certification Exams (computer-based testing)</td>
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<tr>
<td>August 28-31</td>
<td>2016 PWX, Minneapolis Convention Center, Minneapolis, MN</td>
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### 2017

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<tr>
<th>Date</th>
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<tr>
<td>April 23-26</td>
<td>2017 North American Snow Conference, Iowa Events Center, Des Moines, IA</td>
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Growing away from petroleum

Andrew C. Lemer, Ph.D., Senior Program Officer, the National Academies of Sciences, Engineering, and Medicine, Washington, D.C.; Chair, APWA Engineering & Technology Committee

Dennis Gabor, awarded the 1971 Nobel Prize in Physics for his discoveries underpinning the development of holography, once wrote, “The future cannot be predicted, but futures can be invented.” Imagination to Innovation is a periodic look at new technology and scientific discovery that we could be using to invent the future of public works.

We have a heavy dependence on petroleum-based materials, especially in public works. Imagine trying to keep things running without plastics and asphalt! The problem is that these materials deplete a non-renewable resource, cause a lot of pollution in their production, and are difficult or impossible to recycle.

A variety of researchers and designers are finding new ways to make replacements. For example, a biotech company in Cambridge, Mass., is working with a genetically modified variety of switchgrass that produces a biodegradable polymer. The polymer can be extracted and used as the basis for a moldable plastic.

The company already sells a version of the polymer that is produced by bacteria that feed on plant sugars in a fermentation process, but that process is expensive and more complicated than the straight-from-the-plant approach. A Spanish designer has developed a similar material produced from beets, corn starch and sugarcane that he then uses to manufacture chairs and other domestic products.

In Iowa, researchers have been studying a bioasphalt binder produced from similar materials through a thermochemical process called fast pyrolysis. That process yields oils that can be used to manufacture a number of petroleum substitutes, including the binder that could take the place of traditional asphalt in pavement. That material has already been used in a bikeway demonstration project.

Researchers in France have found that microalgae—used traditionally in cosmetic dyes and food supplements—may be a starting point for producing a similar binder employing a hydrothermal liquefaction process involving pressurized water. And in the Netherlands, others have been experimenting with using lignin, the material that holds wood fibers together in plants and is a waste product from paper-making; more than 50 million tons of the stuff reportedly are burned off annually. Currently the most promising uses of lignin involve incorporating it chemically into the asphalt mix to improve performance of the finished pavement.

It is worth remembering that for nearly a century, from about the mid-1800s, using wooden planks to pave roads represented a huge improvement for transport. These various biomaterials, moldable plastics and bioasphalt, might represent simply an improvement on an older technology.

However, the road from discovery to commercial widespread adoption can be long and subject to potholes.

Andrew Lemer, Ph.D., is currently a Senior Program Officer with the National Academy of Sciences of the United States of America. In addition to technical papers and occasional articles for the Reporter, he writes on civil infrastructure and human settlement at www.andrewlemer.com.
LEADERSHIP BY DISCIPLINE

Engineering and Technology

Brian Coopman, MPA, Enterprise Sales Executive, Cartegraph, Henry County, Illinois, and member, APWA Leadership and Management Knowledge Team; Andrew C. Lemer, Ph.D., Senior Program Officer, the National Academies of Sciences, Engineering, and Medicine, Washington, D.C., and Chair, APWA Engineering and Technology Committee

In this edition of the Leadership by Discipline series, Brian Coopman, Enterprise Sales Executive, Cartegraph; former public works official, Henry County, Illinois; and APWA Leadership and Management Committee representative; and Andrew Lemer, Senior Program Officer, the National Academies of Sciences, Engineering, and Medicine, Washington, D.C., and APWA Engineering and Technology Committee representative, consider the role of leadership and management in the use of engineering and technology in public works.

APWA’s Engineering and Technology Committee works to advance public works practice and contribution to our quality of life by encouraging the increase, sharing, and application of knowledge about technology and good engineering.

So what does engineering and technology have to do with leadership and management? Engineering and technology are fundamental to just about all aspects of public works practice. Applying new ways of doing things is how we work to improve the quality, effectiveness, and efficiency of these practices. At the same time, new ways can go wrong, and when they go wrong badly in public works, consequences can be serious. Public works leaders and managers have to weigh the benefits against the potentially undesirable outcomes when deciding whether to try something new.

Public works leaders and managers have to understand that risk is always with us; it’s part of the job! For a variety of reasons, public works practitioners may have particularly conservative attitudes about risk. “We have always done it that way”—said by some to be the seven most expensive words in business—is a way to avoid thinking about anything different or why things are done the way they are. But if the public interest is to be well served, we have to recognize that risk is unavoidable. The challenge of leadership is to keep seeking out opportunities for improvement, deciding that the benefits to be gained make it worthwhile to take a chance...and that we can learn valuable lessons from the failures that occasionally and inevitably may result.

Trying new practices is easier in some aspects of public works management than others, of course. The stakes differ. Some new technologies or engineering practices could affect the health or physical well-being of customers, employees, or the general public; others could cause substantial economic or social disruptions if something goes wrong. A good leader has to be able to make a realistic assessment of the potential consequences—both favorable and less so—that could result from trying something new.

Are there some easier opportunities? The “low-hanging fruit” of engineering and technology
for public works is often to be found in activities that always have to be done and can have substantial effect on system or agency performance. Maintenance is one good example. Maintenance personnel who deal with problems day in and day out may come up with a way to save time, money, or both; good managers must be open to adopting the new way or able to explain clearly what the would-be innovators failed to take into account in proposing their idea.

Over the past few years we have been experiencing tremendous advances in computation and communication. These advances are making the collection and use of data about in-service performance of public works systems much easier and less expensive. The data allow us to spot more quickly when service demands and supply may be changing and to estimate how they may change in the future. The data can be qualitative as well as quantitative... inspection reports as well as field measurements, for example. Simply adopting new technology to collect, store, analyze, and use data to make decisions—rather than relying on uninformed judgement or simply “how we’ve always done it”—can yield big payoffs.

**Can you give some examples?**

The City of Kingsport, Tennessee, Wastewater Department had a legacy DOS-based management-support system in use until late 2014. Born in the Finance Department as a land management system it was made to “fit” into public works operations. The system “worked,” but not real well. Repairs were done in a timely manner but there was no consistency in data entry, so data analysis and reporting were difficult. The Wastewater Department made a strong case for a more robust work management system to fill gaps in their capacity, management, operation, and maintenance (CMOM) program.

