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What an outstanding group of people

Bo Mills, PWLF
APWA President

It has been a tremendous honor for me to serve as APWA President. What an outstanding opportunity this has been for me personally and professionally. Everyone has been so nice. My faith in our public works profession and the professionals who make it work is stronger than ever. What an outstanding group of people.

I began my term at PWX in Orlando, where I accepted the gavel from Ron Calkins. What great mentors he and Brian Usher are to me. The very next week, I visited with the Quebec Chapter in Rimouski for their fiftieth anniversary celebration and some celebration it was. I’ve been blessed to promote APWA in Washington, D.C. and to join chapters throughout our association for luncheons, educational sessions, awards banquets and officer swearing-in ceremonies. Representing APWA at the Institute of Public Works Engineers Australasia conference in New Zealand was certainly an outstanding opportunity for APWA and me. Eachvisit has been filled with tremendous hospitality and graciousness. I couldn’t have been treated any better. I’ve been amazed at how similar we all are, no matter the geography. We enjoy each other’s fellowship, share the same challenges and celebrate the same accomplishments.

It has been so gratifying to work with chapter leaders, committee members, an exceptional staff at APWA and our dedicated Board of Directors to accomplish much over this year. The Board of Directors created two new committees to conform to changing times. The newly created Young Professionals Committee, chaired by Eric Dundee from the Wisconsin Chapter, is off and running looking at our organization from the YP lens and promoting our association to young professionals like never before. Based on the importance of asset management to our profession, our Board of Directors transformed the Asset Management Task Force, created in 2016, into a standing committee. This Board of Directors, who has the heart of service to the entirety of our membership, has worked under Scott Grayson’s (APWA’s Executive Director) leadership to resolve several important issues over this past year. I am grateful to them for their leadership and preparedness creating a highly functioning Board of Directors. APWA is stronger than ever! You can help continue this momentum by volunteering at your chapter, by asking to serve on a committee or by sharing your expertise as a speaker. We are better when we diversify. APWA needs you.

I want to thank the entire membership, the Board of Directors, APWA staff (especially Scott Grayson, who I have leaned on throughout this year), and the chapters for giving me this blessed opportunity. This has certainly been a career pinnacle for me and will certainly stand as a high point in my life.

Thanks,
Bo
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Mission Statement: The American Public Works Association supports those who operate, improve and maintain public works and infrastructure through advocacy, education & member engagement.

BOARD OF DIRECTORS

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www.apwa.net / August 2018 / APWA Reporter
The APWA Utilities and Public Rights-of-Way (UPROW) Committee is one of APWA’s most active Technical Committees. The committee was established as the result of a task force report identifying the need for clarification of common issues arising from the use of the public rights-of-way and provides a forum where diverse stakeholders come together to discuss best management practices, peaceful integration of all users of the rights-of-way and other common issues. The committee provides education and information to help raise awareness about and promote damage prevention and the best use of the public rights-of-way.

Every year the committee provides technical sessions at PWX, sponsors educational Click, Listen & Learn programs, and provides the APWA Reporter with informative articles for the August issue.

The UPROW Committee will sponsor three sessions at PWX this month:

- “The Perfect Storm” on Tuesday, August 28, 2:00-2:50 p.m.
- “UPROW: What Lies Below is What We Know!” Monday, August 27, 2:00-2:50 p.m.
- “Are You Managing Your Rights-of-Way, Or Are They Managing You?” Sunday, August 26, 4:00-4:50 p.m.

In addition to the PWX educational sessions, committee members have been busy writing articles for this edition of the APWA Reporter. Articles submitted or sponsored by the committee include:

- “Utility Coordination Committees: Maximizing Collaboration and Coordination Long Before You Dig” – Rouen Liu
- “Trenchless Technology Innovations Benefit All of Us” – Michael J. Willmets

This spring, the committee presented a Click, Listen & Learn which is available in the Members’ Library, “Got Right-of-Way? UPROW Can Help.” This educational and informative program provides an overview of the UPROW Committee, and how to establish one in your chapter.

If you are interested in matters related to utilities and public rights-of-way, you may want to consider joining an UPROW subcommittee. There are currently three subcommittees with open membership. You may apply directly to the subcommittee and do not need to fill out an application or go through the appointment process. The sub-
Join us for a look at GIS/Mapping through the perspective of different lenses including Public Works and Industry. Leaders in each field will participate in a panel discussion and answer APWA member questions.

To register for this free program visit: www.apwa.net/events
The City of West Linn’s journey to APWA Accreditation

Morgan Coffie, Public Works Management Analyst & Accreditation Manager, City of West Linn, Oregon

Why APWA Accreditation?
Throughout his career in Illinois, Arizona, and now Oregon, the City of West Linn’s Public Works Director Lance Calvert, P.E., has used the APWA Accreditation manual as a benchmark for agency self-assessment. Mr. Calvert believes any agency can use the manual in this way even when not pursuing formal accreditation. After an initial self-assessment, he believed that the City of West Linn Public Works Department was firmly on a path to pursue and achieve full accreditation status amounting to a significant professional achievement for the city and department. In 2015, the Public Works Director decided it was time to put his vision of APWA accreditation into action. Being distinguished as an APWA-accredited agency not only positively impacts the view of professionalism within the agency, but also provides the opportunity to clarify budget and staffing restraints, identify operational needs and/or outdated or inefficient practices, and provides validation of procedures utilized during times of conflict or emergency.

Planning for success
The City of West Linn Public Works Department includes four divisions (Water, Streets, Environmental Services, and Engineering) which are responsible for all maintenance of streets, water, storm, sanitary sewer utilities, all city equipment and vehicles, the city’s Geographic Information System, all developer improvement projects within the public right-of-way, city-funded capital projects, and right-of-way management including all utility franchise agreements. The Public...
Works Department provides these services to a community of 26,000 residents, which is a suburb of Portland, Oregon.

With residents’ demands for high levels of service provided to the community, and limited staff funding, it was imperative to approach the goal of accreditation with realistic expectations. Our first step was to establish a reasonable overall timeline with several attainable benchmarks along the way. By identifying subject matter experts in each area applicable to the city, we were able to do a simple “audit” of the APWA chapters and practices to determine what the city had existing in place, and what needed to be developed. A schedule and matrix was developed to track staff’s progress in the development of new documentation. Staff set aside two to four hours per week to focus on accreditation assignments. Tasks were distributed as equally as possible among staff to avoid burnout among individuals and/or divisions. Management Analyst Morgan Coffie was assigned the duties of the Accreditation Manager with the task of compiling all documentation and keeping other assigned staff on schedule.

Early challenges
In all honesty, while staff could see the long-term benefit of receiving accreditation, it wasn’t always easy to motivate people to take on the additional responsibility or to prioritize accreditation assignments while simultaneously keeping up the same standard of services our community has come to expect. Overall project timelines had to be adjusted on more than one occasion due to unexpected extreme winter weather, changes in city administration, and other various challenges. Luckily, the Public Works Director anticipated that we would encounter some bumps along the way and did not let them deter us.

Keeping the project moving
It is always a challenge to keep people motivated and moving forward when projects span the course of over a year. It is easy to lose focus and procrastinate when your deadline looms far in the distance. However, staff persevered. Regular check-in meetings were held as a group to review overall progress, and individual meetings were held with key staff in need of additional support. Having a consistent staff member assigned as the Accreditation Manager provides a point person for staff to go to with questions, concerns, and suggestions which is also a vital component of ensuring the project moves forward. In addition, having support from the City Manager and City Council for the project adds validity to the effort, particularly when engaging other departments outside of Public Works.

The finish line
In April 2018, after close to three years of work, the city hosted APWA Accreditation evaluators with the end goal of receiving formal accreditation status. After multiple days of review, including multiple employee interviews, the City of West Linn officially became the 139th agency in North America, the fourth in the State of Oregon, and the first in the Portland Metro area to receive the designation of national accreditation by APWA.

Where to next?
The City of West Linn sees APWA Accreditation as a starting point, not an ending. The process of self-assessment and agency improvement aligns with our Public Works Value Statement which dictates that we work continuously to improve. Moving forward, we are developing a Standard Operating Policies and Procedures (SOPP) Manual to integrate all we learned and documented through the APWA Accreditation process. In addition to providing transparent policies and procedures to all staff, citizens, and elected officials, development of a formal SOPP will foster our long-term goal of tracking changes and keeping practices and policies up-to-date in order to make our APWA reaccreditation in 2022 as smooth as possible.

Morgan Coffie can be reached at (503) 722-3431 or mcoffie@westlinnoregon.gov.
Small municipalities must be creative in order to stretch their resources so they can serve their communities efficiently and effectively. One way communities are doing this is through partnerships with outside organizations; they can benefit from working with others who have the resources available. Partnering organizations with common goals can effectively work together, either in a formal or informal arrangement.

Partnerships between organizations can take on different forms. A few examples could include:

- Cities and counties may choose to share resources with one another, especially during emergency management operations. Communities may take this partnership a step further with an expanded Emergency Management Operations Manual and Mutual Aid Agreements that outline the duties of each organization during specified emergencies.
- Cities may outsource the maintenance of their sports fields with private entities (private sports teams) in exchange for the use of the fields at a reduced rate. Teams may have a preference for the quality of the sports fields that are beyond the ability and time available to the city maintenance crew. Shifting the responsibility to the private entity to maintain the field creates a mutually beneficial partnership.
- Cities may collaborate with neighboring communities by contracting with a single contractor for asphalt/concrete for their street maintenance programs to obtain reduced mobilization costs and lower unit prices.
- Small cities with limited staff may need occasional services of a construction inspection, but may not have enough active construction projects to justify having a dedicated employee. Cities can contract with another city or private consulting firm to share employees or services, instead of employing a full-time employee.
- A city can contract with their county to utilize expanded software and support services for Geographic Information Systems (GIS), especially if they don’t have the software or staff support available.
- Cities may have contracts to share specialty equipment. For small cities, it is expensive to purchase specialty equipment, such as a cracksealing machine, that may only be used during certain times of the year. Rental of the equipment may be costly. If a city chooses to purchase the
equipment, they can provide the equipment to other communities at a cost, to recoup a portion of the cost of the equipment, while also providing savings to surrounding communities.

• Joint efforts on grant applications score better when cities collaborate with other entities, expanding the scope of the project. Adjacent cities can submit a joint grant application to improve different segments of a roadway that crosses jurisdictional boundaries.

For certain types of partnerships, an agreement will be necessary to spell out the terms and conditions of the partnership arrangement.

• **Contract Term:** The partnership agreement may be limited to a period of time. Some agreements may be initially set for a one-year term, especially if it is a new partnership with an unknown entity. This gives both organizations the ability to “test the waters” to see if the partnership is mutually beneficial. With subsequent contract renewals, longer terms can be specified.

• **Contract Renewal:** Some agreements may be short term and include a defined timeline with an expiration period. Other agreements are long term with the renewal process outlined. The agreement may renew automatically or outline a specific action required in order to renew the agreement.

• **Contract Termination:** Agreements should include an “out” for both parties. If the partnership no longer benefits the parties involved or one party is in breach of the contract, there should be language included in the agreement for the parties to terminate their contractual arrangement. There is typically a notification period necessary to terminate the partnership agreement, which can be initiated by either party.

• **Contract Fee:** Depending on the agreement, there may be an exchange of a fee for the service requested to be included in the agreement. Consequences for failure to pay the fee should also be included in the termination clause.

• **Action Required:** There may be specific duties necessary for one or both parties to complete for the duration of the agreement. The scope of those duties should be outlined in the agreement, broken down by task and milestone dates.

Not all arrangements are perfect when it is all said and done. Both parties need to make sure their best interests are being served, either with a service or a monetary compensation. As with any contractual relationship, there needs to be controls in place. Both parties need to monitor the arrangement to make sure that it continues to be mutually beneficial. If at any time the arrangement is not mutually beneficial, be prepared to act accordingly. The agreement has a termination clause for a reason; don’t be afraid to use it.

When agreements between organizations, public or private, work as they should, they become an asset to the community. These partnerships are able to relieve unnecessary labor hours and added expenditures from small cities with limited resources, allowing mutual benefit to the area as a whole.

Alysen M. Abel will have a panel discussion on this topic at PWX 2018 in Kansas City, Missouri. Her session is entitled “Small Cities/Rural Communities Perspective: Leveraging Public/Private Partnership” and takes place on Monday, August 27, at 3:00 p.m. The panel discussion will highlight strategies implemented by small communities to benefit the bottom line. Alysen can be reached at (816) 741-7676 or AAbel@parkvillemo.gov.

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Are we fatigued by the terms diversity, heterogeneity, inclusion, integration, understanding, and so on?

Ram Tewari, Ph.D., Pembroke Pines, Florida; Member, APWA Diversity Committee

With more than 100 articles published in the APWA Reporter on the topics of “diversity” and “inclusion,” I was struck with the amount of writer’s block. What new spin on these themes could I write for the Reporter? The June issue’s Diversity and Inclusion Committee article was titled “What does diversity mean to you?”

Therefore, I am venturing to ask several different questions in this article. Is there a lack of clarity on diversity and inclusion and other associated terms, i.e., EEO, discrimination, ADA, bias? Also, is there a lack of interest, enthusiasm, or concern about training and more initiatives? And, who is responsible for implementing these policies that would raise awareness and acknowledgement in the workplace? Human Resources?

It is true that defining “diversity” is an ever-changing challenge because our nation is becoming more diverse by the year. The United States has become more ethnically and racially diverse over the past century and is expected to continue this trend well into the latter half of the 21st century according to Pew Research Center’s recent demography-related findings. The emerging globalization has led to a critical need for a greater understanding of the role that national and cultural differences play in conducting business in our great country and around the world.

As of 2015, 14% of the U.S. population is foreign born, compared to just 5% in 1965. Nearly 39 million immigrants have come to the U.S. since 1965, with most coming from Asia and Latin America. The 2015 Census Report predicts that the percentage of the U.S. population that is foreign born will continue to increase, reaching 19% by 2060. This increase in the foreign-born population will account for a large share of the overall population growth.

By mid-century, it looks as if the United States (present population of 326 million) may become a majority-minority nation, a place where whites make up less than half the population; while African-Americans, Asians, Hispanics, and other minority groups together—no single racial or ethnic group—will be more than 50% of the total population. The country’s racial profile will be vastly different.

Think who we are and how we are being the same and yet being different? Yet, “not like us” thinking still prevails.

Now, while you are thinking, let me focus on the diversity of the APWA membership. APWA serves professionals in all aspects of public works—a fact that sets us apart from other organizations and makes us an effective voice of public works throughout North America. With a worldwide membership over 30,000 strong, APWA includes not only personnel from local, county, state/province, and federal agencies, but also private sector personnel who supply products and services to those professionals. APWA has 63 chapters in North America, including eight chapters in Canada.

The mission of the charter of APWA’s Diversity and Inclusion Committee is advancing diversity issues throughout the association, placing value on all individuals and the different perspectives of those individuals, and promoting the process for all to feel included as part of the whole. The mission statement lists twelve principal objectives to achieve the mission.

The committee aims to advance diversity and inclusion issues by placing value on all individuals and the different perspectives of those individuals and promoting the process for all to feel included as part of the whole. For the committee’s deliberations, the terms “diversity” and “inclusion” include dimensions of race, ethnicity (multi-culturalism), national origin, religious beliefs or other political and social ideologies, gender, sexual orientation, creed, age (geodiversity), lifestyle, functional diversity (physical abilities/disability), height/weight, educational background and socio-economic status (income level).
We have all heard that a diverse workforce enables employers to better utilize employees and serve their customers. So, the question that arises is, “What are the best practice(s) for using diversity and inclusion in a workforce to enhance overall organization performance?” Are there any tried-and-true approaches? Are there any standards for diversity and inclusion?

We have been told that diversity management alone is insufficient for improving workplace performance. What is required instead is an approach that ultimately promotes greater inclusion of employees (especially women and minorities) in ways that take their views into account and promote their self-esteem; to be aware of the complex and important relationship between national cultures of the workforce and organizational culture, while communicating adaptability, dedication, values, and common goals.

If you’re looking for resources for propagating the mission of the Diversity and Inclusion Committee for feedback (survey), new ideas, strategy and creative approaches for training and performance improvement, a great resource is the APWA Council of Chapters. The Council of Chapters is comprised of one delegate from each of the 63 APWA chapters spanning all the U.S. and Canada.

Members of the council serve APWA as advisors to the Board of Directors, Executive Director, Technical Committees, and staff in support of the mission of APWA in accordance with the association’s bylaws and parliamentary procedures. Delegates also act as a conduit in sharing the opinions and ideas of their chapters and serving as points of contact at the local (chapter and branch), regional, and national levels for the dissemination of information to and from members.

It is noteworthy that APWA works with many organizations and groups. In some cases, APWA has formal partnership agreements for advocacy or sustainability activities, or for the international exchange of information and best practices. It will be worthwhile to know the “diversity and inclusion” policies of these organizations and groups.

Therefore, my suggestion is to contact these organizations and groups about their policies and successful implementation of the same.

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

Resources:


Articles on diversity from the APWA Reporter; SHRM Survey 2013 Findings: Diversity and Inclusion

www.apwa.net / August 2018 / APWA Reporter 11
Emerging Leaders Academy: Making relationships to last a lifetime

Connie Hartline, Editor, APWA Publications, American Public Works Association, Kansas City, Missouri

Travis Laughlin is a young man on the rise in the Lincoln, Nebraska, Public Works and Utilities Department. Ten years ago, “public works” would not have been his answer if an interviewer had asked, “Where do you see yourself ten years from now?” But after a recent promotion to district supervisor (after another fairly recent promotion), dealing with asset management issues, and with eight years of public works experience, “public works” is his answer now—and he gives APWA’s Emerging Leaders Academy (ELA) much of the credit.

With thoughts of becoming a teacher, Travis started college in 2008, but by the summer of 2010 he had changed his major and decided to start working full-time while figuring out the future. Fortunately, the Lincoln public works department was looking for laborers, so Travis applied and literally got to start his public works career on the ground floor.

During that time, while he worked full-time and also went to college full-time, Travis also found time for a wife and two children. Ultimately, Travis graduated from the University of Nebraska-Lincoln in 2016 with a bachelor’s degree in applied sciences.

One of Travis’s stated goals is “to never stop learning,” which he seems to be faithfully pursuing. For instance, as a result of his first contact with APWA at the 2016 North American Snow Conference in Hartford, Connecticut, he went to the APWA website to look around. There he saw an opportunity not only to improve himself, but also to benefit the approximately 30 people he supervises, and to better assist the department in getting its “ducks in a row” as it goes through APWA’s accreditation process.

The ELA program accepts 16 candidates each year. This year’s Academy, of which Travis is a member, is in its 11th year. The year-long national program provides intensive leadership and management training within the context of public works. It encourages professional growth through a strong network of peers. Candidates must be professionals who have been working in the field of public works for not more than ten years or have been working for longer than ten years but have been promoted into their first leadership role within the past three years. They must also have demonstrated an interest in advancing their careers within the profession.

One of the newly acquired skills Travis attributes to the Academy is his demonstrated ability to interview effectively for jobs within his own agency. He is also working with his classmates on this year’s class project, “Agents of Change – Evolving Public Works in a Changing World.” The project gives each year’s class the chance to examine issues surrounding leadership in public works and culminates with a presentation at APWA’s PWX. Travis believes that not only does he personally benefit from the in-depth approach to the project and other areas of the program, but he also is able to share some of the information with the people he supervises.

Most of all, though, the greatest benefit Travis identifies is the networking aspect of the Academy. He and his 15 classmates regularly interact throughout the year, but he doesn’t expect those relationships to cease upon graduation at PWX 2018 in Kansas City in August. Being able to pick up the phone or send an e-mail to ask questions of the other professionals from all over North America is something Travis expects will last a lifetime.

Connie Hartline can be reached at (816) 595-5258 or chartline@apwa.net.
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One Machine – One Operator – Endless Applications
Awards 2018

PWA’s Awards Program recognizes outstanding individuals, groups and chapters representing the best in public works.