After looking over what might be done with newer information technology, Kingsport identified vendors capable of providing a better system. In the process the city recognized two major risks: First, any new system would...
have to be clearly an improvement of their current workflows and data entry processes. Second, staff would have to take an active role in the entire selection and implementation process. Innovation would come not simply from a technology purchase, but from taking real ownership of the new way of doing business.

Starting with the Wastewater Department, Kingsport acquired a new standardized work order system; this was subsequently extended to use by the Water, Streets, and Traffic Departments. With its new work order system in place, managers could see how particular facilities and types of assets were performing; this led the city to embark on developing a comprehensive asset management program tied in with the geographic information system (GIS), taking advantage of software they already possessed. The new technology enabled Kingsport to transition from solely reactive maintenance to preventive maintenance. Crews now gather data on the age, current attributes, and condition of assets. As this information is compiled, Kingsport is realizing the potential for predictive maintenance: using scientific models with the capability to forecast potential failures and recommend activities to extend the service life of their assets.

Twice the size of Kingsport, the City of Davenport, Iowa, Public Works had similar issues. Multiple information systems were in use across 18 different operating divisions. Some of these systems were more up-to-date, but the most-used was (like in Kingsport) an aged DOS-based system. The old application was built in-house and used in almost every city department including Public Works, Finance, Police, Fire, Code Enforcement, and others. Only one person in the IT department could run a comprehensive report from the system...and only if he was in the office, of course! Advanced pipe inspection software was being used, but CCTV videos and inspection reports were stored in a cascading pile of boxes in the back corner of a store room.

Davenport’s Public Works leadership recognized the need for change, but annual budget cuts were feeding a “make-do-with-less” attitude; everyone just kept trudging along. Then the city’s Finance Department undertook to upgrade its financial software. Public Works hitched themselves to that wagon and began to find money for technology upgrades (like the CCTV videos) in dusty corners of the capital improvement program budget, long-forgotten accounts with a thousand dollars here and a thousand dollars there. Taking these first small steps led to identifying the potential for a GIS-based enterprise management system spanning across the 18 Public Works divisions. Implementation has included approximately 140 users inside the system and the deployment of over 30 mobile devices in the field to assist in data capture. The Facilities Division has implemented more than 100 automated preventive maintenance plans, eliminating completely the manual assignment of preventive maintenance tasks; and the Wastewater Plant quickly replaced an older preventive maintenance system when the software vendor terminated support.

Now Davenport is working on conversion of construction project inspection forms, required on projects developed with federal or state support, from paper to a computerized system. Once implemented, inspectors will log daily inspections and required reports via mobile devices in the field, eliminating the need to feed and store thick binders of daily inspection forms.

The bottom line? It takes leadership and management effort to take advantage of technology and engineering. Experience in both Kingsport and Davenport illustrate the important role that leadership and management play in using technology and engineering to improve public work practice. The interesting footnote is that leadership and management do not necessarily come from the top of the organization; all levels of staff are involved. Most importantly, if everyone can see that they stand to gain from new ways of doing things, innovation comes naturally even in organizations not usually thought of as likely to try new things. As James Bryant Conant, former President of Harvard University, once observed, “Behold the turtle. He makes progress only when he sticks his neck out.”

Brian Coopman can be reached at (563) 587-3318 or briancoopman@cartegraph.com; Andrew Lemer can be reached at (202) 334-3972 or alemer@nas.edu.
Green Streets: Getting to efficient, effective and affordable

Matthew Fabry, P.E.
Program Coordinator
San Mateo Countywide Water Pollution Prevention Program
Redwood City, California

Municipalities in California face persistent, challenging, and expensive-to-fix water quality impairments as a result of pollutants in stormwater runoff, including bacteria, metals, mercury, polychlorinated biphenyls (PCBs), and trash. To address these issues, regional stormwater permits require local governments to develop and implement plans to achieve pollutant reductions over time. In California, in an effort to mitigate the state’s crippling drought, lawmakers mandated Stormwater Resource Plans focused on multi-benefit stormwater capture projects for any agency wanting to compete for voter-approved bond funds.

Green infrastructure, or using natural systems to capture, treat, and infiltrate stormwater, is emerging as an essential tool for stormwater management. Green streets incorporate green infrastructure in public rights-of-way to manage roadway runoff. Opportunities for green streets are abundant and provide numerous benefits beyond water quality improvement. The challenge is making them efficient, effective and affordable. This article details seven ways municipalities can employ innovative techniques to do just that.

1. Integrated Planning
Municipalities can move beyond water quality-based planning to comprehensive, integrated, multi-benefit planning. This enables a shift from opportunistic stormwater management to focused implementation of prioritized, multi-benefit projects. An example of integrated planning is the City of San Mateo’s Sustainable Streets Plan that combines Complete Streets (accommodating all modes and users safely) with Green Streets (www.sustainablestreetsanmateo.com). Integrated planning typically results in greater community engagement by shifting the focus from water quality to sustainable communities and can open up a wider variety of funding sources.

Another primary benefit of integrated planning is it leads to municipal standards. Similar to how cities adopt standards for sidewalks, bike lanes, or streetlighting, integrated plans allow municipalities to adopt...
green street standards that can also be applied to development projects. In addition to requiring a developer to widen sidewalks adjacent to a project, municipalities can also require construction of green street features. This can expand the footprint of stormwater management associated with new and redevelopment beyond the parcel to include adjacent rights-of-way, thereby shifting green street costs to the private sector.

2. Integrate with Other Investments
As California works to reduce greenhouse gas (GHG) emissions in the face of anticipated population and job growth, regional and state agencies are incentivizing dense development around transit. Billions of transportation dollars are slated in the coming decades for bicycle and pedestrian improvements to encourage alternative modes of transit. “Complete Streets” projects that involve pedestrian bulbouts, wider sidewalks, bike lanes, and streetscape improvements present a prime opportunity for green infrastructure integration. Bulbouts can become vegetated curb extensions that capture stormwater; sidewalks can incorporate permeable pavement and stormwater planters; street trees can become tree well filters; Complete Streets can become Sustainable Streets. These integrated projects reduce GHGs and simultaneously build resilience for unavoidable climate change impacts. Integrated investments drive down the water quality cost share; the challenge is breaking down the silos between stormwater and transportation. Figures 1 and 2 on pages 31 and 32 illustrate typical Complete Streets components and the ways in which green infrastructure can be incorporated to create Sustainable Streets. Figure 3 on page 34 provides a recent example of an integrated project.