In the April issue of the APWA Reporter we announced the recipients of the Excellence in Snow and Ice Control Award; in the May issue we announced the recipients of the Top Ten Public Works Leaders of the Year Award; and in the July issue we announced the recipients of the Public Works Projects of the Year Award. In this issue we announce the rest of this year’s award winners, recognizing their achievements in excellence demonstrated by their vision, passion and delivery of service to their communities.

Myron Calkins Young Leader Award
The Myron Calkins Young Leader Award recognizes and encourages young APWA members who have demonstrated an initial commitment to the profession and the association and show potential for future growth within the association. The award promotes the concept that length of career does not necessarily indicate leadership abilities or potential for service.

Daniel “Scott” Goforth, P.E.
Transportation Project Manager
HDR Engineering, Inc.
St. Louis, Missouri

For the past five years, Daniel “Scott” Goforth, Transportation Project Manager with HDR Engineering, has been a major part of the growth for the Young Professionals Committee as well as the entire Missouri Chapter. Goforth took an idea about starting the Young Professionals Committee and grew it into a committee that serves as a path for dozens of new young professionals to grow their career in the Missouri Chapter as well as the engineering community. Due to his leadership, the chapter’s membership numbers are at record numbers as the majority of new members are young professional engineers.

Goforth serves as an experienced highway engineer and project manager. He is skilled in trail, ADA, roadway, bridge and stormwater drainage design. He has served as lead project engineer on transportation improvement projects from municipal streets to large, multi-discipline highway projects with construction costs ranging from $0.5 million to $5.5 million. He has directed and supervised others while overseeing the design process on both local public agency and Missouri Department of Transportation projects. Goforth successfully delivers projects that require preliminary, right-of-way and final design submittals on schedule and within budget by understanding strengths of his team members and delegating accordingly.

Joline McFarlane
Operations Programs Coordinator
City of Airdrie, Alberta

Early in 2016, Joline McFarlane was promoted to the position of Operations Programs Coordinator of the Water Services Department for the City of Airdrie, Alberta. She leads an eight-member team in five distinct technical areas: Industrial Monitoring Laboratory; Asset Management; Sewer Pipe Inspections; Stormwater Management; and Underground Buried Utility Locates. She is responsible for mentoring, work planning, performance evaluations, and professional development of her team. She also assists in developing operating and capital budgets and makes recommended improvements for short- and long-range planning.

In the past few years, McFarlane has gained hands-on experience working in two disasters in Alberta: one in High River (2013) and the other in Fort McMurray (2016). During the floods in Southern Alberta, McFarlane was deployed to High River. There she was the Camp Manager and ensured that all Emergency Operations staff had a place to sleep at the end of the day. During the Fort McMurray wildfires, she filled the role as a GIS Technician in the Planning Section. She was responsible for producing maps for emergency responders and working with industry liaison personnel. For both of these deployments, McFarlane mobilized with very little notice and was gone for more than a week.

Ryan Petersen
Inspection Manager
Charleston County Public Works Department
North Charleston, South Carolina
In 2017, Ryan Petersen was promoted to his current position as the Inspection Services Manager of the Engineering Department for the Charleston County, South Carolina, Public Works Department. In addition to his daily responsibilities within public works, he also plays a vital role in the department’s emergency management planning and recovery for natural disasters. In the past four years, he has been a vital component to the department’s recovery efforts on a ten-thousand-year flood event and two named hurricanes that devastated the Charleston area. Petersen’s skill set was a benefit to the region as his GIS mapping capabilities and strong management skills not only benefitted his department but neighboring jurisdictions as well.

Petersen’s strong work ethic and commitment to the public works profession has carried over for the benefit of APWA. His contributions to the local and state chapters in South Carolina have been vast since joining APWA in 2013. He has been involved in some fashion with every South Carolina-hosted APWA event since 2013 and continues to strive within the professional community. Most recently, Petersen was the lead chairperson for the Conference Registration Committee. This was a large undertaking and the first time in conference history the registration was handled internally by volunteers from the SC APWA family.

**Professional Manager of the Year Award – Administrative Management**

The Professional Manager of the Year Award in Administrative Management seeks to recognize outstanding achievement in the area of administration within the public works department and to inspire excellence and dedication in the public sector by recognizing the outstanding career service achievements of administrative professionals.

**Florinda O. Langilotti**

Operations Manager
City of Pasadena, California

Florinda O. Langilotti has been with the City of Pasadena for 17 years and is now the Operations Manager for the Department of Public Works. Her extensive experience in her various managerial administrative positions...
throughout Southern California prepared her to be an asset to her city in her new position. She now oversees 69 full-time employees and an operating budget of approximately $20.7 million.

Langilotti has developed and implemented an organizational-wide centralized fleet replacement program, developed and implemented a computerized maintenance management system (Lucity), and conducted a comprehensive maintenance optimization study. She has also led building automation upgrades and helped facilitate coordination of the staff to support the Rose Bowl. She further implemented a number of recommendations from the maintenance optimization study to improve maintenance operations and reduced the Fleet Maintenance Division overtime by 172% over the past four years. Langilotti has also implemented major construction upgrades to the Citywide Compressed Natural Gas fueling station.

**Professional Manager of the Year Award – Engineering and Technology**

The Professional Manager of the Year Award in the Engineering and Technology category recognizes the outstanding career service achievements of engineering and technology professionals. The primary focus of this award is the recognition of exceptional leadership and management in the area of engineering and technology.

**Alexander K. Bardow, P.E.**

Director of Bridges and Structures
Massachusetts Department of Transportation
Boston, Massachusetts

Alexander K. Bardow has been demonstrating outstanding leadership as the Massachusetts Department of Transportation (MassDOT) State Bridge Engineer for 23 years. He ensures that the bridges of Massachusetts are safe, making final decisions on structural matters as they relate to MassDOT bridge policy and that MassDOT goals, as they relate to bridges, are met. He supervises and manages all operations of the MassDOT Bridge Section including developing MassDOT bridge design policy and standards. He oversees the operation of the MassDOT Statewide Bridge Inspection Program, ensures its compliance with federal highway standards, and determines the safe load posting for MassDOT and municipal bridges.

Bardow also interfaces with the six MassDOT Districts regarding bridge-
related matters, provides structural advice to the MassDOT Construction Division, coordinates all federal aid activity with the Federal Highway Division Bridge Engineer, serves on the MassDOT Specifications, and acts as the MassDOT representative to the American Association of State Highway and Transportation Officials (AASHTO) Subcommittee on Bridges and Structures. When the Central Artery Tunnel ceiling collapsed in 2006, Bardow was appointed by then-Secretary of Transportation John Cogliano to lead the design of the repairs and the remediation of the entire ceiling system in the I-90 Connector Tunnels.

Arthur Goodhind, Supervisor, Land Facilities and Natural Resources Division Department of Public Works Town of Natick, Massachusetts

program to set planting priority locations based on percent canopy cover and impermeable surfaces.

Goodhind has also established field use policies that have promoted new ideas and communication efforts for all stakeholders and the Natick DPW to improve user experience with both operational changes and capital projects. He was a co-coordinator of the Natick Healthier Lawn Initiative, working in collaboration with the Town’s Sustainability Coordinator. Goodhind serves as Treasurer and Trustee of the New England Sports Turf Management Association, is an Executive Board Member of the Massachusetts Tree Wardens and Foresters Association, and is the Massachusetts State Liaison for the Society of Municipal Arborists.

Professional Manager of the Year Award – Facilities and Grounds
The Facilities and Grounds Professional Manager of the Year Award recognizes the outstanding career service achievements of facilities and/or grounds management professionals. The primary focus of this award is the recognition of exceptional leadership and management in the field of facilities and/or grounds.

Kevin Rogers, Fleet Manager County of Forsyth Winston-Salem, North Carolina

In his role of Fleet Manager for the County of Forsyth, North Carolina, Kevin Rogers is responsible for managing and directing the operations of the County’s Fleet Services Division which consists of 600-plus assets. This is accomplished by managing the maintenance operations, monitoring fleet maintenance cost, purchasing of vehicles and equipment, advising other departments of potential replacements while maintaining best practices in the area of rightsizing and efficiency, researching new technologies, and serving on committees in the county to further improve the efficiencies and safety of the employees. Rogers also provides management, leadership, and professionalism through staffing, directing, coordinating, reporting, and budgeting decisions to support the provision of services through the Fleet Services Division.

Rogers is always seeking opportunities to develop professional and technically. His active participation in the APWA North Carolina Chapter as a member and a director on the Equipment Services Board has offered a variety of growth and development options for him and he has taken advantage of every feasible opportunity that has come his way. His active involvement in the North Carolina Chapter has afforded him opportunities to present his experiences on a broader platform as he is sought by vendors to share his story of implementing products and strategies. The most recent occurrence of this was in June 2017 at the chapter’s Annual State Conference in Greenville, North Carolina.

Tod Fagan, Manager, Right-of-Way Spire St. Louis, Missouri

In his role of Fleet Manager for the County of Forsyth, North Carolina, Kevin Rogers is responsible for managing and directing the operations of the County’s Fleet Services Division which consists of 600-plus assets. This is accomplished by managing the maintenance operations, monitoring fleet maintenance cost, purchasing of vehicles and equipment, advising other departments of potential replacements while maintaining best practices in the area of rightsizing and efficiency, researching new technologies, and serving on committees in the county to further improve the efficiencies and safety of the employees. Rogers also provides management, leadership, and professionalism through staffing, directing, coordinating, reporting, and budgeting decisions to support the provision of services through the Fleet Services Division.

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Professional Manager of the Year Award – Public Right-of-Way
The Professional Manager of the Year Award in the Public Right-of-Way category recognizes the outstanding career service achievements of public right-of-way management professionals. The primary focus of this award is the recognition of exceptional leadership and management in the field of public sector fleets.

Professional Manager of the Year Award – Public Fleet
The Professional Manager of the Year Award in the Public Fleet category recognizes the outstanding career service achievements of public fleet management professionals. The primary focus of this award is the recognition of exceptional leadership and management of public sector fleets.
Tod Fagan has worked at Spire (formerly Laclede Gas Company) for more than 33 years. He spent his first 16 years installing new gas lines and relocating existing lines for municipal road reconstruction projects in the St. Louis, Missouri area. For the last 17 years, he has served Spire in the right-of-way department in different leadership roles. Starting as a Senior Right-of-Way Representative, Fagan secured easements and municipal excavation permits daily. After just two years in that role, he was promoted to the Manager of Right-of-Way and has served in this role ever since. He currently oversees the securing of easements and permits, and serves as the municipal liaison with the public works departments in Spire’s communities.

Fagan has incorporated his right-of-way management system to the newly-acquired companies to improve customer service with the public works departments he serves. This has shown immediate improvements with coordinating Spire’s accelerated pipeline replacement work with municipal street maintenance work. Conflicts with work schedules have reduced significantly, leading to a much-improved experience for the right-of-way users.

Robert Beaudoin is the Superintendent of Environmental Services for the Town of Lexington, Massachusetts. His focus on municipal solid waste and recycling service began in 1997 working as a regional recycling coordinator for 34 towns in northeast Massachusetts, prior to transitioning to the Pay-As-You-Throw (PAYT) Coordinator in 2001 for the Town of Lexington. He subsequently served as Lexington’s Solid Waste and Recycling Coordinator, prior to his appointment as Superintendent of Environmental Services for the Town’s Department of Public Works in 2005.

As Superintendent of Environmental Services, Beaudoin is responsible for a variety of environmental services including the curbside refuse and recycling contract and the management of the Lexington Compost Facility at Hartwell Avenue. Under his guidance, the Hartwell Avenue site has been transformed from the Town’s old landfill into a residential drop-off and recycling center, the first regional household hazardous product facility in the Commonwealth, the DPW’s construction material storage yard, and a municipally-operated compost facility that annually converts 50,000 cubic yards of residential and commercial yard waste into more than 20,000 cubic yards of finished soil and compost products that generate more than $500,000 in revenues annually.

David Coyle has extensive and diversified leadership experience in transportation management. He has served in state, county, and local government agencies during his 38-year career in the public sector. He has also served honorably in the United States Air Force. Coyle is currently the Assistant Director of Field Operations at the Ohio Department of Transportation (ODOT). In addition to supervisory responsibilities of the twelve District Deputy Directors, he is also accountable for the Maintenance Operations, Facilities, Operations, and Equipment Management Divisions of ODOT.

By employing employee engagement techniques, Coyle has routinely challenged the workforce under his direction to take chances, be empowered, and offer solutions either through quality-based teams or suggestions to improve the organization. When he was ODOT District Deputy Director of District 12 (Cuyahoga, Lake and Geauga Counties) in Northeast Ohio, he developed Focus Reports for the Executive Leadership team consistent with the strategic plan, creating accountability for all career professional managers. These Focus Reports enabled the exempt employees with the assistance of all bargaining unit employees (a total of 450) to meet or exceed all 64 Organizational Performance Index goals.

Professional Manager of the Year Award – Solid Waste
The Professional Manager of the Year Award in the Solid Waste category recognizes the outstanding career service achievements of solid waste management professionals. The primary focus of this award is the recognition of exceptional management, operation and maintenance of public sector solid waste operations.

Robert Beaudoin
Superintendent of Environmental Services
Town of Lexington, Massachusetts

Professional Manager of the Year Award – Transportation
The Professional Manager of the Year Award in the Transportation category recognizes the outstanding career service achievements of public transportation professionals. The primary focus of this award is the recognition of exceptional leadership and management by an individual through a significant transportation-related project or program.

David Coyle
Assistant Director, Field Operations
Ohio Department of Transportation
Columbus, Ohio

Professional Manager of the Year Award – Water Resources
The Professional Manager of the Year Award in the Water Resources category
recognizes outstanding career service achievements of water resources professionals.

**Paul Burris**  
Utility Operations Manager  
City of Elmhurst, Illinois

Paul Burris, Utility Operations Manager for the City of Elmhurst, Illinois, is one of the few water, wastewater and stormwater operator/managers to be licensed in multiple states. He is certified at the highest levels for both water and wastewater in Arizona, Illinois, Indiana, Nevada and New Jersey. He also holds water certification in Michigan for S1-D1 and certification in Michigan for Stormwater Management. Burris has a career that spans 30 years and is highly respected throughout the water/wastewater and public works communities. He is a tireless advocate of water professionalism and licensing, and works to develop positive long-term solutions to challenging problems within all the stakeholder communities he has been associated with.

Burris is a champion of employee certification and licenses for water and wastewater in Elmhurst (high success rate so far) plus other past organizations. He teaches water and wastewater classes for Southern Illinois University at Edwardsville to coach and mentor others in this field. He has taught classes and made presentations at APWA, ISAWWA, MWEA, CSWMA and NEWA to provide mentoring, coaching and training to others in this field.

**Donald C. Stone Award for Excellence in Education – Individual**

The Donald C. Stone Award for Excellence in Education (Individual) was established in honor of Donald C. Stone, founder of APWA. The award recognizes outstanding and meritorious achievement of individuals assisting in the areas of continuing and graduate professional education for public works professionals.

**James B. Martin, P.E.**  
Associate Director, ITRE; Director, NC LTAP  
ITRE/North Carolina State University  
Raleigh, North Carolina

James B. Martin is Associate Director of the Institute for Transportation Research and Education (ITRE) at North Carolina State University (NCSU) in Raleigh. He is also Director of the North Carolina Local Assistance Program (NC LTAP) and the North Carolina Airport Technical Assistance Program (NC AirTAP) located at ITRE. A registered Professional Engineer, Martin holds bachelor’s and master’s degrees in civil engineering from NCSU. He is active in APWA at the state and national levels, and also serves on several Transportation Research Board committees including Maintenance and Operations Personnel (AHD15), Environmental Analysis (ADC10), and Ecology and Transportation (ADC30).

Martin has been both an LTAP instructor and program administrator at the state, regional and national levels for more than 30 years, and has served as NC LTAP Director since 1990. Throughout his tenure with LTAP, he has contributed greatly to the professional development of public works employees in North Carolina and the nation. NC LTAP is one of 59 LTAP centers nationwide established by the Federal Highway Administration (FHWA) in 1982 to help local agencies tap into new technology, information and training so they can operate more efficiently and safely. Martin was instrumental in bringing LTAP to North Carolina in 1986 as one of the first state centers to be organized.

**Community Involvement Award**

The Community Involvement Award recognizes public works leaders who are also leaders in their community; encourages public works professionals to become active leaders in their community; and ensures public trust in public works professionals through recognition of outstanding community leadership.

**John Keaven, P.E.**  
Project Manager  
Crawford, Murphy and Tilly, Inc.  
St. Louis, Missouri

John Keaven, Project Manager with CMT in St. Louis, Missouri, began his community involvement work as a member of the St. Louis Branch Advocacy and Outreach Committee in 2015; soon after he became the chairman of the committee in 2016 and still continues to be the chairman to date. His work includes organizing and overseeing events and projects such as working with kids and students at The Little Bit Foundation, packing and distributing food at local food banks, and raising funds for the branch’s annual adopt-a-family program as well as many other volunteer programs. The original annual goal for the St. Louis
Branch adopt-a-family program was to adopt and provide Christmas gifts to one family. Over the past few years, Keeven has stepped up the awareness of the program that has helped raise nearly $5,000 per year and allowed the branch to adopt three families each year with much needed clothing, gifts and supplies.

The Advocacy and Outreach Committee also participates in the St. Louis Crisis Nursery’s Holiday Hearts Program to adopt several disadvantaged families each year providing gifts and other items during the December holiday season. Keeven organizes several raffles throughout the year to raise the funds necessary to support these families. Because of his leadership, the committee’s efforts and the generosity of the APWA membership, many families in the St. Louis area have had joyous holiday seasons.

Harry S. Swearingen Award for Outstanding Chapter Achievement and Excellence in Chapter Service – Individual

The Harry S. Swearingen Award recognizes outstanding individual achievement through chapter activity and achievement in support of APWA’s strategic plan, goals and objectives, as well as outstanding service to APWA as a public or private sector member at the chapter level.

Jeannine Clancy
Assistant General Manager, Technical Services Metropolitan Council Environmental Services St. Paul, Minnesota

Jeannine Clancy has served the Minnesota Chapter on numerous committees and as a member of the chapter’s Executive Committee, which culminated in her serving as chapter president. The chapter recognized her commitment when they designated her one of the co-chairs for the very successful PWX hosted in Minneapolis. She has promoted the chapter and APWA throughout the state, particularly with her efforts to encourage young professionals to become engaged in APWA at the chapter and national levels.

During the chapter’s Fall Conference, networking opportunities have been developed to raise the awareness of the need to support children during the holiday season with food, financial support, clothing and gifts. The chapter raised money for the Toys for Tots program, and was selected to be on KARE 11 TV (Minneapolis–St. Paul, NBC) to highlight the chapter’s donations. During the first year, Clancy ensured that the toys donated by the chapter were stored safely, that additional toys were purchased with donations, and that the toys were transported to KARE 11 studios.

President Colin M. Durante
President Pavement Technology, Inc. Westlake, Ohio

Colin M. Durante has been affiliated with public works his entire life. In 1971 he learned of a process that could allow local governments and their public works departments to inexpensively improve the overall condition of the customer Service, Integrity, and Technical Excellence. Since WSB’s inception, the company has remained committed to creating a culture of relationship building, forward-thinking and collaboration that enables technically advanced, thoughtful, and creative engineering and design solutions.

As a company that believes that strong partnerships between public and private industry bring success to everyone, WSB has remained committed to supporting the Minnesota Chapter for many years working together to advance the chapter’s mission to advance the theory and practice of the design, construction, maintenance, administration and operation of public works facilities and services. Opportunities to exchange ideas, learn best practices, cultivate and train the next generation of young professionals and work as a group to solve challenges are just a few of the reasons WSB has chosen to become deeply involved throughout the Minnesota Chapter at every level.