3. Capitalize on Multiple Benefits
Green infrastructure provides many benefits, and green streets can improve air and water quality, reduce urban heat islands, recharge groundwater, minimize flooding, calm traffic, increase property values, enhance bike and pedestrian environments, and educate the public. Some of those benefits are already connected to programs with funding, such as urban forestry to address urban heat islands. Others are much harder to capitalize, but given that most green infrastructure benefits are not water quality issues, local agencies need to start quantifying the full cost-benefit of these types of projects. The U.S. Environmental Protection Agency’s green infrastructure website (https://www.epa.gov/green-infrastructure) has some great cost-benefit resources, such as the Center for Neighborhood Technology’s “The Value of Green Infrastructure: A Guide to Recognizing its Economic, Environmental and Social Benefits.” Recognizing and quantifying these benefits can often open new sources of funding.

4. Evaluate Alternative Funding Opportunities
In addition to grants, there are other innovative funding approaches that agencies can consider. Examples include:

• The City of Portland charges stormwater impact fees on development in proportion to a project’s roadway frontage and vehicle trips generated.

• Property owners in the Dogpatch neighborhood in San Francisco recently voted in favor of a Green Benefit District to fund green infrastructure and other community improvements.

• Plans such as San Mateo’s Sustainable Streets Plan enable revised traffic impact fees to support plan implementation.

• Operations and maintenance—always a significant concern when implementing green streets—can be managed by private partners, such as Business Improvement Districts, or community partners, such as Master Gardener Associations, community volunteers, or other
nonprofit organizations, in order to reduce municipal costs.

- Community-based public-private partnership models, such as is occurring in Prince George's County, Maryland, reduce costs and shift risks to private entities responsible for designing, building, and maintaining green infrastructure based upon pre-agreed criteria.

5. Maximize Opportunity and Efficiency

When it comes to green streets, intersections and proximity to existing storm drain systems are key. It’s a prime location to manage stormwater, as it is typically the bottom of the “streetshed” where stormwater capture is maximized. Intersections are ideal locations for vegetated curb extensions: existing drain inlets serve as overflows and connection points for underdrains; the pedestrian environment is improved with reduced crossing distances, increased visibility, and ADA-compliant curb ramps; existing red curb zones minimize parking loss.

Most low-density residential streets can probably be managed with a single parking space-sized vegetated curb extension at the end of the block.

6. Support Rebate and Incentive Programs

The amount of run-on from adjacent parcels to a roadway impacts the size of stormwater management features to effectively manage runoff. Older commercial and industrial areas with large, impervious parcels that drain directly to the roadway may not be feasible locations for green streets. As such, programs incentivizing private property runoff reduction, such as with rain barrels, cisterns, rain gardens, permeable pavement, and green roofs, can benefit green street programs. Simple rain barrel rebate programs may be appropriate for residential areas, whereas programs like Philadelphia’s stormwater fee crediting program can incentivize large-scale onsite stormwater management. All approaches can reduce runoff to public rights-of-way, thereby reducing flow to green street features.

7. Utilize Cost-Effective Designs

As agencies build more green streets, it’s important to evaluate design standards and specifications for cost-effective improvements. Some green street designs can be over-engineered with lots of curbs and concrete, all of which increase implementation costs. Agencies should review all aspects of design for opportunities to reduce costs. Green street features should also be designed for low-cost maintenance.
Every year National Public Works Week gets bigger and better. The number of participating municipalities continues to grow, which means the number of citizens who are exposed to the value of public works grows.

At APWA one of our main goals is to educate the general public about the value and necessities of public works projects throughout North America, and public works professionals like you are our best ambassadors.

Public Works Professionals don’t stop after National Public Works Week is over, neither should the celebration. Keep the recognition in your area going by finding additional ways to celebrate the men and women of public works!

Visit our website at apwa.net/npww for more information about National Public Works Week. Be sure to share your experiences on social media using the hashtag #NPWW.

If you have any questions about NPWW, contact Jared Shilhanek at jshilhanek@apwa.net or call 816-595-5257.

Matthew Fabry, P.E., manages the San Mateo Countywide Water Pollution Prevention Program for the City/County Association of Governments of San Mateo County. Readers are encouraged to download the Program’s award-winning Sustainable Green Streets and Parking Lots Design Guidebook at www.flowstobay.org. Mr. Fabry can be reached at (650) 599-1419 or mfabry@smcgov.org.

for issues like sediment, leaf, and trash removal. Integrated designs for stormwater, pedestrian, and bike features are essential.

Retrofitting public rights-of-way with green infrastructure is becoming more common, both for mandated water quality improvement and to create resilient communities in a changing climate. Comprehensive, integrated, and multi-benefit planning is an essential first step to creating meaningful green street programs, and the innovative techniques described above will move municipalities away from opportunistic implementation and toward efficient, effective and affordable green street programs.

Figure 3 – Green Street example on Hillside Boulevard in the Town of Colma, CA, 2015 Small Cities/Rural Communities Project of the Year, APWA Northern California Chapter (Credit: CSG Consultants, Inc.)
Drones as a tool for bridge inspection

Jennifer Zink, P.E., Principal Bridge Inspection Engineer, Minnesota Department of Transportation, St. Paul, Minnesota; Barritt Lovelace, P.E., Regional Manager, Collins Engineers, Inc., St. Paul, Minnesota

Project Overview
Unmanned Aircraft Systems (UAS), or drones, have been making headlines for their potential uses including deliveries, aerial photography, and agricultural planning, and recently, bridge inspections. In the spring of 2015, the Minnesota Department of Transportation (MnDOT) initiated a study to identify the potential benefits of using UAS as a tool for bridge inspections. MnDOT selected Collins Engineers, Inc. (Collins) to assist with the study based on their reputation as bridge inspection experts and a history of innovation and successful project work with MnDOT.

Federal Aviation Administration (FAA) Rules
The project team first identified current FAA rules regarding UAS use for commercial applications. There are currently three separate sets of rules to follow depending on the application and the operator. For hobbyists, the restrictions are minimal. Government agencies can obtain FAA approval through a Certificate of Authorization (COA) process that takes less than 60 days. Private companies must obtain an exemption to Section 333 of the FAA Modernization and Reform Act of 2012 (FMRA) specific to the UAS being flown but can fly under a blanket COA provided by the FAA.

For this study, the private company process applied since the consultant team was considered the UAS operator, even though MnDOT—a government agency—led the project. More specific information can be found on the FAA website, but generally, to fly under the non-government agency rules, the following requirements must be followed:

- An approved Section 333 Exemption must be obtained.
- A licensed pilot is required.
- Flights must be line-of-sight only.
- Aircraft must be operated outside of an airport’s five-mile radius unless permission is granted from the airport.
- All aircraft must be certified and registered by the FAA.
On February 15, 2015, the FAA proposed a new set of rules governing the use of small UAS or “Micro-Drones” (under 55 pounds). The proposed set of rules would allow the commercial use of small UAS with less restrictive requirements.

Assessment of Current Practices

The Federal Highway Administration’s (FHWA) National Bridge Inspection Standards (NBIS) mandate the inspection of all highway bridges at intervals not to exceed 24 months (with some exceptions). The NBIS requires that a certified Team Leader be present onsite at all times during the bridge inspection. The Team Leader must meet certain minimum qualifications through combinations of training, experience, education, and professional registration.

There are many ways that bridge inspectors access bridge components including under-bridge inspection vehicles, man lifts, rope access, ladders, and even binoculars in some cases. Utilizing UAS is simply another tool to access bridge components for inspection purposes.

Hands-on inspections are required for fracture critical bridges and may be necessary for other bridges at the discretion of the inspector. In these cases, UAS would not provide the level of assurance required for public safety and may not meet minimum regulatory requirements. But for the majority of bridges, UAS could be a tool for the bridge inspector to improve the quality of inspections, and reduce the need for expensive access and traffic control measures.

Phase I Study Results

For Phase I, an Aeyron Skyranger UAS (http://aeryon.com/aeryon-skyranger) was used. This aircraft was designed with military, public safety, and commercial uses in mind and is a very robust and capable unit. While the Skyranger met many of the requirements for collecting inspection data, its range of vision prevented views directly above it. In addition, at the time of the study, the Skyranger was unable to fly directly under the bridge decks because of GPS signal loss.

During Phase I, the project team performed fieldwork at four bridges throughout Minnesota. Bridge selection criteria included factors such as population density, bridge type, bridge size, proximity to airports, and bridge owner cooperation.

For each bridge, the report from the most recent inspection was used to make an objective determination as to whether previously identified conditions and deficiencies could be correlated with the UAS results. Overall, deficiencies and conditions could be identified with the exception of areas directly under the deck where the UAS was unable to fly. Image quality was impressive and the infrared sensor showed potential in identifying concrete delaminations.

Phase II Study

Phase II of this study is exploring technology that is specifically built for performing inspections, with a forward and upward facing camera and the ability to fly directly under the bridge deck. Using the Sensefly eXom (https://www.sensefly.com/drones/exom.html), the preliminary results have been very positive. The eXom has several inspection-specific features including the ability to provide an upward view, the ability to fly without GPS, an integrated thermal camera, and ultrasonic sensors for obstacle avoidance. These features proved very valuable when performing inspections.

Phase II began in the fall of 2015 with fieldwork performed on the Blatnik Bridge in Duluth in conjunction with MnDOT’s already scheduled inspection. This bridge is 7,980 feet long and was constructed in 1961. The main span is an open spandrel steel arch with steel deck trusses at each adjacent span and the approach spans consist of continuous steel beam spans. The research will continue this spring with the project team using a thermal camera for delamination surveys, inspection of the interior of a steel box girder, and inspection of a culvert. Preliminary estimates indicate that there could be up to a 60% cost savings when utilizing the UAS versus...
an under-bridge inspection vehicle for the approach spans. The final results of Phase II will be published in June 2016.

Conclusions and Recommendations

UAS technology is advancing rapidly and improvements in the technology are proving to make them an effective tool for bridge inspectors. The first thing the research team learned was that utilizing UAS for bridge inspections can be done safely from both the bridge inspectors’ and the traveling public’s perspective.

Second, the quality of the images provided by UAS allowed for the identification of conditions and defects. However, it cannot replicate a hands-on inspection or replace the need for a qualified inspector onsite. Non-engineer operators of UAS may not have the training and ability to recognize the significance of conditions they encounter or to target areas prone to more rapid deterioration or failure.

Finally, recreational grade UAS have limited capability as far as bridge inspections and inspection-specific UAS are a great deal more capable.
The Future
The benefits of using a UAS as a bridge inspection tool are clear and the advances in technology have increased the potential for implementation. MnDOT is considering the implementation of UAS where it can improve safety, the quality of inspections and provide cost savings. There will no doubt be a day when the UAS will be a common tool used in bridge inspections increasing bridge inspectors’ ability to ensure the safety of the traveling public.

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Transportation Committee Anecdote
The adjoining article on use of UAS for bridge inspections is an excellent example of using new technology to address maintenance type activities. The Transportation Committee is always searching for applications of new technologies for planning, design and maintenance activities to share with the APWA membership. Recent responses from our member survey indicated maintenance is their number one priority.

Drones are proving to have great potential for use in many areas of transportation. An American Association of State Highway and Transportation Officials (AASHTO) March 2016 survey of state DOTs indicated that 17 state DOTs have researched or used drones, with another 16 reporting they are considering using them for certain tasks. AASHTO’s Drone Study Fact Sheet can be found at http://tinyurl.com/zchlgbe.

The Transportation Committee is sponsoring an educational session on “Drones for Bridge Inspections” at the 2016 PWX in Minneapolis. The session takes place on Monday, August 29, at 3:00 p.m. Please join us for this informative session.
Over the next few years we are going to hear a lot about Flint, Michigan; the mistakes that were made; the problems that could have been avoided. Whatever the result, there will be many lessons to learn. Public works professionals, the keepers of our infrastructure, must make sure to not only learn from what happened, but to do everything they can to prevent a repeat, not only in the water field, but in all our disciplines.

Because this tragedy involved a key part of our infrastructure, members of the public works profession need to engage in frank discussions among ourselves, as a profession, about what happened. We also need to consider our own thoughts as there is a strong lesson of ethics and morality to learn. As a profession we must develop our own list of do’s and don’ts, not only tactically, but strategically, so in the future similar disasters will be less likely to happen.