Presidential Leadership Award

The Presidential Leadership Award is presented by the APWA President to members who have distinguished themselves and the public works profession with their leadership.
Durante's idea worked very well, and his company is now in its 46th year. During these years he became involved with APWA on the state chapter level and became an annual vendor at the APWA national conferences. He understood the value of how APWA was helping to promote education and professionalism for public works employees and departments across the nation. As such he became more involved in the state chapters of those states where his company was doing business.

During the past 25 years Durante’s company has been a strong supporter and sponsor of many chapter activities and has had a presence at chapter conferences in Ohio, Tennessee, Kentucky, Georgia, North Carolina, South Carolina, Florida and other states. He has encouraged and supported many of his staff members as they served on committees or became officers in state chapters in Ohio, Tennessee and Florida.

Exceptional Performance Award– Adversity
The Exceptional Performance Award– Adversity recognizes exceptional performance in the face of adversity in service to the public.

Jonathan Beder
Director of Public Works
Town of Plymouth, Massachusetts

On December 19, 2015, the community of Plymouth, Massachusetts, experienced a catastrophic rupture of a 30-inch wastewater force main pipe behind the Sheriff’s Department near Exit 5 off Route 3. Under the direction of Jonathan Beder, Director of Public Works for the Town of Plymouth, the DPW immediately worked to address the rupture and the environmental issues resulting from the break. On January 27, 2016, the Town experienced a second break and on January 31, a third break occurred. This obviously created a crisis situation for the community as it impacted and could have stalled the main artery of the sewer system. Under Beder’s direction, repairs began on these sites immediately as well and continued with non-stop work to not only repair and replace the ruptured pipes, but also to establish a bypass system which would serve the affected residents.

Subsequently, Beder directed the DPW and outside consultants in designing and installing an entirely new system. All the while, he continued to maintain Plymouth’s infrastructure, attending to snowplowing, winter maintenance, and spring and summer repaving as well as general upkeep. He also presented necessary information and updates to the Town government, legislative delegation, and the residents of Plymouth. Beder was able to allay fears through a constant stream of communication, always keeping the Town’s government and residents aware of new developments and any neighborhood impacts caused by the repair work.

City of West Kelowna, British Columbia
The Public Works Department from the City of West Kelowna, British Columbia, was faced with a number of severe challenges as a result of extreme weather events in the spring.
and summer of 2017 including unprecedented flash flooding and continuous flooding for an extended period of time. The team demonstrated their ability to work hard and smart despite these extremely adverse conditions. The flood resulted in evacuations, threatened homes of the public, and closed roads.

The Public Works Department acted quickly with a confident and sustained “boots on the ground” response that lasted an astonishing 100 days without a break. The response also included strong partnership between the Public Works Department, Parks Department and the Fire Department. It is no exaggeration to describe these efforts, dedication, and hard work as unlike anything else that has been seen in British Columbia in recent history. The actions of the Public Works Department averted significant destruction, loss and damage and earned the heartfelt gratitude of their community.

Exceptional Performance Award—Diversity
The Exceptional Performance Award—Diversity recognizes individuals and organizations that have made outstanding contributions to diversity.

John Lozada
Manager of Federal Programs, Office of Diversity & Civil Rights
Massachusetts Department of Transportation
Boston, Massachusetts

For more than 30 years John Lozada has provided guidance, created programs, worked with community groups and public agencies, and has been a champion of diversity to ensure inclusiveness, fairness and equality for all. He has provided counsel to low-income residents on legal matters relating to housing, unemployment and consumer protection. While an attorney for the U.S. Department of Education, Lozada was working on complex investigations against discrimination claims based on race, color, national origin, sex, disability and/or age. His work has led to educational opportunities throughout the United States by working with colleges, universities, and agencies to help low-income Americans enter college and graduate school.

Lozada started his work with MassDOT in 2009 as the merged agency’s first Director of Civil Rights, where he led the restatement, implementation and oversight of affirmative action/equal employment and business opportunity programs. As Manager of Federal Programs, he directs enterprise-wide efforts to comply with Title VI of the Civil Rights Act and leads the transition plan development and implementation efforts under Title II of the Americans with Disabilities Act. As an attorney with extensive experience in government, administrative law, transportation, employment and education, Lozada has proved to be a major resource to MassDOT, the MBTA, public works professionals and the public.

Exceptional Performance Award—Journalism
The Exceptional Performance Award—Journalism recognizes exceptional performance in presenting the story of a public works issue or event that projects a positive image of individuals or agencies in the course of their performance in both broadcast and print mediums.

Addressing Citizen Requests for Traffic Safety Concerns Guidebook
Minnesota Local Road Research Board
St. Paul, Minnesota

City and county engineers often receive requests, complaints, and suggestions from residents about traffic and unsafe drivers. In many cases, citizens specifically ask a local agency to install traffic control measures, such as a stop sign, warning sign, or devices that indicate a crosswalk. Several requests are also made to change the speed limit. Not all jurisdictions

handle these citizen communications in the same way. In some cases, the concerns may not be routed to the right personnel within the agency. Other times, the agency may address the concern, but the public may not understand the rationale behind the action taken.

In light of these issues, the Minnesota Local Road Research Board developed the Addressing Citizen Requests for Traffic Safety Concerns guidebook to provide local agency staff with a best-practice approach to addressing citizens’ common requests for traffic safety concerns. This document was developed using guidance and experience from a technical advisory panel comprised of members who take calls from citizens each day and have learned what approaches work best. This guidebook specifically focuses on: the importance of communication; logging requests; steps for following up on a request; standard responses; and an explanation of why a requested strategy may or may not be the appropriate solution.

Exceptional Performance Award—Chapter Journalism
The Exceptional Performance Award—Chapter Journalism recognizes exceptional performance at the chapter level for their newsletters, magazines and/or other publications and broadcast mediums.

Chicago Metro Chapter
The Chicago Metro Chapter is always looking for ways to positively promote all the great things that public works agencies do on a daily basis. In the era of “viral videos,” the chapter tried to make a funny parody to a popular song in an attempt to educate the public about public works. The video sheds light on traffic control, detours, snow removal, water supply, flooding, mowing, sewer backups, leaf removal, tree maintenance, GIS mapping, technology improvements, roadway improvements, and customer appreciation. The “You’re Welcome” video has reached and educated many people with more than 30,000 views.

The Publicity and Communications
Committee (PCC) had been thinking of producing a fun video to post on the Chapter Facebook page since late 2016 which did not materialize. On September 22, 2017, Rachel Lange reached out to the PCC and suggested creating a thank-you video thanking public works based on the “You’re Welcome” song from the Disney movie Moana. Several parodies were made online using the song in different settings. The chapter reviewed the original lyrics and drafted a rough draft inserting public works-related themes. Filming began on November 6, 2017, at 9:30 a.m. and wrapped up by 4:00 p.m. On December 18, the chapter created a YouTube Channel and posted the “You’re Welcome” video. Link: https://www.youtube.com/watch?v=OLNnSI8EwWs&t

Exceptional Performance Award–Sustainability

The Exceptional Performance Award–Sustainability recognizes exceptional performance that demonstrates outstanding contributions to sustainability in public works. Sustainability is accomplished by the efficient delivery of infrastructure in an environmentally and socially responsible way that ensures the best choice in the long term.

Water Resources Division
City of Frisco, Texas
The Water Resources Division within the City of Frisco Public Works Department has achieved considerable operational success maintaining sound financial stewardship while responsibly balancing environmental and economic needs within the Frisco community. Because of the pioneering efforts made by the Water Resources Division, the North Texas Municipal Water District began recent installations of weather stations in other member cities by patterning a program after Frisco. Through the success of the utilization of the weather station data as the core for conservation programs, these water conservation efforts may now be achieved regionally on a larger scale.

Frisco Water Resources has also continued plans for expansion of their programs. Upcoming plans include the launch of a commercial irrigation program and launch of commercial conservation programs to aid restaurants, hotels, and shopping strips in the reduction of water consumption. These programs will involve working in tandem with Frisco’s Irrigation Inspectors and Senior Landscape Architect to ensure these commercial businesses are keeping irrigation systems in proper functioning repair to improve water efficiency.

Technical Innovation Award

The Technical Innovation Award recognizes an individual, team or organization for the development and implementation of a creative idea, device, process or system that enhances the goals of public works in serving the public and protecting the environment.

East Valley Arterial Travel Time Map Project
City of Mesa, Arizona
Anonymous Re-identification (ARID) sensors allow travel time and congestion information to be collected by matching the unique signature of Bluetooth or Wi-Fi enabled devices, such as mobile phones and in-car electronics. The City of Mesa, Arizona, had existing ARID sensors within its boundaries and sought to expand its network within the city. The City invited other East Valley cities to participate in the expansion project, to further grow the network in the region. New ARID sensors were installed in the City of Mesa, City of Tempe, and the Town of Gilbert. The ARID system allows information to be shared easily across agencies, benefiting the traveling public crossing through multiple jurisdictions.

The expanded ARID system automatically detects and alerts traffic operations staff of a suspected crash or other non-recurring events. If an increase in travel time is detected, indicating a possible incident, agencies can take corrective measures such as modifying signal timing. The expanded system was designed to be interoperable with Mesa’s previous system. In addition to real-time congestion monitoring, the data can also be used to evaluate signal timing modifications. Before/After analyses can be conducted to determine the effectiveness of timing modifications. The system data can serve as a tool for signal optimization and re-timing along a corridor.

APWA Awards Program

For more information about APWA’s Awards Program contact the Chapter Relations Department at (800) 848-APWA or rwilhite@apwa.net.
The purpose of the accreditation program is to provide a means of formally verifying and recognizing public works agencies for compliance with the recommended practices set forth in the *Public Works Management Practices Manual*. It is a voluntary, self-motivated approach to objectively evaluate, verify and recognize compliance with the recommended management practices. Accreditation offers a voluntary evaluation rather than government regulated activity, and increases professionalism while instilling pride among agency staff, elected officials and the community.

<table>
<thead>
<tr>
<th>Agency Name</th>
<th>Accreditation</th>
<th>City, State</th>
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<tbody>
<tr>
<td>Arapahoe County, CO</td>
<td>Accreditation</td>
<td>Public Works &amp; Development</td>
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<tr>
<td>Atlanta, GA, City of</td>
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<td>Clark County, WA</td>
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<td>Corinth, TX, City of</td>
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<td>Crystal Lake, IL, City of</td>
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<td>Little Elm, TX, Town of</td>
<td>Accreditation</td>
<td>Public Works: Utilities &amp; Institutional</td>
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<td>Alexandria, VA, City of</td>
<td>Accreditation</td>
<td>Transportation and Environmental Services</td>
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<td>Public Works and Transportation</td>
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<td>Edmond, OK, City of</td>
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<td>San Francisco, CA, City and County of</td>
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<td>Topeka, KS, City</td>
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<td>Virginia Beach, VA, City of</td>
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<td>Public Works</td>
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CALL FOR PRESENTATIONS

HAVE A GREAT SOLUTION TO SHARE?

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www.apwa.net/2019cfp
PWX — THE 2018 CONFERENCE YOU DON’T WANT TO MISS!

PWX provides a first-class multimodal learning experience designed for professionals at all levels and across the entire spectrum of public works. Come prepared to see, hear, touch, and discuss in a variety of traditional and interactive sessions, seminars, workshops, and networking opportunities. Attendees can also spend time on North America’s largest exhibit floor for public works equipment and services — we’ve carved out generous portions of non-compete time so you don’t miss any sessions. Kick tires, talk about technology, or get the scoop on new products. You can even step in front of a video camera and tell your very own public works story. To take advantage of everything PWX has to offer with more than 5,000 public works colleagues from North America and beyond, meet us in Kansas City!

Don’t forget to download the ATTENDEEHUB MOBILE APP!

Be sure to download the “AttendeeHub” mobile app for the latest PWX conference information!
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City of Leawood

City of Olathe

City of Lenexa
THANK YOU TO THE...

**PWX Program Review Committee**

Education sessions for APWA’s PWX are solicited through a Call for Presentations process. For the 2018 PWX, almost 300 proposals were submitted. A special thank you goes out to the PWX Program Review Committee who reviewed and ranked each proposal and then met to plan and develop the cutting-edge PWX Education Program.

Committee Chair: J.C. Alonzo, ENV SP, Consultant, Shockey Consulting Services LLC, Lenexa, KS

Members: Caroline E. Barlow, PE, Senior Civil Engineer, Seattle Public Utilities, Seattle, WA; Chris S. Porman, Director of Municipal Services, City of Plymouth, MI; Andrew G. Stevenson, Manager, ATAP Infrastructure Management, Saskatoon, SK, Canada; Giselle Rodriguez, PE, City Engineer, City of Fayetteville, NC; Dennis Wilson, PE, PhD, County Engineer, Sarpy County, NE; Doug J. Drever, Retired, Saskatoon, SK, Canada.

**Kansas City Metro Chapter Host Committee**

A special thank you goes to the Kansas City Metro Chapter and Host Committee for their dedication and hard work to make this PWX a success. Thank you to all the APWA members who so generously volunteered time to support the 2018 PWX! When you see a volunteer be sure to say “thank you” for all their hard work and support! The APWA family is without equal in their generosity and willingness to support so many worthy efforts. Thanks to each of you for being an “Everyday Hero!”

Cory Clark, Heather Bray, Patty Hilderbrand, John Zimmermann, Kathy Schikevitz, Beth Johnson, Jason Meyers, Dan Brown, Jerry Johnson, Gary Strack, Ralph Davis, Ron Schikevitz, Rob Krewson, Jason Waldron, Joel Cerwick, Trey Whitaker, Bill Billings
PWX HIGHLIGHTS

APWA WELCOMES THE INTERNATIONAL FEDERATION OF MUNICIPAL ENGINEERS!

For the first time ever, the International Federation of Municipal Engineers World Congress is being held in conjunction with the 2018 PWX! Attendees from all around the world will be joining us in Kansas City, adding an international perspective to many sessions. Please welcome our friends from around the world!

REGISTRATION HOURS

Registration is located in Lobby 2300.

Saturday
7:00 a.m.–5:00 p.m.

Sunday
7:00 a.m.–6:00 p.m.

Monday
7:00 a.m.–5:00 p.m.

Tuesday
7:00 a.m.–4:00 p.m.

Wednesday
7:00 a.m.–12:30 p.m.

WiFi

Complimentary WiFi is available throughout the Kansas City Convention Center. To access:

Network Name: apwapwx2018
Password: apwa2018

PWX MOBILE APP

All attendees are strongly encouraged to download and utilize the PWX mobile app as it will provide you with everything you need to get the most out of your experience in Kansas City. The free app is available for iOS devices in the App Store and for Android devices in the Google Play store. Visit the PWX 2018 website or see below for more information and download instructions.

GET ACQUAINTED PARTY

Get ready to have a good time as the Kansas City Metro Chapter welcomes attendees to Kansas City and PWX with a fantastic opening night party. Embrace the company of your public works peers as you sample great local food and drink, including world famous BBQ from Joe’s Kansas City BBQ, and enjoy entertainment from the legendary, world-traveling Irish American folk rock band, The Elders, on stage at the Power & Light District.

FALLEN HEROES MEMORIAL WALL

All new at PWX 2018, APWA has created a Public Works Fallen Heroes Memorial Wall to honor the many public servants in public works who have lost their lives or been seriously injured in the line of duty. Going forward, this concept will also be available on the APWA website for public works agencies to submit memorials for those they’ve lost while serving their communities.
EXHIBIT HIGHLIGHTS

EXPO TIMES
The exhibits are located in Exhibit Halls B, C, and D, and will be open during the days and times listed below. APWA has made it easy for you to spend time with the exhibitors and not miss a single education session. Each day, non-compete exhibit times have been set aside for you to visit the exhibits and have lunch in the Exhibit Hall.

Sunday
Noon – 4:00 p.m.
Non-Compete: Noon – 3:00 p.m.

Monday
9:00 a.m. – 3:00 p.m.
Non-Compete: 11:00 a.m. – 2:00 p.m.

Tuesday
9:00 a.m. – 3:00 p.m.
Non-Compete: 11:00 a.m. – 2:00 p.m.

Grand Opening
At noon on Sunday, the 2018 Exhibit Floor will officially open! Don’t miss one of the most exciting times during PWX. Be the first to explore the largest annual exhibit of public works products, equipment and services in North America.

APWA Connect LIVE!
Booth #1701
Similar to APWA’s online APWA Connect community, APWA Connect LIVE! provides attendees with an environment to meet public works experts, network with peers, and stay up-to-date with the latest happenings in public works. Knowledgeable APWA staff are also available to answer questions and provide information on APWA products and programs.

EXHIBIT FLOOR PAVILIONS
Visit our new Geographic Information Systems, Asset & Inventory Management and Eco-Solutions Pavilions on the exhibit floor to learn all about the newest technologies in these areas and how they’re being used in public works.

NEW PRODUCT SHOWCASE
Now transformed from “posters on the wall” to a product display booth featuring dozens of the newest products in public works, the showcase allows you to feel and experience these great new products and innovations first-hand.

NEW PRODUCT THEATER
Exhibitors being featured in the New Product Showcase will demonstrate their product, its features and how it came to be in short, 20-minute sessions in the new theater located in the New Product Showcase.

EXHIBITOR SOLUTIONS THEATER
Earn CEUs as you hear insightful and detailed, 50-minute presentations from exhibitors on topics you won’t want to miss. Discover sessions uniquely designed to give you cutting-edge information on a product or service addressing the needs of the public works industry.

TECHNOLOGY SOLUTIONS THEATER
Come see the latest and greatest public works advancements in the Technology Solutions Theater. Exhibitors presenting these 50-minute sessions will cover the newest information and technology applicable to public works.

PRIZE DRAWINGS
APWA Connect LIVE!, Booth 1701
Great prizes, donated by the KC Metro Chapter Host Committee, will be given away each day in the Exhibit Hall at APWA Connect LIVE! Attendee prize tickets are conveniently printed with their badges at registration. To be eligible to win, you must be present during the drawing times. Check the PWX Mobile App for days/times. Good luck!

APWA NATIONAL EQUIPMENT ROADROdeo AT PWX 2018
Kansas City Convention Center – Hall E
Tuesday, August 28, 2018

3 COMPETITIONS:
Backhoe/Mini-Excavator Competition
Watch contestants show off their skills on both a backhoe and a mini-excavator, using various props to precisely execute and maneuver!

Skidsteer Competition
Watch participants command a skid steer and show the audience their maneuvering skills as they navigate around barricades while carrying a basketball and making a bucket!

Technicians Competition
Watch as technicians test their knowledge and hands-on abilities in 7 different stations:
• Shop Safety
• Electrical
• Snow Plow
• Hydraulics
• Fabrication
• Tire Repair
• Automotive and Medium/Heavy Truck (written exam)
EDUCATION PROGRAM

The theme of the 2018 PWX is “The Power of Public Works.” Public works professionals will have plenty of opportunities to acknowledge, learn more about, and celebrate the services that public works provides and the impact that public works has on the well-being and quality of life of our communities.

It all starts with the daily General Sessions!

- You must attend the Opening General Session on Sunday at 10:00 a.m. on The Power of Purpose – Where Your Talents and the Needs of the World Intersect, featuring Roy Spence. This presentation will help you discover how you can bring the power of purpose to your public works career and service.

- You will be eager to get up early on Monday and Tuesday to attend the 8:00 a.m. General Sessions: Monday’s General Session features Vernice “FlyGirl” Armour in a program called Cleared Hot! You HAVE Permission to Engage. Tuesday’s program will be incredible fun! Jason Latimer (Scientist and Magician) will captivate you with a presentation called See Beyond the Illusion of Knowledge.

- Finally, on Wednesday at 11:00 a.m., the Closing General Session will feature an inspiring presentation from Jake Wood, former Marine and founder of Team Rubicon, a nonprofit disaster response organization made of up over 65,000 military veterans. Jake will talk about The One and Nine: Building Teams and Organizations That Win.
The Power of Public Works is featured throughout the PWX Education Program. Aspiring and current public works leaders will have the opportunity to examine the impact that capable and inspiring leaders can have on the public works presence in the community and on the public works workforce. You’ll have a variety of leadership sessions to choose from, among them are:

- **Aspiring to Public Works Leadership?** – Sunday, 3:00 – 4:50 p.m. and the International Public Works Director Roundtable – Monday, 2:00 – 3:50 p.m. Both of these sessions have been brought back by popular demand from previous PWX programs as they offer you the invaluable opportunity to delve into the aspects and qualities of leadership needed most in today’s world.
- Also returning this year, is the Happy Hour Jam: How to Deal with Annoying Crap! Sunday, 4:00 – 4:50 p.m. This frank look into the challenges of public works leadership gets more fun every year!

When discussing The Power of Public Works, one can’t shy away from the tough questions. There will be three Dare to Ask presentations that will shed light on issues common to us all as we navigate our changing world:

- **Dare to Ask: Women and Men Working Together** – Monday, 9:45 – 11:00 a.m.
- **Dare to Ask: What It Really Takes to be Resilient** – Tuesday, 2:00 – 2:50 p.m.
- **Dare to Ask: Automated Vehicles: Potential Safety Issues Impacting Local Public Agencies** – Tuesday, 2:00 – 2:50 p.m.

The power and impact that public works projects and efforts can have on the viability of a community will be explored in several sessions. To name just a few:

- **Tale of Two Smart Streetcar Cities** – Sunday, 3:00 – 3:50 p.m. and KC Streetcar: The Owner, The Operator, The Advocate – Tuesday, 9:45 – 11:00 a.m. Both of these sessions examine the positive economic development and livability impacts that smart transit can have on neighborhoods.
- **The Massive Impact of Stockholm’s New Tunnel Diversion on a Small/Rural Community** – Sunday, 4:00 – 4:50 p.m. highlights the profound impact a capital improvement project can have on the local area.
- **Asset Management will be explored in over 15 sessions including a 3-part series called Enhancing the Power of Public Works through Asset Management on Monday, 2:00 – 4:50 p.m. and a 2-part series on Asset Management in Australia – Tuesday, 9:45 – 11:00 a.m. and Wednesday, 9:30 – 10:45 a.m.**

Public works’ responsibilities and influence in accommodating new automated and connected vehicle technology is at the forefront of many of our concerns. So, check out these sessions: **Bringing Connected Vehicles to Your Town** – Sunday, 3:00 – 3:50 p.m. and Beyond the SMART CITY: Positioning Your Public Works Agency for an Unimaginable Future – Tuesday, 9:45 – 11:00 a.m.

Public works’ role in ensuring community sustainability and resiliency will be highlighted in several session offerings including: The annual Public Works Stormwater Summit scheduled for Monday and Tuesday afternoons, 2:00 – 4:50 p.m. each day; **New Era: Local Government Taking the Lead on Sustainability** – Tuesday, 9:45-11:00 a.m.; **What Does Emerging Technology Mean for Resilience?** Tuesday, 9:45 – 11:00 a.m.; **Is Resilience…Sustainable?** – Tuesday, 4:00 – 4:50 p.m.

At the American Public Works Association, we take pride in bringing you the latest products and services that cover the field of public works. In the APWA Store you will find publications, training resources and self-assessment tools on nearly every public works topic, from fleet services to winter maintenance, from the history of public works to management policies and practices, and from emergency management to water resources. Whether you’re looking to educate your workforce on a new technology, to inform the community at-large about public works in general, or to increase your own knowledge of a specific topic, APWA has an extensive selection of public works resources at your fingertips!
SATURDAY
AUGUST 25
Golf Tournament
Tiffany Greens  7:00 a.m.
Registration
Lobby 2300  7:00 a.m. – 5:00 p.m.
Room 2104A  8:00 a.m. – 1:30 p.m.
Brewery Tour
Crossroads Arts District  4:00 – 8:00 p.m.

SUNDAY
AUGUST 26
Registration
Lobby 2300  7:00 a.m. – 5:00 p.m.
First-Timers & New Members Meeting
Room 2215A  7:00 – 8:20 a.m.
Education Sessions  8:30 – 9:45 a.m.
Opening General Session
Grand Ballroom  10:00 a.m. – Noon
Exposition Open
Halls ABCD  Noon – 4:00 p.m.
Non-compete Exhibit Time  Noon – 3:00 p.m.
Exhibitor Solutions Theater #1
Booth 1701 – APWA Connect LIVE!  1:00 – 3:50 p.m.
Exhibitor Solutions Theater #2
Booth 933  1:00 – 3:50 p.m.
Technology Solutions Theater
Booth 2615  1:00 – 3:50 p.m.
New Product Theater
Booth 1841  1:00 – 3:50 p.m.
CPWA Luncheon
Room 2215A  Noon – 1:30 p.m.
Prize Drawing
APWA Connect LIVE!  1:50 p.m.
Education Sessions  2:00 – 4:50 p.m.
Fleet Workshop (afternoon session)  2:00 – 4:00 p.m.
Public Works Stormwater Summit
Day One  2:00 – 4:50 p.m.
Awards & Recognition Ceremony & Reception
Grand Ballroom  5:00 – 7:00 p.m.
Young Professionals Networking Reception
No Other Pub  8:00 – 9:30 p.m.

MONDAY
AUGUST 27
Registration
Lobby 2300  7:00 a.m. – 5:00 p.m.
General Session
Grand Ballroom  8:00 – 9:30 a.m.

TUESDAY
AUGUST 28
Exposition Open
Halls ABCD  9:00 a.m. – 3:00 p.m.
Non-compete Time  11:00 a.m. – 2:00 p.m.
APWA Blood Drive
Hall A  9:00 a.m. – 3:00 p.m.
Education Sessions  9:45 – 11:00 a.m.
Fleet Workshop (morning session)  9:45 – 11:00 a.m.
Exhibitor Solutions Theater #1
Booth 1701 – APWA Connect LIVE!  10:00 a.m. – 2:50 p.m.
Exhibitor Solutions Theater #2
Booth 933  10:00 a.m. – 2:50 p.m.
Technology Solutions Theater
Booth 2615  10:00 a.m. – 2:50 p.m.
New Product Theater
Booth 1841  10:00 a.m. – 2:50 p.m.
National Equipment Roadeo Awards Presentation
Hall E  12:30 p.m.
Prize Drawing
APWA Connect LIVE!  12:50 p.m.
Education Sessions  1:00 – 4:50 p.m.
Fleet Workshop (morning session)
Exhibitor Solutions Theater #1
Booth 1701 – APWA Connect LIVE!  10:00 a.m. – 2:50 p.m.
Exhibitor Solutions Theater #2
Booth 933  10:00 a.m. – 2:50 p.m.
Technology Solutions Theater
Booth 2615  10:00 a.m. – 2:50 p.m.
New Product Theater
Booth 1841  10:00 a.m. – 2:50 p.m.
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Hall E  12:30 p.m.
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Education Sessions  2:00 – 4:50 p.m.
Fleet Workshop (afternoon session)  2:00 – 4:00 p.m.
Public Works Stormwater Summit
Day One  2:00 – 4:50 p.m.
Awards & Recognition Ceremony & Reception
Grand Ballroom  5:00 – 7:00 p.m.
Young Professionals Networking Reception
No Other Pub  8:00 – 9:30 p.m.

WEDNESDAY
AUGUST 29
Workshop/Tours (ticketed)
Buses Depart on 14th Street between Central and Wyandotte  7:00 – 11:00 a.m.
Registration
Lobby 2300  7:00 a.m. – 12:30 p.m.
Education Sessions & Classroom Workshops  7:30 – 10:45 a.m.
Winter Maintenance Supervisor Certificate Workshop
Room 2215A  8:00 a.m. – 5:00 p.m.
APWA Headquarters Tours
APWA Office  8:30 – 10:30 a.m.
Education Sessions  9:30 – 10:45 a.m.
Closing General Session
Grand Ballroom  11:00 a.m. – 12:15 p.m.
APWA is excited to announce the new Certified Public Works Professional program will launch at PWX 2018 in Kansas City.

The Certified Public Works Professional (CPWP) designation will have two levels:

- Supervision Level (CPWP-S)
- Management Level (CPWP-M)

The Certified Public Works Professional-Supervision (CPWP-S) recognizes individuals in the public works field who have the knowledge and experience to become supervisors in a public works organization. It is targeted to front-line employees, first-line supervisors and crew leaders, or others who wish to advance.

The Certified Public Works Professional-Management (CPWP-M) recognizes individuals in the public works field who have the knowledge and experience to manage organizations within a public works department. It is targeted to current supervisors who desire to move to management positions, mid-level managers and superintendents who wish to advance.

As with our existing certifications, the certification process will include:

- Eligibility Application with requirements
- Multiple-Choice Exam
- Recertification

Certification — Building a Better Tomorrow

- Certified Public Fleet Professional (CPFP)
- Certified Public Infrastructure Inspector (CPII)
- Certified Stormwater Manager (CSM)

Visit the certification webpage at: www.apwa.net
Don’t miss these at PWX!

• If you’re looking for a place to meet with your colleagues, gather with old and new acquaintances or just relax awhile, visit the Kansas City Metro Host Chapter Hospitality area in Lobby 2300 of the Kansas City Convention Center.

• Join us in honoring the best in the business! Come see your peers recognized during APWA’s Annual Awards and Recognition Ceremony on Monday from 5:00-6:00 p.m. in the Grand Ballroom of the Kansas City Convention Center. Be sure to attend the reception that follows in the foyer of the Grand Ballroom.

• At APWA’s Connect LIVE! booth (#1701) on the exhibit floor, our goal is to provide attendees with an environment where each of you can meet public works experts, network with your peers and stay up-to-date with the latest happenings in public works. We’ve added so much, you might have a hard time leaving! Don’t worry, we’ll also have knowledgeable APWA staff available to answer your show questions and provide you with information on APWA products and programs.

• Finding your way around the exhibit floor can be a challenge. To make it easier, we have included special interest pavilions throughout the floor, giving you instant access to solutions to many of your greatest challenges in your communities. Pavilions include: Geographic Information Systems Pavilion; Asset & Inventory Management Pavilion; and Eco-Solutions Pavilion.

• The New Product Showcase and New Product Theater remain popular focal points of our show floor. New Product Showcase: Now transformed from “posters on a wall” to a “product display booth” featuring dozens of the newest products in public works, the showcase allows you to feel and experience these great new products and innovations. New Product Theater: Exhibitors will demonstrate their product, its features and how it came to be in 20-minute sessions in the new theater located in the New Product Showcase around the floor.

• On Tuesday, August 28, get ready for a rip-roarin’ good time at the second-annual National Equipment Roadeo. Lasso up your colleagues and drop by the exhibit floor for this national equipment and mechanics competition featuring competitors from APWA chapters all across North America. Stop by and cheer on your favorite competitor.
Four options to attend PWX

PWA is excited to bring the 2018 Public Works Expo (PWX) to Kansas City, Missouri, August 26-29, at the Kansas City Convention Center. With more than 125 educational sessions and more than 80,000 square feet of exhibit space, you will have the opportunity to learn, network and see the largest display of public works equipment in North America.

By the time this issue of the APWA Reporter hits your mailbox, there will only be a short time left before PWX begins. Needless to say, time is running out; however, there’s still time to register! Just go to www.apwa.net/PWX for more information.

To ensure you are able to arrange your schedule to be here and have the options you need, APWA gives you four options to attend PWX:

1. Full PWX Member Registration – $929.00. Includes access to the exhibit hall with lunch vouchers for Sunday, Monday and Tuesday; entry to all educational sessions including General Sessions; Wednesday Workshops; Get Acquainted Party; Awards Ceremony; and access to the National Equipment Roadeo spectator area.

2. One-Day PWX Member Registration – $365.00. Choose the day(s) you can attend and get access to the exhibit hall with lunch voucher for day attending, and entry to all educational sessions including General Session.

3. One-Day Expo Only Pass – $50.00. Access to more than 400 exhibitors with all the latest in public works equipment, services and technology.

4. Pre-PWX Seminar Member Registration – $300.00. This year’s Pre-PWX Seminar is “Self-Assessment Using the Public Works Management Practices Manual—A Tool for Improving Operations and Management.” This workshop has a separate fee and you do not have to be registered for PWX to take advantage of this great opportunity for additional education.

Don’t miss this opportunity to take advantage of this full library of resources and to experience the excitement of Kansas City. Remember the magic URL: www.apwa.net/PWX.

♫ Goin’ to Kansas City, Kansas City here I come! ♪

Chapter Membership Achievement Award winners announced

The American Public Works Association is proud to announce the winners of the 2018 Chapter Membership Achievement Award. The Chapter Membership Achievement Award encourages membership Growth by honoring the chapters showing the largest percentage of net increase in membership, compared to others of similar size. Every APWA chapter in good standing is eligible for consideration.

Congratulations to the 2018 winners:

<table>
<thead>
<tr>
<th>Chapter Size Division (based upon qty of members as of June 30, 2016)</th>
<th>Award-Winning Chapter</th>
<th>Net Membership Increase from July 1, 2017 - June 30, 2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 members or less</td>
<td>Alaska</td>
<td>8.06%</td>
</tr>
<tr>
<td>101-200 members</td>
<td>Western Pennsylvania</td>
<td>5.73%</td>
</tr>
<tr>
<td>201-300 members</td>
<td>Indiana</td>
<td>6.37%</td>
</tr>
<tr>
<td>301-500 members</td>
<td>Illinois</td>
<td>6.91%</td>
</tr>
<tr>
<td>501-850 members</td>
<td>Missouri</td>
<td>8.55%</td>
</tr>
<tr>
<td>More than 850 members</td>
<td>Southern California</td>
<td>3.05%</td>
</tr>
</tbody>
</table>

All six chapters receive a $500 award which can be used to provide more education and professional development opportunities for members. The chapters will receive a framed recognition certificate and patch for their chapter banner at the awards ceremony at PWX.
One-day passes available for PWX

Can’t take off a whole week for APWA’s PWX in Kansas City? Don’t worry. We have the ticket that is just your ticket—our one-day registration! Geared for those who cannot take the entire time for PWX, the one-day pass entitles the registrant to all educational sessions on that day and, also, entry to the exhibit floor where the latest in public works equipment and services will be on display.

The one-day registrations may be purchased onsite at $365.00 (member rate). A special pass to tour the exhibit hall only is also available for just $50.00.

Speaking of the $50.00 special exhibit hall pass, PWX 2018 in Kansas City is the perfect opportunity for supervisors to let staff attend the exposition for one day. PWX is great for those attendees who are able to go for four days, but it is also a wonderful experience for non-supervisors who can tour the exhibit floor for only $50.00 per day. It’s a chance to have your entire staff take advantage of this once-a-year gathering of the biggest and best in public works.

New this year! Tuesday Operations & Maintenance Day includes: operations and maintenance education sessions, exhibit floor, and National Equipment Roadeo spectator access. $110 (member)/$125 (nonmember).

We’re looking forward to seeing you in Kansas City!

One-day registrations may be purchased onsite at $365.00 (member rate). A special pass to tour the exhibit hall only is also available for just $50.00.

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*Data rates may apply.

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**Data rates may apply.
Armour Boulevard (i.e., 35th Street) through Kansas City, Missouri (KCMO), is a notable corridor within the city, due to the proliferation of estate-style mansions constructed by some of its most famous residents during the late 1800s. These famous Kansas Citians included Armour Boulevard’s namesake, K.B. Armour, a member of the prominent family of meatpackers from Chicago and one of the first members of the KCMO Parks Board.

Once a tree-lined street filled with stately homes and broad lawns that was envisioned to be the southern boundary of the city at that time, this important midtown boulevard is now primarily lined with the apartment towers and former luxury hotels that replaced those fancy estates during the first half of the twentieth century and then eventually fell into disrepair themselves. Today, only a few of the original historic estates have managed to escape demolition and remain amongst the generally residential properties along the 1.25-mile long segment of Armour Boulevard running between Broadway Boulevard and The Paseo.

In recent years, this corridor has seen significant revitalization efforts from private developers, as numerous apartment towers have been rehabilitated to attract a younger generation of residents into mid-town Kansas City. New mixed-use commercial and residential developments are also proposed near some of the major intersections along the historic corridor to continue enhancing its overall attractiveness.

In early 2013, the KCMO Public Works Department enlisted the services of George Butler Associates, Inc. (GBA), a local consulting engineering firm headquartered in Lenexa, Kansas, to begin an in-depth study of this historic boulevard corridor. Working collaboratively with the residents of the adjacent Hyde Park, Old Hyde Park, and Squier Park neighborhoods, GBA has since completed parking and traffic studies, performed “road diet” analyses, and finally, provided bicycle facility planning and designs along this critical east-west thoroughfare corridor in the city.

The initial traffic studies by GBA and the City evaluated the commuter peak period operations at the major, signalized intersections along the 20-block-long study corridor. Traffic counts obtained by KCMO in 2013 indicated that vehicular volumes along the Armour Boulevard project length ranged from about 6,000 vehicles per day (vpd) on the eastern end of the corridor up to about 10,000 vpd on the west end. Parking usage was also studied within the project area one block both north and south of the Armour Boulevard corridor for the entire project length, by first preparing a comprehensive parking inventory and then completing maximum parking accumulation studies. These completed traffic and parking studies indicated that a “road diet” would be appropriate along the 35-mile-per-hour Armour Boulevard corridor. The proposed designs will reduce the existing four-lane street width, with only “sharrow” bicycle markings provided, into a three-lane street width with separated bicycle lanes, while

Protected bicycle lanes finally pedal their way to KC

David J. Mennenga, P.E., PTOE, Traffic Engineer, George Butler Associates, Inc., Lenexa, Kansas, Presenter, PWX 2018
During the “interim” state of construction, both commuter and recreational cyclists are comfortable using the new parking-protected bike lanes along Armour Boulevard.

maintaining the existing parallel parking along both sides of this 56’-wide roadway.

With additional stakeholder input provided by homeowners and apartment residents from the surrounding neighborhoods, as well as from the local BikeWalkKC advocacy group, a collaborative and iterative corridor design process began during the Fall 2015. Based on stakeholder input, in early 2017 KCMO Public Works staff decided to proceed with the design of fully-protected bicycle lanes along Armour Boulevard. With this preferred parking-protected design, bicyclists travel in a 5’-wide marked lane situated between the existing curb line and a 4’-wide “buffer zone” provided adjacent to the parked vehicles. Only two vehicular travel lanes 11 feet in width are provided along the intermediate sections of the corridor, except on the approaches to the major, signalized intersections where additional auxiliary turning lanes are required to maintain acceptable traffic operations during the peak commuter periods.

This Armour Boulevard improvement project provides the first parking-protected bicycle facilities to be constructed within the entire Kansas City metropolitan area. These protected bike lane designs include designated “bike boxes” at each end of the corridor, where Armour Boulevard intersects other north-south bike routes designated along Broadway Boulevard and The Paseo. At several of the major signalized intersections along the project corridor, left-turn queue boxes are provided to assist cyclists in making “twostage” left-turning maneuvers. Marked “mixing zones” are also designated within the proposed bike lane designs to highlight the potential conflicts between cyclists and right-turning vehicles at the major, signalized intersections. Finally, the proposed bike lane designs also accommodate numerous bus transit stops along the corridor, even relocating several existing “near side” stops to “far side” positions across the intersection to reduce conflicts with cyclists at critical decision points.

With the assistance of Congestion Mitigation and Air Quality (CMAQ) grant funding administered through the MidAmerica Regional Council, the metropolitan planning organization for the bistate Kansas City region, KCMO accepted contractor bids for these protected bike lane improvements in October 2017. Construction on the project began in early May 2018 with a micropaving asphalt overlay that was placed along the entire project corridor, prior to the final installation of the new parking-protected bike lane markings. The markings installation process is anticipated to be completed by July 31, 2018. When completed, the project will have a total construction cost of approximately $700,000.