The focuses of many early stories about Flint have concentrated on the many political machinations that may have, seemed to have, or possibly occurred. For many of us in public works, it is easy to say we have no control or part in politics. But if we want to promote public works as a guardian of public health and welfare we cannot simply ignore politics by saying we are technologists not politicians. Consider perhaps that one definition of politics is the process by which we allocate resources and power. If we are honest with ourselves, we must admit that we engage in resource allocation every day—we are politicians! So, we cannot simply turn our heads.

While Flint specifically concerns our water infrastructure, it is important to generalize this case because the same types of problems can affect our entire infrastructure. Above all, after the dust has settled the public works profession needs to be in a stronger position when it comes to protecting our infrastructure and all the hundreds of millions of people that we provide basic life services to every day.

Even at this early time, there are lessons to learn from Flint. There will be many more to come. As a profession we must make sure that every one of our members learn and keep in mind these early lessons.

We need to have respect for what citizens tell us. As a profession we work with people every day. They are our customers, our friends and neighbors. We know that good public works is a combination of good engineering and common sense. We know that most of our customers, friends and neighbors may not be scientists or engineers, but they do have common sense. We need to listen to them.

We need to encourage and develop strong technical abilities. Of the major professions, we are most egalitarian of them all. Caring and
successful public works officials can start in our business as maintenance workers or college graduates because we have opportunities for people at almost every educational level. But because we deal with many technical matters, we need to gain working knowledge of them all. To be able to counter bureaucratic and regulatory “double talk we need to be committed to lifelong learning and encourage developing strong technical skills in our staffs.

**We need to be grounded to the people we serve.** People with all types of backgrounds can join the public works profession. Ideally, the public works professionals serving a community reflect that community in all ways, from gender to cultural heritage to racial background. Such close grounding to the people we serve means we can have a much better understanding of their needs, and can communicate much better with them, than bureaucrats and regulators miles away. We need to encourage diversity in our profession.

**We need to develop our communication and political skills so we are better able to stand up for and protect our infrastructure.** Public works is not only a technical business, but a people business. To be successful we need to be able to operate outside the safe confines of public works, promoting our work and communicating with everyone in our communities. We must learn to be comfortable talking to groups and the media to state our case and make our points.

**We need to look past the cheapest way to do things and bring a balanced, common sense approach to the cost of building, operating, and maintaining our infrastructure.** Cheapest is not always better, and most costly is not always best. The truth for all of us in public works is that we must do the best we possibly can with the money we have available. We must always use our funds wisely. But our guiding principle must be that the money we spend must always serve the people and above all protect them.

**We need to show the value of local control of our infrastructure.** It is simple geography, but often misunderstood. Bureaucrats and regulators are often far away; we are on the ground in our communities. So common sense says we should have a much better awareness of what our infrastructure needs and our citizens want. We must make sure that we fight for our communities and make sure the regulators and bureaucrats know what is important to our communities.

**We need to show the value of having experienced public works officials involved in decisions involving infrastructure.** Public works has always been a quiet and modest profession. But there is not a moment that goes by in everyone’s lives every day that is not directly affected or influenced by the infrastructure we plan, build, and take care of. We need to care about our infrastructure, not in a “know-it-all-eliteist manner” but in a way that shows we understand how important it is to our friends’ and neighbors’ and strangers’ down the street health and well-being.

A large part of what drives most public works officials to stay in the profession is the understanding that we want to play a part in making the lives of millions of people safe and comfortable. We build not only for today, but for generations of people yet to be born. We apply science and technology to serve and protect people like no other profession.

While this characteristic of our profession is admirable, to a certain extent it also means that the politicians and the “bean-counters” of the world often decide about infrastructure without asking or considering in a meaningful way what we have to say. We are sometimes just too “laid-back.” But what I have learned over the past 45 years is that I don’t help people by ignoring what they say, or not fighting for their concerns, but by listening to them and strongly passing those ideas on.

Just consider that for many years we have worked to protect our water supplies from terrorist attacks. We have fenced well-fields in and locked down our sites. After all that work and expense, it is unfathomable to think that one of the most significant “attacks” that has occurred has been from the inside. Poor decisions by bureaucrats, regulators, and politicians breached all those security measures almost silently. The public works profession and its members must make sure that this does not happen again... **not with our infrastructure!**

That bureaucrats, regulators and politicians ran wild in their self-serving decision-making processes is intolerable. That such self-serving harmed the health of thousands of people is nearly impossible to grasp. For public works those actions ignored the efforts of thousands of public works professionals over many years. We must simply not allow it to happen again.

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Flood mitigation for Blair water and wastewater treatment plants

Al Schoemaker
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City of Blair, Nebraska
Member, Council of Chapters, Advocacy at the Chapter Level Committee

During the summer of 2011 the Missouri River basin south of the Gavins Point Dam was flooded due to excessive snow pack and extreme rainfall in the northern water shed of the Missouri River basin during the winter/spring of 2011. On Memorial Day weekend of 2011 the Corps of Engineers, who regulate the dams on the Missouri River, sent out flood inundation maps for the entire Missouri River basin south of Gavins Point Dam showing estimated flooding limits and depths due to the higher than usual release from Gavins Point Dam. During a typical spring/summer the Corps of Engineers releases 16,000 to 19,000 cubic feet of water per second from the Gavins Point Dam. During the months of July through September of 2011, the Corps of Engineers released 160,000 cubic feet of water per second from Gavins Point Dam. The initial maps provided by the Corps of Engineers showed floodwaters in and around the Blair water and

Blair water and wastewater plants surrounded by flood waters in June 2011
The City of Blair constructed temporary flood protection berms and established pumping for the water and wastewater treatment plants effluent and stormwater from inside the berms to protect the city’s water and wastewater treatment plants from future flooding events. The City of Blair hired HDR Engineering of Omaha, Nebraska to help develop a 404 Federal Emergency Management Agency (FEMA) Hazard Mitigation funding application to construct permanent flood protection berms; a pump station to pump effluent from the water and wastewater treatment plants during high river events; and backup generators to maintain plant operations in the event of power loss. The preliminary cost estimate was $6,337,717 for all three phases of work. The City of Blair was able to show a benefit versus cost ratio of 3.23 for the project. Extensive effort was required by the City and HDR to respond to FEMA and Nebraska Emergency Management Agency (NEMA) requests for information; the City’s application was approved for Phase I work on December 17, 2013. This approval allowed the City to authorize HDR to move forward with the preliminary design of the improvements outlined in the application. The City submitted the completed preliminary design to FEMA for review and requested approval to move onto Phase II of the project. FEMA granted Phase II approval on July 3, 2014. HDR Engineering then moved forward with final design and preparing construction bid packages for contractor bidding.