At the end of this five-year-long study, design, and construction process, the Armour Boulevard improvement project represents a total community effort that ultimately led to the City’s first parking-protected bicycle facility, as KCMO staff responded to the community’s desire for a higher level of service for local bicyclists. The City and GBA design staffs created a solid design concept to address the needs for all modes of travel, including vehicles, bicyclists, pedestrians, and transit, while also maintaining valuable parking and access in a dense urban area.

“The City is extremely excited about the implementation of our first parking-protected bike lanes within the city,” said KCMO Director of Public Works/Assistant City Manager Sherri K. McIntyre, P.E. “We are pleased to see that the public is responding so positively to this new parking approach, and that drivers and bicyclists can function together in a safe and positive manner.”

Representing the project design team, David J. Mennenga, P.E., PTOE (GBA Traffic Engineer) and Mario Vasquez, AICP (KCMO Project Manager) will be presenting this topic at PWX 2018 in Kansas City, Missouri. Their session takes place on Wednesday, August 29, at 8:30 a.m. David Mennenga can be reached at (913) 577-8214 or dmennenga@gbateam.com.
et out of the office and circulate among the troops,” read a plaque in my commander’s office a long time ago when I was in the Army. It took me years to figure out that the most important work I do as a leader is not performed behind a desk.

In my years in public works, I’ve seen leaders do their obligatory one day in the field “with the guys” and return to the office, never to be seen in the field again, leaving the impression that they’ve just checked a box. I’ve seen public works directors pose for the photo op by the backhoe, to be on the cover of the next issue of the department’s newsletter, making the workers feel like props in a public relations campaign.

I will submit to you, dear reader, that this exercise of spending time in the field with your team needs to be repeated again and again, over and over, every year forever. Every other Friday, I report in to one of my teams dressed in jeans and a t-shirt with my steel-toed boots, gloves, and safety vest. I tell the team leader that I’m there to be an extra, if unskilled, pair of hands and that I expect no special treatment either in the assignment of work or what tasks we’re to undertake. I’m there to work, not spectate.

In six years of doing this, I have patched potholes, placed concrete, jackhammered sidewalks, wired traffic signals, picked up roadkill, installed thermoplastic markings, cleaned sewer pipes, sampled wastewater, lubed machinery, cut grass, located utilities, chipped brush, built curbs, hauled yard waste, replaced light bulbs, inspected restaurants, cleaned trash racks, serviced police cars, spliced fiber optic cable, repaired sewers, and much more. I even dug a grave by hand once. It was only for an urn, but still…. In short, there is almost nothing the team members in my department do that I do not have at least a passing hands-on familiarity with.

Aside from just acquiring experience, I find this to be great time to be open to questions. How many of us have had a formal meeting with employees and, at the end, asked, “Anybody have any questions?” and gotten only crickets in response? Many people just will not ask questions in front of their coworkers. Peer pressure wasn’t just a high school thing. But, six hours into a shift and you’ll find you have earned the trust of your coworkers to get honest feedback and questions.

Once you’ve ridden in the cab of a truck or worked on a site with someone for a few hours, you’ve had the chance for the awkwardness to wear off. You’ve already talked about family, kids, where you grew up, how long you’ve been here, hobbies, sports teams. And then the real questions come out. What do I think about this policy, or why do we have to do this practice that no one likes? Why did the last union contract have to incorporate this particular change? Why can’t we wear shorts in the summertime? (Really, that question comes up Every. Single. Time.)

Jonathan Gano, P.E.
Director of Public Works, City of Des Moines, Iowa
Member, APWA Leadership & Management Committee
Presenter, PWX 2018
By the time we’ve been together for a few hours, the barriers to communication that are always there in a senior-subordinate relationship come down—way down. I’m sure they don’t ever really go away, but my estimation from years of these conversations is that it’s much easier to get candid feedback this way than any other method out there. I have been given more and better feedback—raw, unvarnished feedback—through this single source than any combination of surveys, sensing sessions, Q&As, or forums. It is the best listening session you can come up with.

Moreso, I’ve found that by coming back again and again, the team knows this isn’t just a one-time thing. It’s not a PR stunt or a photo op. They’re not in trouble and requiring some director-level oversight. Every workgroup gets a chance—whether they want it or not—and they know it’s not just once. It makes a difference that it’s a perpetual program—it’s more real—so they are listening to me just as much as I am listening to them. Every time I travel with a crew or a team, I am putting the department’s vision and values into action.

Since I make it clear that I am just there to join in the work for the day, I have also had to explain that it’s not a “gotcha” time to complain about their supervisor. This is not “Undercover Boss” and I believe in the chain of command. Most of the time I just give advice. But I will, in the right circumstances, intervene in selected situations to solve something immediately. Sometimes, it’s as prosaic as buying better gloves.

Before dismissing this as a stunt or personal idiosyncrasy, take a deeper look at what’s actually going on when joining in a work crew for a day. This kind of activity is actually a form of management-by-wandering-around, a much discussed but hard to implement management technique.

Management-by-Wandering-Around (MBWA), popularized by stories of the early days of Hewlett-Packard, is a leadership style where the manager makes a habit of randomly wandering around the building to check in on different workgroups. Leaders can then discuss projects, processes, or other work with teams without waiting for reports or meetings. It’s an opportunity both to hear directly from the people doing the work and also to influence it informally early on, long before any formal report is written or results presented. The leader has a chance to share with the team their perspective and furnish insights into projects and activities, asking questions, making suggestions, and guiding the work informally.

The idea is that seeking out feedback and forcing interaction between different levels of an organization and its leaders breaks down the filters of those intervening layers. Why wait for a monthly meeting or a written report that will go through a subordinate manager when you can just wander down the hallway and poke your head in the office and find out what’s going on right now? The key benefits of MBWA are that leaders listen, transmit the vision and values in regular conversation, and help fix things.

Though first associated with Hewlett Packard and identified as a key part of the company’s DNA in The HP Way, it is part of how Disney, Xerox, and Toyota operate. Similarly, Apple’s Steve Jobs was famous for a version of MBWA that involved unplanned, random interactions with customers. While this wandering around approach may work well at a technology company where everybody has an office, I found it necessary to be slightly less random in applying the same technique to working with field crews. But the benefits are the same. It is an up-close and personal style of leadership. There’s no hiding behind a desk or other trappings of authority when you’re shoveling asphalt and patching potholes.

So, some of the best advice I can give is to get out of your office and get to work.

Jonathan Gano will give a presentation on this topic at PWX 2018 in Kansas City, Missouri. His session is entitled “You Can’t Lead from Behind a Desk” and takes place on Tuesday, August 28, at 9:45 a.m. He can be reached at (515) 237-1425 or jagano@dmgov.org.
Introduction

Engineers apply *creativity and innovation* to pure science to solve problems. One reason we must do this is to “soften” pure science so it can serve people in the real world. The softening process is the “art of engineering”—a humanization of science.

**Art:** The expression or application of human creative skill and imagination, typically in a visual form such as painting or sculpture, producing works to be appreciated primarily for their beauty or emotional power.

https://en.oxforddictionaries.com/definition/art

The process of creativity is much like what a visual artist does to create a sculpture or painting, or any of those works which we consider art. Thus, engineers, because of their creativity, share space with artists. So, it is not much of a leap to the idea of incorporating artistic features into our built infrastructure. Yet it is often difficult for us to do because in trying to humanize our projects we must deal with the following dilemma:

### Some Ideas on Value

- "Nowadays people know the price of everything and the value of nothing."  
  – Oscar Wilde

- "Color is an inborn gift, but appreciation of value is merely training of the eye, which everyone ought to be able to acquire."  
  – John Singer Sargent

- Do we engineer a piece of infrastructure and then decorate it with “art” to make it look “pretty,” much like we frost a cake?

  or,

- Do we create a piece of infrastructure and from the onset make “art” part of its fabric, much like selecting a truss type for a steel truss bridge?

To resolve this dilemma, we first need to know why we are building infrastructure. For most of us, we build to fulfill a community need. Yet, in building there is an opportunity to do more than just fulfill a functional need. We can bring *value* to our world and the people who occupy it by using our creativity and innovative thinking to enhance the solution.

To bring this enhanced value, we have a choice to make. Do we build the most expensive and biggest project we can engineer? Or, do we devise a solution that solves a problem in the simplest, most elegant way, and displays the creativity of which humans are capable? This is the point where we take the art of engineering one giant step by incorporating the artistic process into a project’s development.

But “artsy stuff” makes projects expensive; at least that is the first argument we hear when we propose anything but “plain gray.” The litany of reasons continues, stressing that we do not have the funds to build what we need and have little if any money to preserve the basics. After economics come arguments such as people will only want to vandalize it! We somehow assume that our customers prefer “plain gray and square” and will attack anything else.
The emphasis on economics especially forces us to the plain gray solution. We often also consider aesthetic features to be add-ons, somehow attached to a structure like an ornament. As a result, we simply never consider that our projects do not have to be dull and boring, or lack even the most basic aesthetic appeal. We forget that our projects occupy our communities many years, often generations, and they play an important part in how a community (collectively) sees itself. We ignore the fact if all we build is plain, gray, and square, that is exactly how people will see themselves—and their world.

During the “Cold War” one of the pictures we received of our Eastern Block opponents was of blocks of massive, square, dull buildings used for housing and offices. They were examples of the soulless and joyless communities that the people were subjected, an example of the mind-numbing oppression of the Communist/Socialist system.

When we build infrastructure, the idea of building “new” or traditional art is not the only approach that we can take. For example, nature is a great model. Wetlands have great beauty and they not only add beauty to our projects, they make them sustainable. Another approach considers that engineering in public works involves two facets of art. One is to make infrastructure that brings value to the community greater than its basic intended purpose by using artistic devices.

The other is the ability to innovate and create much like artists. Innovative designs and looking beyond the
standard details is just as much an act of artistic creativity and innovation as painting a masterpiece. The artistic approach, *the art of engineering*, can lead us to the simplest, most elegant solution to a problem.

**How to incorporate art into projects**

When we think of great engineers, the first name that does not always come to mind is Leonardo da Vinci. We think of him as a great painter. But he was also a brilliant engineer, imagining innovative and creative designs, many well before their time. In da Vinci we had a person who brought the art of engineering and visual arts together. He did it in a way that serves as an example of what we can achieve if we view our work of building infrastructure in an artistic (i.e., creative) way.

To incorporate art into infrastructure we need to recognize the value our projects, as pieces of visual art, bring to a community; especially since this value can be much greater than the basic value projects bring by (say) only focusing on increasing highway capacity or improved sewage treatment. However, we do not often consider the immense value artistic enhancements can bring. These come through enhancing economic development efforts, educational benefits, and community prestige. Unfortunately, there is no place in cost-benefit or life-cycle analyses for this value to be included. But a monetized value would increase the benefits significantly.

People have many ideas about the value of art, especially when considering inclusion of an artistic device. Unfortunately, we tend only to focus on the added cost. But, engineering in art, beauty, and aesthetics does not need to be expensive, *if we go into the project with the idea that we want to incorporate such features. Then the art becomes part of the fabric of the project. To do this, artists, landscape architects and architects must be major and early contributors to project designs. If we feel threatened by these professionals, we need only remember the real artist is the builder who turns dreams into reality, just as da Vinci was the artist because he wielded the brush.*

There are also some steps we can take to help us be creative and innovative. Larry Richards of the University of Virginia recommends a series of activities to incite creativity when faced with an engineering problem. If we make these activities part of our work and our design process, then we have a greater opportunity to bring art into our projects.

**Infrastructure, value, and art**

There are several ingredients essential for good infrastructure. We think of money first because long-term funding programs allow proper planning. Stable, long-term financing also lets us look out over time and rationally decide what to build.

The 7 Elements of Art (Artistic Devices)

- Line
- Shape
- Form
- Space
- Texture
- Value
- Color

But the most important ingredients—creativity and innovation—are just as precious, and often just as scarce. These ingredients bring value to our infrastructure though aesthetics. Sometimes bringing aesthetics can be as simple as carrying a curve (see Figure 3). But the art of creativity and innovation also allows us to spend money wisely to make the best use of what we have by helping us to be more creative engineers.

The next time you are thinking about building more than plain gray and
square consider this. One of the great-est artists and engineers the world has seen did not have a problem mixing infrastructure and visual arts. Look over the left shoulder of La Gioconda and check out the piece of civil engineer-ing infrastructure that memorializes da Vinci’s engineering side. Then consider if da Vinci understood the link between art and infrastructure. We could do a lot worse than to imitate him.

Inciting Creativity (per Larry Richards)
• Immerse yourself in a domain or problem
• Be prolific—generate lots of ideas
• Use tools for representations and thoughts (e.g., brainstorming, notebooks, and sketches)
• Play with ideas
• Avoid premature closure
• Don’t be afraid to be different
• Be open and receptive to new ideas
• Do it—practice your craft
• Maintain a product orientation
• Relax—indulge your diversions
• Reflect—review what you have done
• Have fun!

References

Dennis A. Randolph, P.E., PWLF is Director of Public Works for the City of Grandview, Missouri. He has been active in the field for more than 50 years as a city and county engineer and director. He is also an adjunct instructor at the University of Missouri–Kansas City. In 2015 he was selected as a Top Ten Public Works Leader of the Year. Dennis will give a presentation on this topic at PWX 2018 in Kansas City, Missouri. His session is entitled “Infra-structure and Art: Not So Far Apart” and takes place on Sunday, August 26, at 3:00 p.m. He can be reached at (816) 316-4855 or drand77201@att.net.

Sarah Jones is the Engineering Assistant for the Grandview Public Works Department. She is a graduate of the Kansas City Metro Chapter’s Public Works Institute and serves on the Board of the Grandview Arts Council.

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Building Exceptional Staff Talent (BEST)

William A. Verkest, P.E., PWLF, APWA National Past President; Presenter, PWX 2018

Let’s be realistic. At some point you are going to retire, or you are going to move on to new challenges, or you are just going to leave—for whatever reason. The same is true for your direct reports and the other key people in your organization. The question is: What have you done to prepare your organization for this eventuality? Said a different way: Have you identified your replacement and have you trained that person to “take your place”?

Sure, it may take a national search to really take your place. But, typically, organizations will look internally at the talent that is there before going outside. And typically, executive leaders know who their real or emerging leaders are. Preparing them to assume a new leadership role; that’s where BEST comes in. BEST is a succession planning program.

Succession planning is crucial to the sustainability of any department. Its purpose is to ensure the continuity of the department’s leadership by identifying and developing potential candidates for key management positions. Basically, it is a process by which the current department leadership makes sure the right people are ready at the right time to lead the department.

BEST was originally titled Building Engineering Services Talent and was created specifically for the Department of Engineering Services within the City of Arlington, Texas. The overwhelming success of the program showed that it could be used in any city department; hence, the title change.

What BEST is: It is an opportunity to share in some thoughts on the subject of leadership. It is a commitment on the part of the individual and the department to participate and succeed. It is a forum to challenge ideas as well as each other. And finally, it is but one brick in a foundation upon which to build personal leadership skills.

What BEST is not: It is not a formal “course” in basic management or leadership. It is not a panacea; leadership cannot be fully learned in just 12 months, 12 years, or perhaps a lifetime. It is not a lecture series detailing the latest management or leadership fad. And, it is not a guarantee that every participant completing the program will be immediately promoted to the next level or to the director level.

Moreover, BEST is a congruent two-tier process. Tier one is the individual tier and tier two is the organizational tier.

Tier One: People make an individual commitment to enhance their leadership ability by fully participating in program activities, accepting constructive criticism of their competencies, and agree to assist other participants, current and future, in their individual development.

Tier Two: The department provides the framework and resources necessary to enhance leadership potential, foster career development, and encourage acceptance and expansion of leadership competencies.
As originally designed, BEST lasted twelve months, and consisted of a very formal two-hour session each month. It had a highly structured agenda, forced interaction among the participants, and led at some point to a case study in group dynamics. Each person had a coach with whom they could discuss issues pertaining to the monthly sessions as well as meet informally to discuss matters of mutual interest.

**First Meeting:** The first meeting started with a kick-off luncheon that included a strong congratulatory welcome from the department director. The agenda for each month was reviewed, mutual responsibilities were detailed, and individual expectations were laid out. The director gave his thoughts on leadership and the participants were asked to complete a key competencies assessment (based on those expected of Arlington leaders). They would do the latter again at the last BEST meeting.

**Meetings Two Thru Twelve:** Each of these sessions included an executive organizational perspective, a discussion topic or question, a participation requirement, and a feedback opportunity.

The City Manager, Deputy City Managers, and selected department heads were asked to provide their thoughts on leadership, but more specifically they were asked to cite what in their careers attributed to them being successful as city leaders.

The discussion topic or question consumed most of the two-hour session. Each participant was given a red card and a green card, indicating disagreement or agreement with the subject. Once the topic was read, participants raised one or the other card; just one—no abstentions. Then participants were asked to justify their vote. This is where the real group interaction took place. Example discussion topics:

- “The difference between success and failure is in the level of effort.”
- “Being in charge sometimes means making people angry.”

Participants in the program were required to attend a city council meeting, a city council work session or pre-council meeting, a deputy city manager’s staff meeting, and a planning and zoning commission meeting. They brought their meeting observations to the following BEST meeting and shared thoughts on leadership style, tactics employed, demonstrated alliances, issues being worked, and expected or perceived outcomes.

In addition to discussing participation meeting observations, the feedback portion of the BEST session started with a revisit of the previous session to see if there were any “hanging” issues or concerns that needed to be revisited. It was also a time to identify any “wow” lessons learned or any specific benefit that someone wanted to discuss.

So, if that’s the program, how does one get started?

The first step is to outline the program and get buy-in from the mayor, city manager, or chief executive officer of your organization. This support is critical as the participants will be spending time away from their normal duties notwithstanding only a short period of time each month. This is also the time to solicit support from those people who will be providing the executive perspective at each session.

Identify the emerging and potential leaders who will be invited to participate in the program. The engineering services director invited his direct reports and those who reported to that level of management. Keep the overall number small enough to ensure everyone gets to “talk” during the discussion time.

Establish a firm schedule and identify a location for the BEST sessions away from the department, so as to keep distractions to a minimum.

Create a program portfolio that includes, at least, the following:

- Congratulatory/welcome letter
- List of participants and coaches
- BEST program description
- BEST monthly planning calendar
- Monthly program page that includes the speaker, the discussion topic, a note and observations section, and a feedback section
- Participation meeting information
- Participation log
- Participation notes and observation page
- A list of leadership competencies

Wrap it all up in a highly visible personal notebook with that person’s name boldly displayed.

As stated at the outset, Building Engineering Services Talent was highly successful. The nature of its content lends itself to any department. End of program assessments were highly complimentary and included solid recommendations to make the program stronger. So, we did it again.

**Bottom Line:** If you were to fire yourself, to whom would the department turn? Have you prepared that person to take your place? It is your job, you know!

Bill Verkest will give a presentation on this topic at PWX 2018 in Kansas City, Missouri. His session is entitled “BEST: Building Exceptional Staff Talent” and takes place on Tuesday, August 28, at 3:00 p.m. He can be reached at jubilldy@sbcglobal.net.
Building a smart sewer network

Brandon Freeman, Partner, TREKK Design Group, LLC, Springfield, Missouri; Presenter, PWX 2018

Every water and sewer utility, day in and day out, is charged with making sure clean water is delivered to homes and businesses and wastewater is carried efficiently away, all while keeping user costs affordable.

This task is crucial to public health and economic vitality, but it is becoming even more daunting as long-in-place pipes and other infrastructure continue to age and potential environmental changes present new difficulties such as increased flooding and sanitary sewer overflows.

The technology that has almost eliminated human pushing and pulling in some endeavors—like the robotics and artificial intelligence used in manufacturing and online retail—has not been adapted suitably enough to operate water and sewer systems. Even cellular communication networks are not yet reliable, affordable and redundant enough for 24/7 operation.

However, help is on the way. Technological tools are becoming available that will provide data collection and analytics, and these will enable human operators who control pipe network performance make better, more timely decisions.

Data-Assisted Human Control

Picture a community of 15,000 residents with a robust wastewater SCADA system. The community’s utility can have a first-rate control system in place, yet operators may not know precisely how the system reacts to heavy rainstorms. But flow monitoring studies over time, using computers and data collection, can help operators gauge when to use equalization basins to reduce upstream sanitary sewer overflows and alleviate peak flows to the treatment plant.
Technology is being developed and implemented by companies like OptiRTC or EmNet seeking to control flooding in urban stormwater systems and combined sewers using real-time control. If investment in real-time control or SCADA is too large of an investment for your utility or is years away, strategies can be implemented, albeit on a small scale, that will help water and sewer utilities improve operation over time. They include:

**Real-Time Monitoring.** Cellular technologies exist that will monitor sewer networks and provide data to help operators track changes with system upgrades or rehabilitation. In the Midwest, it is common to do 90-day flow monitoring studies between April and July. As climate patterns have changed in recent years, some of the largest rain events have occurred in July/August and even in December. These heavy rains can be critical in understanding how resilient the pipe network is. By having real-time data, network control operations can be tweaked to help reduce sanitary sewer overflows and tested over time to real-time flow and rain data.

**Alerts.** Advancement in technology has led to cheaper sensors, such as using ultrasonic sensors vs. traditional area velocity in-pipe sensors. Sensors such as the SmartCover, EASTECH iTracker or the ADS ECHO provide real-time alerts for overflows, and are considerably cheaper than legacy flow monitoring technology, in both capital costs and installation. These can provide more cost-efficient operation of combined sewer overflow structures that require periodic, expensive maintenance procedures to keep diversion structures clear of debris to eliminate dry weather discharges or identify areas with potential pipe maintenance issues. Recently, visual-based monitoring and artificial intelligence has been developed for sewer systems, which has the potential to be even cheaper than other sensors and provide an operator with visual confirmation of issues present. Using machine learning algorithms, long periods of visual data can be analyzed to detect leaks, surcharging and overflows.

**Validated Predictive Models.** Hydraulic models can provide tremendous insight into system performance. But without “truthing” or updated hydraulic data over time, the model is as good as its inputs. Validated predictive models must be built, checked against true hydraulic system performance and then recalibrated as warranted in real time. Artificial intelligence can be used to do simple calculations in real time, such as rainfall derived I/I estimation, and speed up the process of updating the model or running iterations. Often infiltration and inflow projects are initiated in collection systems to offset having to build larger treatment plants or interceptor sewers to carry the additional peak flows. If accurate models are built and analyzed over time with real-time data, progress can be documented over time towards reaching project goals.

**Adaptive Management & Budgeting.** Imagine flow monitoring data, a capital improvement plan and historic GIS data all in one place, with results tracked over time. Let the computer do the repetitive, calculable tasks and enable the human operators to provide the creative thinking to develop solutions. Software, such as Baseform, can help to consume commonly generated data sources (some real time and some historic) and provide decision makers the data needed to develop defensible capital improvement plans.

**Conclusion**

Technology certainly will shape the future of civil engineering in delivering quality utility service to our stakeholders. To solve utility problems in the future, a civil engineer will need to understand data analytics, programming and manufacturing techniques. Using those technology tools, the civil engineer must design lean systems, minimize waste and fix what must be fixed. The civil engineering profession owes that much to future operators of our systems.

Brandon Freeman will give a presentation on this topic at PWX 2018 in Kansas City, Missouri. His session is entitled “Building a Smart Wastewater Network” and takes place on Monday, August 27, at 4:00 p.m. He can be reached at (417) 225-8919 or at sales@trekkpreview.com.

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he majority of guidance on resilience comes from the emergency management perspective and addresses community-wide planning, such as NIST’s Community Resilience Planning Guide, the Plan Integration for Resilience Scorecard, and FEMA’s National Floodplain Insurance Program Community Rating System. These relatively new resources primarily address environmental hazards and the planning to minimize damage. There are very few resources for guiding or assessing the resilience of infrastructure at the systems level as it serves the community in the built environment.

The Envision® guidance and rating system for sustainable infrastructure attempted to fill this gap by focusing on individual infrastructure projects, the materials to build and maintain them, and how they contribute to the community. The Institute for Sustainable Infrastructure (ISI) released Envision in 2012 as a collection of best practices to help infrastructure professionals make better decisions during the lifecycle of all types of infrastructure. Envision translates community-wide sustainability and resilience goals into actions on individual projects.

ISI defines sustainability as “A set of environmental, economic, and social conditions in which all of society has the capacity and opportunity to maintain and improve its quality of life indefinitely without degrading the quantity, quality, or availability of natural resources and ecosystems.”

ISI defines resiliency as “The ability to successfully adapt to and/or recover readily from a significant disruption.”

Therefore, ISI considers resilience part of sustainability. The concept of resilience, much like the concepts of stakeholder engagement and lifecycle considerations, is specifically addressed and also inherently included in all of the Envision concepts.

After five years of implementation, ISI updated Envision in 2018. Envision v3 addresses 64 concepts, or credits, organized into five categories: Quality of Life (QL), Leadership (LD), Resource Allocation (RA), Natural World (NW), and Climate and Resilience (CR). Each credit can have up to five levels of achievement (Improved, Enhanced, Superior, Conserving, and Restorative), each with a different point value. Envision version 3 includes 11 new credits, 8 significantly rewritten credits, and numerous revisions. The definitions, goals, and points for each credit are detailed in a guidance manual and online scoresheet.

Resilience-specific credits are included in the Climate and Resilience category (formerly known as Climate and Risk). This category went from 8 credits out...
of 60 total (13%) to 10 out of 64 (16%) as listed in Table 1. It also went from 127 points out of 845 total (15%) to 200 out of 1,050 (19%). The percentage of points in both the Climate and Resilience and Leadership categories increased with corresponding decreases in other categories creating more of a balance of points (and emphasis) across the categories (Figure 1).

The increase in the number of credits and points in the Climate and Resilience category was due to two causes: (1) the growing body of knowledge on resilience and (2) clarification and reorganization of Envision credits. This included:

- CR1.1 Reduce Net Embodied Carbon is a new approach on the topics addressed in v2 credits RA1.1 Reduce Net Embodied Energy and RA1.4 Use Regional Materials. Carbon is a proxy to compare materials in favor of renewable materials and reduction in pollution.
- CR1.2 Reduce Greenhouse Gas Emissions now includes a minimum target reduction.
- CR1.3 Reduce Air Pollutant Emissions was significantly rewritten to clarify the targets.
- CR2.1 Avoid Unsuitable Development was significantly rewritten from parts of v2 credits CR2.2 Avoid Traps and Vulnerabilities, NW1.4 Avoid Adverse Geology, and NW1.6 Avoid Unsuitable Development on Steep Slopes to address hazards related to site selection and configuration traps.
- CR2.2 Assess Climate Change Vulnerability was expanded to include four levels of achievement.
CR2.3 Evaluate Risk & Resilience combines v2 credits CR2.2 Avoid Traps & Vulnerabilities, CR2.3 Prepare For Long-Term Adaptability, and CR2.4 Prepare For Short-Term Hazards.

CR2.4 Establish Resilience Goals & Strategies is a new credit encouraging the development and transparency of clear goals.

CR2.5 Maximize Resilience includes aspects from v2 credits CR2.3 Prepare For Long-Term Adaptability and CR2.4 Prepare For Short-Term Hazards as well as accountability for LD2.1 Establish A Sustainability Management Plan (v2 credit LD1.2 Establish a Sustainability Management System).

CR2.6 Improve Infrastructure Integration was moved from the Leadership category (v2 credit LD2.2 Improve Infrastructure Integration) to recognize the resilience of integrated systems.

CR0.0 Innovate or Exceed Credit Requirements was extended to allow the achievement in three ways: (1) exceed the requirements for any existing credit, (2) demonstrate innovation, or (3) include sustainable actions not otherwise covered (such as managing heat island effects, which was v2 credit CR2.5 Manage Heat Island Effects).

In total, 25 of the 64 Envision credits are related to resilience (the additional 15 credits outside the Climate and

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**Table 2. Additional Envision v3 Credits Related to Resilience**

<table>
<thead>
<tr>
<th>Envision v3</th>
<th>Relationship to Resilience</th>
</tr>
</thead>
<tbody>
<tr>
<td>QL1.5 Minimize Light Pollution</td>
<td>Minimize pollution</td>
</tr>
<tr>
<td>QL0.0 Innovate or Exceed Credit Requirements</td>
<td>Innovation</td>
</tr>
<tr>
<td>LD2.1 Establish A Sustainability Management Plan</td>
<td>Minimize pollution</td>
</tr>
<tr>
<td>LD2.3 Plan For Long-Term Monitoring &amp; Maintenance</td>
<td>Durability / adaptability</td>
</tr>
<tr>
<td>LD2.4 Plan For End Of Life</td>
<td>Durability / adaptability</td>
</tr>
<tr>
<td>LD3.3 Conduct a Lifecycle Economic Evaluation</td>
<td>Affordability</td>
</tr>
<tr>
<td>LD0.0 Innovate or Exceed Credit Requirements</td>
<td>Innovation</td>
</tr>
<tr>
<td>RA1.1 Support Sustainable Procurement Practices</td>
<td>Minimize pollution</td>
</tr>
<tr>
<td>RA1.2 Use Recycled Materials</td>
<td>Minimize pollution</td>
</tr>
<tr>
<td>RA1.3 Reduce Operational Waste</td>
<td>Survivability</td>
</tr>
<tr>
<td>RA1.4 Reduce Construction Waste</td>
<td>Survivability</td>
</tr>
<tr>
<td>RA2.1 Reduce Operational Energy Consumption</td>
<td>Minimize pollution</td>
</tr>
<tr>
<td>RA2.2 Reduce Construction Energy Consumption</td>
<td>Minimize pollution</td>
</tr>
<tr>
<td>RA2.3 Use Renewable Energy</td>
<td>Minimize pollution</td>
</tr>
<tr>
<td>RA2.4 Commission &amp; Monitor Energy Systems</td>
<td>Minimize pollution</td>
</tr>
<tr>
<td>RA0.0 Innovate or Exceed Credit Requirements</td>
<td>Innovation</td>
</tr>
<tr>
<td>NW0.0 Innovate or Exceed Credit Requirements</td>
<td>Innovation</td>
</tr>
</tbody>
</table>

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Figure 2. Kunia Country Farms (Hawaii) earned Envision Gold in 2016 in part for using repurposed shipping pallets for garden beds, minimizing electricity required by maximizing gravity flow, and generating 100% of the project’s energy needs from onsite solar.
Resilience category are listed in Table 2. These credits represent 39% of the total points.

The remaining 39 credits don’t necessarily exclude resilience, but they do not focus on specifics of resilience in terms of a product, project, or infrastructure system. For example, the Natural World credits could be considered to address the resilience of the earth as a whole. The Quality of Life and Leadership credits could be considered to address the resilience of a community or all society. Many of the Envision credits are related to other credits, so the definition of resilience, or, in implementation, the definition of the project boundary, is necessary to describe the resilience in each credit.

Back to the initial question…Is resilience sustainable?

• By most definitions (including ISI’s), resilience falls under sustainability. Something must be resilient to be sustainable, but it can be resilient and not sustainable. So, resilience can be sustainable.

• As the growing body of knowledge on resilience (such as the increasing number and stringency of Envision credits and criteria) shows, we can sustain our efforts to be resilient in order to create more resilient infrastructure and communities.

The authors will give a presentation on this topic at PWX 2018 in Kansas City, Missouri. Their session is entitled “Is Resilience… Sustainable?” and takes place on Tuesday, August 28, at 4:00 p.m. Denise Nelson can be reached at (804) 363-7437 or Denise@bgllc.net; Fariborz Tehrani can be reached at (559) 278-1762 or ftehrani@csufresno.edu.
Emergency! Disaster! Crisis! Catastrophe! Calamity! Cataclysm!

The term “emergency” defines a sudden and unforeseen incident of significant risk to people and property that requires immediate response. Emergencies can occur anytime, anywhere. The scale and scope of emergencies varies depending upon the type and magnitude of a disaster and the demographic, physical and economic characteristics of the affected communities. Though some types of disasters are more likely to occur in specific regions—for example, earthquakes in coastal California, tornadoes in the Great Plains and hurricanes along the Gulf Coast—nearly all areas of the U.S. are vulnerable to floods and windstorms. Whatever the cause, public works will have an important role in emergency management.

Plan and prepare for emergencies: if you wait, it’s too late!

Dave Bergner, M.A., PWLF, Principal, Monte Vista Associates, LLC, Mesa, Arizona; Member, APWA Road Safety Subcommittee; Presenter, PWX 2018
FEMA defines an emergency as:

“an occurrence, natural or man-made, that requires a response to protect life or property. Under the Robert T. Stafford Disaster Relief and Emergency Assistance Act, an emergency means any occasion or instance which, in the determination of the President, federal assistance is needed to supplement state and local efforts and capabilities to save lives and to protect property and public health and safety, or to lessen or avert the threat of a catastrophe in any part of the United States. This includes major disasters, terrorist attacks or threats, civil unrest, wildland and urban fires, floods, hazardous materials spills, nuclear accidents, aircraft accidents, earthquakes, hurricanes, tornadoes, tropical storms, tsunamis, war-related disasters, public health and medical emergencies, and other occurrences requiring a response.”

Furthermore, the basic premise of the National Incident Management System (NIMS) is that all incidents begin and end locally. The federal government supports state, tribal, and local authorities when their resources are overwhelmed or anticipated to be overwhelmed. The intention of the federal government in these situations is not to command the response, but rather to support the affected state, tribal, and local authorities.

Though the federal government may provide supplemental assistance to state and local entities in a major disaster, it is important to keep in mind that:

- All emergencies are local.
- Most disasters are caused by natural events.
- Local governments are expected to handle the immediate response for the first 72 hours.
- Local governments are responsible for the recovery phase.
- The extent of damage and injuries may not meet state and local thresholds for assistance.
- The local government remains in charge even if state or federal assistance is provided.

According to FEMA, 95% of all emergencies are of the Types 1-3 categories which are local, short-term incidents. (Type 2 is more regional in scope and Type 1 is of national significance.)

What this means is that public works agencies will be responding, to some extent, in nearly all local emergencies. More importantly, public works is typically in charge for recovery. Public works departments have lots of experience with windstorms, localized flooding, snow and ice storms, water main breaks, pavement failures, rock/mudslides, damaged traffic signals and streetlights, traffic incidents, haz-mat spills, etc. Because they are normally handled without assistance or reimbursement from a state or federal government, local agencies may view them as just “routine.” But what about larger, longer-term emergencies? Are public works agencies fully prepared to effectively sustain a complex response and recovery operation following a major disaster?

The popular image of “first responders” is police cars, fire trucks and ambulances rushing in with sirens blaring and blue and red lights flashing. In the background, hardly if ever recognized, are the flashing yellow lights of local public works. We may not be involved in every emergency, but when we are needed—to clear and repair the roadways,
establish temporary traffic control and assist with search and rescue—we must be ready.

DHS places public works in its Emergency Services Sector along with law enforcement, fire and rescue, emergency medical services and emergency management. The mission and structure of the other disciplines is centered on response to emergencies. Public works departments, in contrast, focus on the planning, design, construction and maintenance of infrastructure and provision of certain services. Response to emergencies has been considered a “call us when you need us” mindset. Now, public works agencies must change from reactive to a proactive stance and include all phases of emergency management—preparedness, response, recovery and mitigation—as a vital function.

APWA recently adopted a “First Responder” symbol for public works. But it takes more than just slapping on an emblem patch, T-shirt or decal to be a real “First Responder.” Public works personnel must be properly trained in the same fundamentals of emergency management as the other responder disciplines. “Learn It to Earn It.”

NIMS training, based on the Incident Command System (ICS), is required under Homeland Security Presidential Directive (HSPD-5) for agencies to receive federal funding, grants, training, and reimbursement of disaster recovery costs. The basic courses for all responders and support personnel are IS-100, Introduction to Incident Command System, and IS-700, Introduction to NIMS. Managers, supervisors, and others who lead crews or teams should also take IS-200, ICS for Single Resources & Initial Action Incidents. Additionally, mid-level managers and above should take IS-800, Intro to the National Response Framework and ICS-300, Intermediate ICS. Department directors, division chiefs and superintendents should take ICS-400, Advanced ICS. Public works staff at all levels must be prepared to fully integrate into Incident Command roles onsite or at the city, county or state Emergency Operations Center.

Other IS courses pertinent to public works:
- IS-552 P.W. Role in Emergency Management
- IS-554 Emergency Planning for P.W.
- IS-556 Damage Assessment for P.W.
- IS-558 P.W. in Disaster Recovery
- IS-559 Local Damage Assessment
- IS-632 Introduction to Debris Operations
- IS-633 Debris Management Plan Development
- IS-634 Introduction to FEMA’s Public Assistance Program
- IS-775 EOC Management and Operations

The IS (Independent Study) courses can be taken through the Internet. ICS-300 and 400 courses are classroom-only over several days. Each state’s emergency management office arranges these and other EM courses. (More information is available at: https://www.fema.gov/pdf/emergency/nims/nims_training_program.pdf)

Beyond the requisite training, public works agencies need to be properly organized, staffed and equipped. The “Four P’s” of Plans, Policies, Protocols and Procedures must be developed, kept current and incorporated into regular activities; for instance, using the Incident Command System for winter maintenance operations. Annual “refresher” sessions for all are important. Also, public works key personnel should regularly meet with counterparts from police, fire, utilities, and other departments and agencies to review overall emergency management plans and activities.

Lastly, every public works agency should make preparation a constant process, a matter of routine. Refueling vehicles and equipment by end of each workday; regularly checking the condition, quantity and presence of essential tools and supplies; frequently testing auxiliary communication and information systems; inspecting facilities for deficiencies and hazards; having contracts in place for additional resources; renewing Mutual Aid Agreements; and at least semi-annually updating contact lists of staff and other departments, agencies and jurisdictions. Emergencies often happen at night and on weekends; when you get that call at 3:00 on a Sunday morning of a three-day holiday (personal experience), you’ll want to be confident that your agency can promptly and fully respond.

Dave Bergner is a retired Public Works Superintendent and former Emergency Services Planner. He has completed over 100 FEMA courses and earned the Advanced Professional Series Certificate. He will give a presentation on this topic at PWX 2018 in Kansas City, Missouri. His session is entitled “Planning and Preparing for the Next Emergency: If You Wait, It’s Too Late” and takes place on Monday, August 27, at 3:00 p.m. He can be reached at (480) 699-4043 or dlbergner@gmail.com.
Economic impacts of local recycling processing: a circular economy study of the City of Phoenix

Mara DeFilippis, ENV SP, Project Engagement Manager, Arizona State University, Tempe Arizona; Joseph P. Giudice, Assistant Public Works Director, City of Phoenix, Arizona; presenters, PWX 2018

There are roughly 1.5 million people living in Phoenix, Arizona, who dispose of waste every day. Instead of transporting waste to sit in a landfill—a huge economic cost on its own—the City of Phoenix wants to turn something unwanted into something good: a vibrant and resilient regional circular economy. In a circular economy, “trash” is diverted from the landfill and repurposed or recycled as raw materials for new products or energy. In Phoenix’s case, “trash” is converted into local economic development.

Recognizing this opportunity to transform waste into value, the City of Phoenix developed the “Reimagine Phoenix: Transforming Trash into Resources” initiative for the City’s municipal services to reach a goal of 40% diversion by 2020 and zero waste by 2050. Recognizing that success is best achieved with effective teams, Phoenix partnered with Arizona State University (ASU), home to the nation’s first comprehensive School of Sustainability, to establish a network of academics and practitioners focused on creating value and economic development opportunities from solid waste streams.