The project was completed with four construction bid packages. The first was an earthen berm construction bid package; the second was the site utilities with new pump station bid package; the third was a generator bid package; and the last was a wetlands mitigation package. Wetlands were identified during preliminary design within the project limits that would be disturbed by construction. The City of Blair was required to provide mitigation for these wetlands which was done on a nearby site with the Corps of Engineers’ approval. The City submitted an amendment application to FEMA to address the funding for the wetlands mitigation which was not included in the initial application and to address higher than expected construction costs. The construction bids came in almost $1 million over initial cost estimates. The amendment was approved by FEMA in March 2015.
Several challenges had to be addressed during the design and construction of the project. The first challenge was the reconstruction of Fairview Drive which provides access to the City’s water and wastewater treatment plants. Fairview Drive provides the only means of access to the water and wastewater treatment plants for chemical deliveries and access for City personnel. In addition, Fairview Drive provides the only access to Optimist Park which is located on the Missouri River. The Park includes a boat ramp which is heavily used year round. Fairview Drive was extensively damaged during the 2011 flood from Marina Drive to Optimist Park and was part of the claim made by the City as part of the Disaster 4013. The reconstruction of Fairview Drive was required to be completed by August 1, 2015 to remain eligible for FEMA funding. However, part of the mitigation application included elevating approximately one-third of Fairview Drive above the 500-year high river elevation to protect it from future flooding and assure access to the water and wastewater treatment plants during a future high river event.

The City negotiated an access route through a business that allowed for the extended closure of Fairview Drive while allowing continued access to the water and wastewater treatment plants and to the park. Temporary surfacing was installed on the detour and gates were installed in the perimeter fence that protects the plants.

The second challenge was addressing the existing utilities on the site including three raw water transmission mains, the finished water transmission mains, sanitary trunk sewers, gas mains, underground electrical lines, communication lines and chemical feed lines. All of these utilities had to be moved or protected to allow for the raising of Fairview Drive and the construction of the earthen berm.
Extensive planning was necessary to address the construction sequencing that would allow the plants to remain in service while allowing for continuous construction operations.

An additional challenge was the overhead electrical service to the plants. The raising of Fairview Drive required Omaha Public Power District (OPPD) to reroute their secondary feed into the plants and rebuild a portion of the distribution system within the plants. Extensive coordination was required with OPPD to ensure their work fit in the overall project schedule.

The major last challenge was working with Union Pacific Railroad. The UPRR mainline is located on the south side of the water and wastewater treatment plants on a high embankment. Their right-of-way extends to the south edge of Fairview Drive. A significant portion of the Fairview Drive mitigation embankment is located on UPRR ROW. In addition, the UPRR required all utilities be relocated off of their ROW including the new storm sewer outfall and force main to the Missouri River. The outfall alignment was adjusted to accommodate the UPRR requirement.

Construction started in October 2014 and is scheduled to be completed by June 1, 2016. FEMA requires any hazard mitigation-funded projects to be completed within 36 months after initial approval of funding. The preliminary design took three months to complete, and FEMA reviews took another three months; additionally, FEMA required the last six months of the project schedule be reserved for auditing. As such, only 24 months was allowed for the final design, bidding and construction to be complete. As mentioned previously, construction schedules and sequences were developed to allow multiple contractors to work on the site at the same time. The construction contracts included intermediate deadlines that forced the contractors to follow the desired construction sequence.

Fortunately, two contractors secured the first three contracts for the project limiting the amount of conflicts on the project and allowing us to complete 98% of construction in only 15 months. Weekly joint construction meetings were held onsite to address project coordination, sequencing, and schedules.

Total project cost is $7,394,991 with $5,546,242 FEMA funding or 75% and $1,848,749 local funding provided by the City of Blair. The City of Blair reached out to the Papio Missouri River Natural Resources District and requested $500,000 funding from them toward the local match funding which was approved in March 2015.

The project has been a success for the citizens of Blair by allowing them to provide true long-term flood protection for the City’s water and wastewater treatment plants. As recently as June 2014, after many days of heavy rain, the Missouri River once again threatened the City’s treatment plants with flooding. Fortunately the river did not get as high as predicted, but it showed the real need for the City to have flood protection for their treatment plants. A special thanks to FEMA, NEMA, PMRNRD, OPPD, HDR Engineering, Eriksen Construction and Graham Construction who all worked together to make this project a true success.

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The mission of the National Weather Service (NWS) is “the protection of life and property and the enhancement of the national economy.” In order to meet this mission the NWS focuses on four main areas related to weather: forecasting, observing, analyzing and communication. As part of the Weather-Ready Nation initiative, the NWS is shifting from a product-focused service to interpretation and consultation.

There are 122 NWS offices in six regions around the United States that are staffed 24 hours a day, seven days a week. Public works agencies at all levels are strongly encouraged to call their local office if they have any questions about the forecasts or other weather-related questions. The NWS also appreciates weather reports from people in the field. Public works professionals are generally out in the elements and can be great eyes and ears for the National Weather Service. Individuals interested in taking weather observing to the next level should visit http://skywarn.org/ for more information on becoming a Skywarn weather spotter.

For public works staff, one of the most important things to understand is what NWS Watches, Advisories, and Warnings mean.

**Watches**
The Watch products are intended to provide the public with a heads-up of a possible event 36-plus hours in advance. One of the common misperceptions of a Watch is that it will lead to a Warning. Watches are based on 50% of the Warning criteria being met. In theory, only 50% of the Watches will become Warnings. Watches are a heads-up product to make people aware of the potential for the threat.

**Advisories**
The intent of Advisories is to provide information on weather events that will have a moderate impact on society, but not enough to warrant a Warning.

**Warnings**
The Winter Weather Warning products clearly define the area and the potential hazard. The NWS is focused on making sure the Warning products are consistent and credible. It is important to understand that the Warning products are county based, and interpreting the forecast through graphics issued by the NWS is sometimes easier than reading through the full warning itself. In an analysis by the NWS, their probability of detection (on a county-by-county analysis) of Winter Storm Warnings was 92% with an average lead time of 21.2 hours last winter.