This partnership established the Resource Innovation and Solutions Network, or RISN, to convene stakeholders throughout the metro Phoenix area and across the world. RISN collaborates via partnerships, proposes real-world projects such as a regional green organics system design, economic impact analyses and a circular economy business incubator, and grows a global network that solves resource management issues and furthers circular economy efforts. The impacts of RISN begin with increased local and regional collaboration, waste aversion, diversion, and better use of diverted materials. More importantly, these initiatives focus on economic development outcomes: creation and growth of firms and jobs.

In November 2017, RISN published the second of a two-part economic impact study implemented by the Seidman Research Institute at ASU. The first study, “Recycle, Repair, Reuse: Gross Economic Impact Estimates of Existing Circular Economy Activities in Maricopa County,” estimated circular economy activities could contribute a maximum of $1.9 billion to the Gross State Product of Maricopa County in 2014. It also estimated that circular economy activities could account for up to 35,454 jobs and $1.2 billion in labor income in Maricopa County in 2014, thereby generating $158.5 million in tax revenues for state and local governments.

The second study, “The Circular Economy: Quantifying the Gross Maximum Economic Contribution of Materials in the City of Phoenix Waste Stream,” was designed to identify and quantify the gross maximum economic impacts of waste diversion options for the currently recycled and additionally recoverable tons of plastic, glass, metals, and paper in the Phoenix municipal waste stream. The Seidman Institute modeled the four waste streams using REMI software and data from a 2015 waste characterization study commissioned by Phoenix and implemented by Cascadia Consulting Group with U.S. Bureau of Labor Statistics NAICS codes. The findings of this report included the following:
Plastic

- One of the quickest potential opportunities for Phoenix from a recycled plastic perspective could be to focus on the processing of post-consumer PET into flakes or pellets to be sold as a feedstock for domestic manufacturers.
- The 2015 waste characterization study estimates that Phoenix already recycles 4,859.8 tons of post-consumer PET each year and could potentially divert an additional 4,245 tons from its municipal waste stream. This is sufficient volume to supply a post-consumer PET flake or pellet processing facility.
- The construction of this facility and five consecutive years’ operations could cumulatively increase Gross State Product (GSP) by a gross maximum of $113.5 million in the State of Arizona and real disposable personal income by a gross maximum of $57.2 million. It could also result in the diversion of more than 9,000 tons of PET annually.
- Approximately 50 people could be directly employed at the plant during each year of operation. For every 1 job-year of direct employment created at the processing firm, up to 3.1 job-years of additional employment could be created elsewhere in Maricopa County.

Glass

- Phoenix is currently home to a recycled glass processor employing 15 people and handling 50,000 tons of recycled glass each year.
- The economic impact of processing the additional 4,591.4 tons of recoverable glass alone during the six-year study time horizon could increase Arizona GSP by a gross maximum of $11.4 million, and real disposable personal income by a gross maximum of $5.7 million over the 6 years.

Metal

- Most of the scrap metal in Phoenix is obsolete because it’s predominantly sourced from automobiles, appliances, air conditioners, and other metallic objects that have ended their useful lives.
- The 2015 waste characterization study estimates that Phoenix already recycles 3,975.8 tons of metal each year and could potentially divert an additional 6,799.3 tons from its municipal waste stream.
- This increase in volume could be easily handled by the existing local scrap metal stakeholders, without any additional investment in jobs and equipment.
- To generate additional local economic benefits, the City therefore needs to either encourage existing manufacturers to expand their local operations or attract new manufacturers that utilize recycled metal to the Valley.

Paper

- There is an insufficient supply of currently recycled and additionally recoverable old corrugated containers within the Phoenix waste stream to meet the fiber inputs of a recycled corrugated box plant.
- A multi-state approach to paper recycling could result in reciprocal circular economy benefits. For example, the City could potentially ship its recycled newspapers, magazines, and printed materials to an existing deinking/pulp manufacturer operating in another state in return for the other state’s corrugated boxes for local processing in the Phoenix area.

The gross maximum total economic impact of a new PET processor alongside additional glass and metal feedstock recycling in the city of Phoenix, could cumulatively add up to $124.9 million to GSP and $63.0 million to real disposable income over the six-year study horizon. This excludes a new paper recycling facility due to the insufficient volume of recycled paper available in the city.

Phoenix’s total amount of curbside recycling would also increase by 15,635.7 tons. As a result, Gross State Product in Arizona could increase by a gross maximum total of $124.9 million, 2017-2022; and real disposable personal income could increase by a gross maximum total of $63 million, 2017-2022. Longer-term, if a multi-state supply could be agreed for a recycled corrugated box plant located in Phoenix, this could further increase the municipal waste recycling rate. It could also increase the annual gross maximum economic impacts previously estimated for PET, glass, and metal (combined) by up to more than 300%. You can see the recommendations and related opportunities at the link at the end of this article.

Due to the strategic findings of this second study, a third phase of this economic impact assessment is currently underway. The purpose of the third study is to evaluate the viability for regional processing solutions for PET plastic resource streams by assessing regional quantities, its respective economic impacts, evaluate the potential for market-based solutions that advance the local circular economy,
and then identify domestic companies that might utilize the feedstock.

Phoenix has identified 50 acres for the Resource Innovation Campus, a circular economy hub located at its 27th Avenue Transfer Station, one of two transfer stations operated by the City to process waste for more than 350,000 Phoenix households as well as municipal services. A Materials Recovery Facility (MRF) and a composting facility are currently located at the campus and this campus will ultimately house waste-to-resource and product-focused businesses and office space to host the RISN Incubator, a niche business accelerator for startup ventures developing new solutions to help drive a circular economy.

For more information, please visit https://sustainability.asu.edu/resourceinnovation/economic-impact-opportunity-circular-economy-phoenix/

_The authors will give a presentation on this topic at PWX 2018 in Kansas City, Missouri. Their session is entitled “Economic Impacts and Innovation Opportunities in Implementing a Circular Economy” and takes place on Monday, August 27, at 9:45 a.m. Mara DeFilippis can be reached at (602) 690-8105 or Mara.Defilippis@asu.edu; Joseph P. Giudice can be reached at (602) 262-6612 or joe.giudice@phoenix.gov."

“The Circular Economy is the next generation of manufacturing, and Phoenix is at the forefront with innovation. The sustainable products crafted and created by companies moving into this advanced industry sector will create job opportunities limited only by imagination.”

– Christine Mackay, Director, Phoenix Community and Economic Development

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FHWA Work Zone Safety Grant No. DTFH61-16-RA-00018
Public Works and the FCC: A natural combination

Marty Williams, Government Affairs Manager, American Public Works Association, Washington, D.C.

The APWA Government Affairs team continually seeks opportunities to show that our members are the “go to resource” to Congressional staff and federal agencies on all matters public works. One of the ways to accomplish this is by reaching out to federal agencies that may not immediately come to mind as a partner to public works, yet have a great impact on essential services such as safety. One of the agencies that I strongly believe can work with public works professionals in a greater capacity is the Federal Communications Commission (FCC).

Who or what is the FCC? What do they do? The FCC was formed by the Communications Act of 1934 to replace the radio regulation functions of the Federal Radio Commission. The FCC took over wire communication regulation from the Interstate Commerce Commission and is comprised of five commissioners, nominated by the President and confirmed by the Senate. Chairman Ajit Pai, Brendan Carr, Michael O’Rielly, and Jessica Rosenworcel make up the current FCC. There is one opening currently and President Trump has nominated Geoffrey Starks to fill that vacancy. Commissioners terms are five years in length. The FCC is responsible for the regulation of interstate and international communications by radio, television, wire, satellite, and cable in all 50 states, the District of Columbia and U.S. territories. It is an independent U.S. government agency overseen by Congress. Additionally, the FCC is the federal agency responsible for implementing and enforcing America’s communications laws and regulations.

Earlier this year, the FCC’s Public Safety and Homeland Security Bureau (HSB) conducted an analysis of the Integrated Public Alert and Warning System (IPAWS), the Wireless Emergency Alert (WEA) system and the Emergency Alert System (EAS). The goal behind the review was to provide the FCC with an opportunity to offer recommendations to improve these notification systems, where needed. Additionally, both the U.S. Senate and House of Representatives have conducted hearings focused on improvements and adjustments regarding how emergency information is disseminated to state and local agencies.

In February I had the opportunity to meet with Lisa Fowlkes, Bureau Chief of the Federal Communications Commission (FCC) Public Safety & Homeland Security Bureau; Debra Jordan, FCC Deputy Bureau Chief, Public Safety & Homeland Security Bureau; and Chris Anderson, FCC Operations and Emergency Management Division Chief following a February 2018 meeting with Marty Williams, APWA Government Affairs Manager. Among the topics covered during the meeting was the role played by public works professionals in emergency communications/operations.
spearhead their organizations’ emergency management and response efforts. The HSB is tasked with providing recommendations to, or acts for, the FCC in all matters pertaining to public safety, homeland security, national security, emergency management and preparedness, disaster management, and ancillary operations. During our meeting, it was apparent to me that Ms. Fowlkes wants her department to be inclusive, and that she and her team would value input from public works professionals.

Subsequently in April, I attended an FCC Workshop entitled “Identifying Critical Information Needs to Improve Communications During Disasters.” During the daylong workshop, I along with the others in attendance heard from locally elected officials, emergency management professionals, and members of the law enforcement community on their communication and information needs to improve response efforts during disasters. It was encouraging that many of the speakers recognized the need for involving public works professionals in these efforts—from start to finish.

As a general rule of thumb when I am meeting with a government official for the first time about public works, such as my meeting with Ms. Fowlkes, I approach the opportunity as a chance to impart some new information about the wide-ranging responsibilities of public works professionals and the challenges they face. It is very rewarding, and frankly never gets old to hear, “Wow, I didn’t realize public works was so involved in this particular area, but now it makes all the sense in the world.”

I believe that even more opportunities are available for APWA and the FCC to grow this relationship and that it will be mutually beneficial to both organizations. My intent in offering this short piece is to encourage APWA membership to comment or provide input on FCC (and other) regulations that impact your ability to tackle the demands facing public works staff day-in and day-out. I am confident that feedback provided by our members will be of enormous benefit to the FCC and to ongoing efforts to enhance existing emergency notifications efforts.

As public works professionals you are hard-wired to act to mitigate and respond to problems, and providing input to the FCC on matters that positively or negatively impact your duties is a tool and opportunity which should not be overlooked.

Furthermore, please don’t hesitate to reach out to me at mwilliams@apwa.net with any recommendations or input you have about challenges you encounter with the emergency alert system and how it may be improved.

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or over two decades the growing gap between the fixed Federal and State Motor Fuel Tax rates and increasing costs of construction have been subject to many editorials, columns, and discussions. At the same time, there was another fiscal influence hiding in plain sight: the manufacture of higher fuel-efficiency vehicles. The impact of these vehicles on the revenue stream was easy to overlook for many as the changes generally occurred in small increments, tenths of a gallon per year, and somewhat offset by the increased number of additional vehicles added to our roads annually. The impact of rising costs of construction and materials was easier to see.

In the last two years more than a dozen states have raised their fuel taxes, while the federal fuel tax has been at the same rate since 1993: 18.4 cents per gallon for gasoline, and 24.4 per gallon for diesel. That’s 25 years without an increase for inflation, and there are no current plans for an increase. The static levels of fuel taxes have required bailout of the national Highway Trust Fund (HTF), and have confounded federal efforts to launch a serious nationwide infrastructure improvement program.

As automotive technology advances, the gap between transportation funding and need for infrastructure improvements is only going to get worse. In 2017, three automakers announced plans to “cap the pump,” shifting more production to electric or other fuel sources in the next decade. Volvo is aiming for over one million alternative fuel cars by 2025, GM is planning to add 18 new electric models by 2023, and Ford also hints at a more electric future. As the technology around fuel cells and mileage increases, and if manufacturers restrict traditional fossil fuel engines, the possibility of an unprecedented rapid decrease in fuel consumption exists, meaning a parallel decrease in tax revenues.

This decline in gas tax revenues may well mirror the current revenue losses that communities have experienced with other user fees, on historically stable sources such as telecommunications fees and utility taxes. During the past eight years, my community of Largo, Florida, saw a marked decrease in revenues from utility fees. Initially blamed on the economic recession, it slowly became apparent that these long-dependable dollars were not coming back to pre-recession levels as they had in the past. Instead the decline in utility fee revenues would become permanent, due to societal change. As people from multiple generations “cut the cord,” the number of home phone lines dropped, reducing local telecommunications tax revenues. Similarly, the advent of energy efficiency programs and rebates reduced energy usage as residents took advantage of rebate and tax credit programs to replace older stoves, air conditioners and refrigerators, but it also reduced city income from previously reliable utility taxes.

In 2014, it was estimated that the federal gas tax generated revenues of $35.2 billion: $25 billion from gasoline sales, and $10.2 billion from the sale of diesel fuel. Consider that in 2014 there were approximately 253 million cars on the road, and the average fuel economy was 25.4 MPG for all light-duty vehicles, so the annual average fuel tax paid was about $100 per vehicle.

**Vehicles of the Future: Good for the environment; bad for highway funding**

**Brian Usher,** Director of Public Works, City of Largo, Florida; APWA National Past President; Member, APWA Government Affairs Committee
Approximately 17 million new passenger-type vehicles were sold in 2015, which translates to 6.5% of the 263 million such vehicles on the road. If, due to manufacturing changes, we were to see 20% of these vehicles change to a non-petroleum type fuel (3.4 million), it would translate to a decrease in the annual fuel tax income of $340 million. If the same change were to occur each of the next three years, it would equate to a loss of over $1 billion in gas tax revenues, a significant impact to our infrastructure funding strategy—and this only addresses the federal fuel tax. Factor this loss now onto each state, county and local agency, and the overall impact of alternative fuel vehicles rises sharply. This loss in revenues has already led to Congressional bailouts for the HTF; within a decade, the loss will be dramatic. We need to readjust our revenues, or readjust our expectations for safe, high-quality transportation facilities.

Initial efforts are underway in some regions to address this looming shortfall. California is adding $100 in fees to Electric Vehicle (EV) registrations. Maine is considering implementing an EV and hybrid fee to offset their projected losses. Georgia imposes $200 per alternative fuel vehicle, while Colorado, Idaho, Michigan, Missouri, Nebraska, North Carolina, Virginia, Washington, and Wyoming all have fees lower than that. As noted in the June issue of the APWA Reporter, a dozen states have pilot programs or are evaluating the notion of a fee per mile system as a more reliable way of funding transportation infrastructure.

Change in government is not traditionally speedy, and raising revenues or other taxes is very unpopular to a large segment of the population, unless a clear benefit can be defined for the voter. Already, there is a shift in the highway funding paradigm—with greater responsibility being taken by states and local governments, away from the historical model of the federal government absorbing a large share of the costs.

As stewards of our nation’s infrastructure, public works professionals are responsible for raising our voices about this decline in transportation resources. We need to support our leaders in developing new funding methodologies, such as vehicle miles-traveled fees, so that we will have clear, efficient methods to replace our dwindling transportation funding.

Brian Usher can be reached at (727) 587-6741 or busher@largo.com.

Advocacy: It is up to all of us to keep fighting the good fight!

Lisa Rapp, Director of Public Works, City of Lakewood, California
Chair, APWA Government Affairs Committee

As I end my term serving on APWA’s National Government Affairs Committee (GAC), I would like to take a few minutes to reflect on my time on the committee and as the Chair. Although I had some experience advocating for public works issues at the state and local levels, I was initially a bit intimidated about doing the same at the federal level, particularly in Washington, D.C. I was lucky to have an experienced member of the GAC, Kurt Corey, invite me to come along with him to meet with his Congressman from Oregon. It was a friendly and cordial meeting where Kurt spoke with the Congressman as if he were an old friend. It gave me the confidence to enter the office of my Congressman later that afternoon. I found Congressman Lowenthal and his staff to be interested and engaged, and most of all, they were really nice people who wanted to hear from their constituents about the needs back home. From that day forward, I tried to approach all of the meetings that I have had with members and staff in the same way, with a goal toward educating them on our important issues and offering our help to them as a technical resource in the future.

One thing that I can share is that the more I have worked with the GAC over this past six years, the more energized I have become in the advocacy arena. In California, I have chaired our California Chapters Advocacy Committee for several years. I plan to remain very active in this committee because the issues facing public works professionals in California are many and critical. We celebrated the passage of SB-1 in April 2017 and subsequent signature by the Governor. This landmark bill raised California’s gas taxes and fees for the first time since 1993, and nearly doubled transportation funding for most local jurisdictions in the state, providing the means to advance badly needed transportation projects statewide.

No sooner than the money began to flow, there was an effort to gather signatures by opposition leaders to repeal this funding source. At the end of June 2018, the Secretary of State certified Proposition 6 for the November 2018 ballot. Public works professionals must now join with cities, counties, organized labor, contractors, and more stakeholders to defeat this proposition at the ballot box. Loss of this revenue source will indeed be devastating, and urgent projects underway around the state will be stopped in their tracks. Since advocacy is education, public works professionals in California will need to make a personal effort to educate their families, friends and neighbors on what the transportation funding means to them and their communities.

Although it may sometimes seem that advocacy is a daunting, uphill battle, I can assure you it is both worth the effort and is a necessary undertaking. Who would know better than we do about infrastructure, transportation, water, the environment, and emergency preparedness? Who could tell our story better than us who live it every day? Do our efforts make a difference? Yes, they do. It was California’s public works professionals delivering a consistent message, backed up with documented facts and figures, that our roads, highways and bridges were failing. That message sold the Governor and the members of the legislature on the need for SB-1 to fund transportation improvements. Now that Proposition 6 is on the ballot to rescind SB-1, it will take that same consistent messaging to our families, friends and neighbors to assure that our good work will not be undone.

As I leave the GAC and move on to other volunteer opportunities with APWA, I plan to continue to advocate at all levels of government. I encourage you to tell your story to your elected officials at the state and federal levels. Be the technical expert that the elected officials know, trust and seek out. Advocate for the needs of your community and region. And know that it all makes a difference!

Lisa Rapp can be reached at (562) 866-9771 or lrapp@lakewoodcity.org.
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scar Wilde once wrote that a cynic was “a man who knows the price of everything and the value of nothing.” With the country’s 150th anniversary, Canadians were reminded of the great infrastructure projects that helped shape our nation. Transformative mega-projects like the Transcontinental Railway and the St. Lawrence Seaway were driven by the vision of building a better nation and, though they certainly cost a great deal, they provided immeasurable value that is still being delivered today.

Unfortunately, there is a trend in the building community for the procurement of public and private projects to be driven by a desire to secure the lowest cost instead of delivering the greatest value. This has been problematic in the past, as deteriorating infrastructure designed and delivered by the lowest-cost bidder illustrates, and it will be increasingly unsustainable going forward as the need for environmentally-responsible design grows with accelerating climate change.

The risks of focusing on price, instead of value, are no more acute than in the earliest stages of a project when the creative talent that guides these projects are retained. An incredibly small variance in consulting fees for architects, engineers, and their design teams can easily make a hundredfold difference in the value and public benefit of the project that gets delivered. For this

Quality-Based Selection

Stop thinking about cost and start thinking about value

John Stephenson
President
Ontario Association of Architects
Toronto, Ontario

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reason, a shift to a process of Quality-Based Selection (QBS) for the design teams that produce important public infrastructure projects is long overdue.

New evaluation
At its most basic, QBS is a competitive procurement process in which firms submit qualifications to an owner who evaluates and selects the most qualified firm based on the specified needs of a project, and not according to the lowest bid submitted. This allows architects and engineers to cut fees to below the point where services can be provided at an acceptable level of quality. This undermines the ability of professionals to respond appropriately to the many indeterminate challenges faced in delivering on a project in a way that advances the public interest.