Another NWS product that is sometimes misunderstood is a Blizzard Warning. To meet the Warning threshold, winds must be 35-plus mph (sustained or frequent gusts) and visibility generally less than one-fourth of a mile. The Blizzard Warning does not require falling snow or significant snowfall. It has all to do with visibility. In other words, a ground blizzard qualifies for the warning.

**Additional Resources**
In recognition that more users are visiting the NWS website via tablet or mobile devices, the NWS website has been made to have a mobile version. This mobile version is much more user friendly and can quickly provide weather information. To get the mobile version of the NWS website, simply visit http://mobile.weather.gov/. It is also recommended that frequent users of the website create a bookmark or shortcut on their mobile device home screen.

The hourly weather graph is an interactive graph showing hourly details of individual weather elements (rain, snow, wind, temperature, etc.) for a specific location for the next 48 hours. To access the hourly graph, visit weather.gov, enter a specific location, scroll down the page and look for the “hourly weather graph” link.

The Area Forecast Discussion (AFD) explains the thinking behind the forecast and is composed by the forecaster after they’ve completed their forecast. The AFD is updated at least twice per day generally around 4:00 a.m. and 4:00 p.m., and more often as necessary. Because it is a discussion about the forecast, it does include scientific terminology, but that shouldn’t deter anyone from reading it. For public works staff, the AFD can give information on the forecaster’s
confidence in the forecast. This may influence decision making on the part of the public works departments in relation to the forecast. If the confidence in the forecast is low, information will generally be included as to why confidence is low so that departments are aware of the range of possibilities. Similar to the hourly weather graph, go to weather.gov, enter a specific location, and scroll down to find the “forecast discussion” link.

One of the newer products related to weather information are the graphical forecasts (referred to as “Weather Story”) being produced by NWS. Similar to the AFDs, the weather stories are produced in the early morning and evening. Weather stories are produced by the NWS local forecast office and are available on the forecast office home page, and on the office Facebook and Twitter accounts.

The NWS has developed an experimental information service intended for the core partners including emergency managers, public works agencies, and other governmental agencies. The service is called iNWS. To get more information on the program or to sign up, please visit https://inws.ncep.noaa.gov/.

Shawn DeVinny has a passion for winter weather forecasting and for providing weather-related decision-support to NWS partners. He is committed to building relationships between the NWS and its partners in order to achieve the ultimate goal of building a weather-ready nation. Shawn can be reached at (952) 361-6670 or shawn.devinny@noaa.gov.

NWS Advisories Defined

- **Watch:** Weather having a significant impact on society is possible but details are uncertain.
- **Advisory:** Weather having a moderate impact on society is imminent or highly likely. Hazardous conditions expected, but should not be dangerous if precautions are taken.
- **Warning:** Weather having a significant impact on society is imminent or highly likely. Dangerous conditions expected.

Radar Basics

**Base Reflectivity**
- The lowest radar scan
- Helpful in seeing as low to the ground as possible
- Won’t fool you as easily because you are seeing only the lowest elevation scan
- Recommended to look at the base reflectivity only

**Composite Reflectivity**
- Displays the maximum return at any level
- Will look worse than base reflectivity
- Can fool you into thinking it should be snowing (evaporation is common at the onset of a storm)
Public works departments across the country provide essential services during disaster response and recovery. One way to help manage the chaos and improve communication during disasters is to develop and integrate emergency management techniques into regular operations. Over the last few years, the City of Golden Valley Public Works Department has been doing just that and, with three presidentially-declared disasters since 2011, the benefits of their efforts have been realized.

The City of Golden Valley is within Hennepin County which is the most populated county in Minnesota. In an effort to boost collaboration and communication within the county, Hennepin County Emergency Management (HCEM) has allowed the cities within the county to have access and use of its selected emergency management software. After a significant amount of research, Hennepin County had selected WebEOC by Intermedix as the county-wide emergency management software. Accepting the county’s invitation to use WebEOC, Golden Valley took the opportunity to explore different ways to use the software for daily operations beyond just disasters. This approach was in line with the thinking that if staff used the program on a somewhat regular basis, they will be better prepared in using the program during a disaster situation.

This article outlines how the City of Golden Valley used WebEOC as somewhat of a computer-aided dispatch (CAD) system for some public works activities. Staff brainstormed different potential activities where WebEOC mapping, information management, and event priority status could be utilized. Ultimately, the following activities were tested using WebEOC: snow events, frozen water services/mains, plow damage (sod, mailbox), potholes, yearly water main breaks, and storm response. In times of ever-evolving technology, information sharing, and limited budgets, the use of disaster-related emergency management software for workflow management was a creative partnership that not only helped prepare for disasters, but also improved documentation and tracking various public works operations.

Before WebEOC was integrated into operations with staff, select public works staff internally experimented with the different potential situations where it could be used. A management team developed standard operating procedures to help facilitate a smooth transition to staff. HCEM staff graciously provided support, facilitated some revisions to WebEOC based on the feedback, and provided feedback on the benefits they recognized at the county level in the information being provided.

Use of WebEOC for public works operations, lessons learned:

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For water main breaks, creating an incident as a stand-alone event was not that useful. The stand-alone method created an incident with only a few events: who is out of water, impact of traffic closures, general staffing information. However, when the incident was for all the water main breaks in a year, then each water main break was its own event within the yearly water main break incident report, which presented the information in a much more useful manner. For example, WebEOC mapping tool allowed for quick mapping of all the water main breaks in the city for the given year. For each water main break event, information logged included when staff was notified, what type of break it was, how many homes were out of water and for how long, and other potentially useful data for later reference. Creating only one water main break incident for the entire year also helped track restoration efforts by other crews because they could log when all the locations were restored.

For plow damage complaints, only one incident was created for the entire winter season (not calendar year). As new damage complaints were reported, new events were created. One major lesson learned was to search for the address of the complaint prior to creating a new event. If the location already had one report logged, it is preferred to update that event instead of creating a new one. The primary reason for this is it provides an easy to see history of complaints per address. It also eliminates multiple points at the same location on the map.

The record cold winter of 2013-2014 highlighted another opportunity for Golden Valley to use WebEOC to track activities related to frozen water services. One overall incident was created for the entire winter (titled “Frozen Water Services”) and each property that had a frozen water service had its own event. Information logged for each property included the property owner’s name, contact information, when the initial report was received, what was done and when, who was working at the address, and other pertinent information. The use of WebEOC for this situation highlighted a few key benefits of this approach. First, all public works staff had access to this information so they could log updates for each address. This method kept everyone on the same page with what and when information was communicated to the property owner. Plus, keeping everyone on the same page did not require extra work because all the relevant staff could just read the log.

Secondly, the mapping feature allowed for management to quickly see the scope of the problem around the City and get detailed information on a given property without tying up staff time.
to get the updates. Finally, by tracking all that information in one location, it minimized the loose ends that had to be chased down as the spring thaw started.

In June 2014, due to a record-setting amount of rain, the city experienced widespread localized flooding situations. From the start of the event WebEOC was used to track all the different flooding locations, reports from residents concerning water in basements, flooded/closed roads, and sandbagging efforts at critical infrastructure locations. The utility locates vehicle had a laptop in it with cellular network access. This unit was used to respond to property owner calls for water in the basement. Before a staff member left the property, they would update the WebEOC event with notes from their interaction with the resident and what was found, and then close the event. This eliminated the need to communicate back to management because they could see updates and notes in real time. Another staff person was handling phone calls and entering information into a computer logging notes for where all the crews needed to respond and what they were doing. As the event was winding down, the need to re-check areas of concern was kept to a minimum because issues had been updated in real time and not on multiple staff notes. This storm event ended up becoming a presidentially-declared disaster and the WebEOC log was an important piece of information for completing all the required FEMA paperwork for reimbursement.

The use of WebEOC for public works operations not only helped improve workflow management, but it also helped prepare Golden Valley Public Works for disaster response and opened the lines of communication with Hennepin County Emergency Management staff. While WebEOC did not work for everything, a lot of non-tangible benefits came from the joint effort. We would challenge readers to reach out to their local emergency management staff to see if a similar option is available.

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“For many of us in the West and other parts of the U.S., conserving water is becoming not just a good thing to do but a ‘must do’ to protect our lifestyles and provide for our residents. We are doing all the normal things to make people aware of the problems but seem to have hit a standstill. Are you aware of any new ideas or methods to get our point across to the public?”

I just returned from a Re-Accreditation Site Visit to Orange County, Calif., where water conservation continues to be a major issue. One of the Model Practices the agency was awarded was for the “Overwatering is Out” web page and the program of activities they have instituted to make the public aware of the need to continue to conserve water. For more direct information contact Eileen DePuy, Accreditation Manager, at Eileen.depuy@ocpw.ocgov.com for referral to the appropriate staff contact information.

Another innovative program is underway in Minnesota where water is crucial to the identity and economy of Minnesota, known as the “Land of 10,000 Lakes” where more than a quarter million visitors every year enjoy canoeing and exploring the Boundary Waters wilderness area and the Mississippi River. Minnesota’s lakes and streams are increasingly polluted and that pollution is starting to take its toll. Attempts to curb pollution including state laws to require “buffer” areas between crops and waterways have not been received well by farmers. Cities spend thousands of dollars filtering nitrates out of drinking water caused by increased use of nitrogen-heavy fertilizers. A team of graduate students in Iowa have launched a new effort, called the Plum Creek Initiative, to pay women to teach their neighbors about water quality problems, show them how they can reduce pollution on their own farms, test local bodies of water for pollution and even help farmers fill out paperwork to get government grants. The students believe the role of women in farming is changing; they are making more decisions and running the business. The premise is that women may be more receptive to environmental concerns than men. They also believe that rural women are more likely to convey that message in a way that shies away from shaming farmers, pointing fingers or relying on partisan arguments. Should be an interesting study. The plan is to be kicked off in August. Watch for more information.

“I recently followed all my city’s requirements to have a ‘free’ pickup of bulky items at my house. The waiting list was six weeks between my call and the date they could schedule it. I waited patiently and gathered the maximum of fifteen items that could be collected to make the trip worth the while. Long story short, we put the items at the curbside at 6:00 p.m. the evening before, as directed, and upon returning home after dinner at 8:30, all the items were gone! Scavengers had taken everything. I felt like a fool for the city to waste manpower and materials to send out a truck to find nothing on the curb! Is this something that happens everywhere or do we just have a problem in our area?”

You know that old axiom, “One man’s trash is another man’s treasure”? That seems to be the case with many recyclable items, in particular. Cities across the country are finding that scavengers are removing the most valuable recyclables to sell for their own benefit while cutting into the city’s diversion rate goals, as well as the funding for programs designed to increase recycling programs and sanitation projects within the community. City officials remind their citizens that “recycling is a law” and “scavenging is a crime.” Most residents want the trash and recycling at the curb to be gone. They feel that once they put it out, it belongs to the city and becomes their responsibility for removal. When scavengers, whether they are organized groups that remove large items for the value of metals, or neighbors who sort through the items and remove those that have market value, such as cans, or newspaper, take materials then they are taking those materials without permission.
Naturally, the scavengers see it as providing a “service” and that what they take is small in value to the city but can help to pay for gas for the car, laundry, or groceries. The likelihood of a crackdown by police for scavenging is slim to none. Reminding your residents on trash bills or by other means is probably the most you can hope for. However, that certainly doesn’t help the city when the diversion rates continue to remain stagnant because materials are disappearing. Not really an easy answer to the problem.

“...whether we should develop a Sustainability Plan. Seems like this was a big push several years ago but we haven’t heard too much about it recently. Did the concept fade out or should we look more seriously at it now?”

According to a national survey of U.S. cities and counties, thirty-two percent of local governments have adopted a Sustainability Plan! Does that surprise you? The survey indicated that nearly 68% of those who replied indicated those plans contain goals or strategies related to economic development. Other plan priorities include energy conservation and disaster mitigation. Sustainability Plans are holistic in nature, meaning the goals and strategies are crosscutting within the community. Consequently, it is not just a “public works” Sustainability Plan but it is an overall plan that involves public works and most other departments within a city/county. APWA has a strong emphasis on sustainability planning through the Center for Sustainability. Check out their web pages at www.apwa.net. For public works departments who are interested in developing more department-specific environmental management systems, the 8th edition of the Public Works Management Practices Manual addresses this role as part of the Accreditation process. A Click, Listen & Learn on this topic will be held on June 23, 2016. Check the education calendar for more details.
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