QBS is sometimes misunderstood to be a driver of cost, as it is generally believed that the public is best served when the lowest price is obtained, but this common misperception confuses the “cheapest price” with the “best value” or even the “lowest cost.” A focus on lowest price ignores the fact that architectural and engineering services are not commodities, and their procurement cannot effectively be obtained in this manner; architects are creative professionals who develop solutions to design problems. Best value and even lowest cost, especially when considering the very long life of public infrastructure, is in fact most often achieved when a focus is placed on finding the most innovative and effective long-term solution to a design problem, one that considers the widest range of socio-economic project goals. This takes time and effort.

Decisions made by architects and engineers have an impact on the entire life of a project. The standard range for fees for architectural services are a micro-slayer of the total project’s cost, and it has been consistently demonstrated that an upfront investment in design services can deliver a significant return over the life of a building.

In contrast, primarily fee-based selection rewards firms for using fewer resources—such as less experienced and less senior staff, or fewer hours—which can translate into reduced service, utility, and sustainability. By rewarding the lowest bidder, firms with a greater appreciation of client needs are disadvantaged, as are firms that accurately anticipate complications and propose innovation. This inevitably compounds costs on the client and end-user side.

A focus on lowest price ignores the fact that architectural and engineering services are not commodities, and their procurement cannot effectively be obtained in this manner; architects are creative professionals who develop solutions to design problems.

It should also be noted that QBS does not preclude the consideration of price in the overall process. Instead, it allows for it to take place at the most appropriate and meaningful stage of the selection process, when the scope of services has been decided upon with a preferred candidate who has a clear understanding of the project.

Canadian and U.S. studies report that design typically represents less than one percent of a project’s lifecycle cost, with construction accounting for six to 18 percent. The remaining bulk of costs are taken up by operations, maintenance, refurbishment, and decommissioning—all items that can be reduced significantly by increased investment.
in front-end architectural design. And this does not even begin to consider the broader environmental and societal costs of badly designed public buildings and infrastructure.

In its guide on selecting a consultant for sustainable municipal infrastructure, developed jointly with the federal government, the Federation of Canadian Municipalities noted that the return on investment is 11:1 when a lifecycle analysis is applied. As such, investing an additional $40,000 into design can result in lifecycle savings of more than $400,000.

While the benefits of QBS are evident from case studies in jurisdictions where it is required for public projects, the federal, provincial, and municipal levels of government have been slow to adopt a bidding system that is clearly in the public’s best interest. According to the World Economic Forum (WEF) 2017 Global Competitiveness Index, over the past five years Canada’s ranking on the overall quality of its infrastructure has steadily declined from 15th place in 2012, to 23rd this year. The WEF also warns that 20 percent of our country’s buildings and transportation infrastructure are now in critical condition.

Governments at all levels should make the adoption of Quality-Based Selection for architects and engineers a priority, especially as the need for major new investments in public infrastructure are both evident and urgent. As Canada seeks to build for the future, a shift toward QBS would help ensure that public funds are well spent and that future generations are well served. This would be a first step towards keeping the procurement cynics away from the obtaining of valuable design services for the benefit of public projects.

John Stephenson is the president of the Ontario Association of Architects.

As Canada seeks to build for the future, a shift toward QBS would help ensure that public funds are well spent and that future generations are well served.
Flooding is a serious challenge in Canada. In the 1980s, Canadian insurers spent approximately $400 million on weather-related insurance payments and, over the last ten years, those numbers have risen to in excess of $1 billion. In 2017 alone, overland flooding resulted in over $590 million in insured damage across Canada, with spring flooding striking B.C.’s Thompson-Okanagan region and heavy rains causing flooding in Saskatchewan, Ontario, Quebec, and Atlantic Canada.

Because flooding is a transboundary issue, and provinces and territories have jurisdiction over different areas of water management in Canada, flooding is a difficult challenge to manage and requires the involvement of many stakeholders.

As a first step towards developing a national strategy to manage flood risk, Public Safety and Emergency Preparedness Minister Ralph Goodale hosted a National Roundtable on Flood Risk in Regina in November of 2017. In the Capital Ballroom at the DoubleTree by Hilton, Public Safety Canada (PSC) staff, the Insurance Bureau of Canada (IBC), and representatives from the Canadian Water Resources Association (CWRA), Canadian Water and Wastewater Association (CWWA), Federation of Sovereign Indigenous Nations (FSIN), International Institute for Sustainable Development (IISD), Federation of Canadian Municipalities (FCM), and federal and provincial/territorial government leaders met to coordinate its efforts to managing flood risk.

Sarah Boon
Science Communications Expert
Founding member of Science Borealis

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Heavy rains, combined with melted snow, engulfed homes and business in eastern Ontario, western Quebec, and parts of New Brunswick in May 2017. This photo was taken on Rue Cousineau in the Cartierville neighborhood of Montreal, May 8, 2017. For the first time since the ice storms of 1988, the city of Montreal declared a state of emergency due to flooding.
discuss the many considerations for such a strategy.

Minister Goodale also requested that the IBC chair a working group on financial risk and consumer awareness, with a mandate to provide options to the federal/provincial/territorial ministers of Public Safety on May 25, 2018. The working group, which included all major Canadian insurance companies, underwriters, realtors, banks, and mortgage lenders, met at the end of March. Their task was to begin construction of a road map for creating the necessary conditions to transfer affordable/insurability risk to the private sector prioritizing increased consumer awareness options for restructuring Disaster Financial Arrangements to address residual residential/commercial risk and public infrastructure in a financially sustainable manner.

**Integrated approach**

Canada is a signatory to the UN’s Sendai Framework for Disaster Risk Reduction, which is a voluntary, non-binding agreement adopted by UN member states in 2015 that recognizes that “the State has the primary role to reduce disaster risk [and] that responsibility should be shared with other stakeholders including local government [and] the private sector.” To ensure that Canada is flood-ready and meets its obligations under the Framework, the federal government established a National Disaster Mitigation Program (NDMP) in 2014 to address rising flood risks and costs and a Technical Working Group on Flood Mapping (TWGFM) in 2015. In 2017, they also released a Federal Floodplain Mapping Framework under the leadership of the Flood Mapping Committee, a partnership between PSC, Natural Resources Canada, National Research Council of Canada, Defence Research and Development Canada, and Indigenous and Northern Affairs Canada. Drawing on the government’s geospatial and national mapping expertise, the goal is to develop a National Flood Information Portal for all Canadians.

CWWA executive director Robert Haller participated in both the IBC and the TWGFM meetings. Haller said that CWWA wanted to ensure that Canadian municipal utilities’ interests were represented, and that all three types of flooding—fluvial from river overflow, pluvial from extreme rain events, and coastal from sea level and waves—were included. He noted that, in addition to better flood plain maps, Canadians also need maps of municipal stormwater capacity, and we need faster forecasting ability, particularly for extreme rain events.

CWRA president Sean Douglas’s organization has also been heavily involved in flood risk management, including hosting a flood workshop in 2016 and undertaking a review of the TWGFM’s guidance document last fall. Douglas’ main takeaway from the roundtable was that there is an “urgent need for Canada to establish national flood mapping standards supported by [...] training and communication to [...] help Canadians understand and prepare for [...] flood risk.”

Douglas recommended that the NDMP continue to be funded to support cross-country, multi-sectoral work around threats, costs, and risks associated with flooding. He said that accurate flood mapping is critical for making risk assessments, particularly since appropriate infrastructure upgrades and development plans can’t be made in the absence of such maps. “[The maps] will foster innovative technology solutions and mitigation measures to help protect existing and new developments from potential flood damage,” Douglas said.

**Public-private partnerships**

At an interview with Water Canada at the GLOBE Forum, Donald Forgeron, president and CEO of IBC, said, “Canadians should not face financial ruin as the result of a severe flood.” IBC supports a “whole of society” approach to reducing flood risk, which means incorporating all levels of government and stakeholders, the private sector, and the Canadian public.

Historically, Canadian home insurance policies haven’t covered loss or damage caused by overland flooding. However, through IBC’s leadership, some Canadian insurers have begun to offer overland flood coverage for policyholders. The challenge now is getting Canadians to access it. Increas-
ing consumer awareness was also a key outcome of the November roundtable and will be part of the ongoing working group effort.

“Collectively, we simply need to do a better job to face this risk head on. We can start by working together to educate and empower consumers,”
- Donald Forgeron

Forgeron added, “There is a need to ‘up the game’ of other private sector actors as we try to drive this message deeper into communities [...] Without a level of knowledge increase, all the things that governments want to do and behaviours that people want to change—none of that will move forward.” Private sector actors, like real estate agents and bank lenders, play an important role in ensuring their clients have the appropriate information regarding their exposure to climate risk, which will enable them to manage or avoid that risk as they see fit. In light of these risks, property owners and investors need to assume greater responsibility for their investment decisions. As a nation, we need to move beyond the status quo of government bailouts for climate risks, given that they are becoming more predictable and manageable, as new floodplain maps are created.

Looking to the future
The expanded FMC held their first meeting on April 5, 2018 and are exploring ways to share up-to-date flood data and interactive flood maps so that existing and future risks can be identified. The idea is to build on existing emergency management initiatives, including the NDMP. The expanded Flood Mapping Committee and the private-sector IBC committees reported to Public Safety Minister Goodale at a meeting of provincial and territorial public safety ministers on May 25, 2018. Future plans and priorities will be defined based on the recommendations of the working groups and those of an overarching advisory council to review their comments.

“Collectively, we simply need to do a better job to face this risk head on. We can start by working together to educate and empower consumers,” said IBC’s Forgeron.

Sarah Boon is a science communications expert and founding member of Science Borealis.

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Ask for a Demonstration!
Often the best laid plans and manufactured solutions fail. This can be especially true when dealing with issues in difficult areas that cannot be seen, such as dealing with soil and groundwater contamination.

Redevelopment in urban centres continues to be highly important as intensification pressures for more sustainable living and lifestyles increase. Brownfields are prime sources for redevelopment opportunities for multi-unit residential and various community uses.

Brownfields are generally defined as underutilized contaminated properties. Dealing with the contamination often requires innovative solutions to minimize human exposure risks for future property uses.

For brownfields where residual contaminants are left in place due to
feasibility, logistics, and cost considerations, a risk assessment process is completed followed by selection of appropriate risk management measures to eliminate the routes for possible human exposure. Examples of physical risk management measures (RMMs) can include barrier walls, soil caps, vapour barriers and diversion systems, restrictions on basement construction, or increased air-exchanges in buildings. Process-based RMMs can include restrictions on property use, prohibition on groundwater use, and routine monitoring of groundwater, soil vapour, and indoor air quality.

**When it fails**

Hundreds of stories can be told regarding successful contaminant mitigation and redevelopment of former industrial properties into productive and higher uses for the changing needs of today’s society. But what about those situations where the brownfield redevelopment plan fails and contaminants concentrations were not as predicted and/or the risk to human health was not mitigated?

In order to fully understand the issue at hand, we need to define failure and when it occurs. Failure would be considered to have occurred when the full assurances and precautions that have been taken to manage any residual contamination and minimizing exposure risks to below the acceptable risk of one in one-million are not met. For the purposes of this discussion, we will assume that all contamination has been identified and fully delineated. As such, we will assume that the failure has occurred due to another occurrence.

If redevelopment has not occurred, there would be no significant failure considerations, as the high costs to construct the proposed development have not yet been incurred as the project is stalled or passed on altogether.

In private developments, conventional financial models need to make sense before the property is even considered, as the return on investment (ROI) within an acceptable timeframe needs to be met. But with public opportunities for municipal or community use where tax-based finances are used in the redevelopment, often the ROI is not the deciding factor, but the needs of the community are. In these cases, it is questioned whether the best solutions are truly considered, or are the lowest cost solutions selected? We have all seen that far too often, you get what you pay for. However, fiscal responsibility with tax-derived public funds often demands the lowest cost solution be employed. Procurement practices and quality-based selection are the topics for another article.
Failure can occur due to inadequate design or product flaws, conditions that were unknown and/or unforeseen, or time constraint pressures. Further, changes in the subsurface conditions and contaminant interactions due to the development onsite, or due to unknown offsite activities, are the biggest contributors to failure. These condition changes can, and often do, result in altered contaminant migration pathways or exposure routes that were not accounted for in the risk assessment modeling and selection of risk management measures. Recall that we assumed that the failure occurrence is not a result of inadequate site characterization. Remedies for the failure can often be implemented after the fact (post development) to mitigate the changes, but at what costs, and from whose budget? If an error occurred, the cost recovery may need to be pursued through insurance settlements or legal actions. The cost recovery will take time, if successful at all.

Remedies, no matter what method or process chosen, come at a cost—a cost that will be higher than if implemented before the development. Remedies that are targeted on removing the source should ensure that exposure risks are minimized and will not present any future issues. Remedies targeting the result of the source should be considered as adhesive bandage solutions that may create future liabilities or failure scenarios.

Avoiding the remedies means avoiding the failure. With millions of dollars at stake, wouldn’t ensuring that failure does not occur be the correct course of action? Failure avoidance can be employed through safety factors, redundancies and formulating contingency plans.

Selection of appropriate risk management measures should be the contingency plan, employment of multiple risk management measures should serve as the redundancy, while the safety factor should be supplied through completion of the risk assessment. Shortcuts on cost or oversights due to time constraints will most certainly affect at least one of these methods.

Brownfield redevelopment can be extremely rewarding for the developer, project team, and community; however, when failure occurs during the process, it can also be one of the largest headaches. Ensuring that the best solution is selected and redundant protective measures are implemented into the development to mitigate exposure risks for the future users are paramount. This often comes at a cost, but in the end the cost will be much less than the cost of project failure.

Grant Walsom is a remediation engineer and partner at XCG Consulting Limited. He currently serves as the president of the Canadian Brownfields Network.
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MEDIA INSIGHT

ROM May 20-26, 2018, APWA and public works departments around the nation celebrated the 58th annual National Public Works Week (NPWW). This annual week-long celebration has been held during the third full week in May since 1960 and serves as an opportunity to recognize and honor the efforts of public works professionals: from providing clean water, to disposing of solid waste, to building roads and bridges or planning for and implementing mass transit, to their actions as first responders removing snow on roadways or devising or implementing emergency management strategies to meet the impacts of natural or man-made disasters.

NPWW is not only recognized by APWA and our members. On May 17, U.S. Senators James Inhofe (R-OK) and Kamala Harris (D-CA) introduced a bipartisan Senate Resolution recognizing the celebration of the week and the important contributions that public works professionals make every day to improve the public works infrastructure of the United States. Many states, provinces, cities/towns and municipalities from across North America also issued official government proclamations and resolutions in honor of the contribution public works makes to their communities.

The APWA D.C. office hosted two events on Capitol Hill to continue energizing and educating the public and legislators on the important contributions that public works professionals make every day to improve the public works infrastructure of the United States. The first event, “Donuts & Trucks,” took place on Tuesday, May 22, outside on the House side of the Capitol Building. The D.C.

Celebrating NPWW in the Nation's Capital

Emily Dowsett, Government Affairs Media Manager, American Public Works Association, Washington, D.C.
Department of Public Works (DPW) provided two vehicles for display, next to which APWA and D.C. DPW staff handed out donuts and coffee to legislators and Congressional staff as they made their way into work. APWA Executive Director Scott Grayson and D.C. DPW Director Chris Shorter were also in attendance, speaking to those making their way into work about the importance of continued infrastructure investment.

The following morning, APWA held a breakfast roundtable on “Public Works in Big Cities” in the U.S. Capitol Visitors Center. For this event, APWA brought together ten public works leaders from cities with 500,000 or more from across the country, to address Members of Congress and their staff about public works operations in their cities. Representatives Blumenauer, Costello and Jackson Lee also came to the event and spoke to the importance of public works advocacy on Capitol Hill.

Following the breakfast roundtable, APWA staff and the public works leaders were treated to a behind-the-scenes tour of DC Water Blue Plains Advanced Wastewater Treatment Plant, arranged by Director Shorter. After the tour, the group heard from Chris Peot, P.E., BCEE, and Annie White of DC Water about organics collection and the infrastructure planning that their operation is responsible for.

Once the tour was done, the group went back into the city for an afternoon session, where the public works leaders shared best practices with one another and discussed how moving forward their departments could stay in contact to continue to share ideas. The busy day was capped off with a reception at the Mansion on O Street, a D.C. “must-see” museum, full of quirky décor and memorabilia, ranked as one of the “Top Five Venues to Explore” by Smithsonian.

To cap off a busy NPWW, the following morning Executive Director Grayson joined the D.C. Executive Office of the Mayor Muriel Bowser and the D.C. DPW at their third annual “Great Graffiti Wipeout” kick-off event, where Director Grayson spoke to the important work that public works professionals do, eradicating graffiti and reducing illegal tagging citywide.

While NPWW 2018 has come and gone, APWA encourages all of our members to continuously work to find opportunities to make their stories known. While we may have to wait until next May to celebrate NPWW, we can still go out there and advocate for our industry. APWA is committed to being the “voice” of public works and our Government Affairs team will keep fighting for you, year-round on Capitol Hill.

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GET IT, LOVE IT, LEAVE IT!
t’s not news that batteries are big business and a target for improvement. From tiny hearing aids to cell phones to autos to wind farms, these chemical reservoirs of electrical energy are handy but heavy, expensive, potentially explosive, and problematic in waste processing. Researchers have recently reported a promising but certainly unusual ingredient for making batteries better: dried discarded apples.

According to the Yara, a Norwegian producer of crop nutrition (think fertilizers) and other ag products, over 63 million tons of apples are produced annually worldwide (about 40% in China!). Apples that are too small, malformed, or just too ugly to be marketed are often sent directly from harvest to waste because they spoil too quickly to be used even as cattle feed. However, they are about 95% carbon and can be processed to become “hard carbon,” the stuff of anodes for sodium-ion batteries.

Sodium-ion batteries are not yet commercial, but they are getting a lot of attention from researchers. Sodium-ion cells could be considerably less expensive than their lithium-ion cousins to produce and are potentially environmentally friendlier. Sodium is the fourth most abundant element on earth and is widely distributed. Lithium reserves, in contrast, are heavily concentrated in four countries; Chile is by far the leader in commercial reserves.

Sodium-ion batteries operate at a slightly lower potential than lithium-ion; their energy density would be comparatively lower. This might limit their application in electric cars but not for grid storage and other applications where battery size may be less of a concern.

In any case, finding the right materials for design and manufacturing of sodium-ion batteries is now the challenge. Hard carbons have emerged as a very promising material for anodes primarily because of low production cost. The material is synthesized at high temperatures from a variety of carbon-based precursors: In addition to ugly apples, for example, researchers have used mangosteen shell, a typical biowaste in southern Asian locales. Research is focused on getting good durability through repeated charge and discharge cycles and high coulombic efficiency, a measure of how much energy is lost in moving electrons through the medium. On both measures, research shows promise. The methods for producing anodes are showing promise of improvement as well.

Challenges remain, of course, before sodium-ion batteries with apples or other agricultural waste at their core become popular. Sodium is even more reactive than lithium (recall the news stories about exploding cell phones). However, the lithium-ion battery was invented only recently (in 1980 by American physicist John Goodenough) but quickly gained commercial prominence because of its ability to deliver high voltages from a compact and light package. Sodium could perform almost as well but at lower cost and with fewer political and environmental strings attached. The future could be peachy!

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.
You gotta keep ‘em calibrated

Bryan Beitzel, Maintenance Superintendent, Village of Buffalo Grove, Illinois; Benjamin J. Jordan, Director, Wisconsin Transportation Information Center, University of Wisconsin-Madison

Calibration of winter maintenance equipment is a best practice that should be a standard operating procedure for every public works department. The Village of Buffalo Grove, Illinois, sees calibration as a foundation of the winter maintenance program, and it has been so for as long as current public works staff can remember. It is a basic step in pre-season preparation and also a must-do after spreader control repairs or hydraulic repairs have been made to a truck.

Calibrated equipment gives accurate data on how much salt you are spreading on the streets. Buffalo Grove uses data to support decision making during a storm and throughout the winter season. Having an accurate and consistent equipment calibration program for solid and liquid deicers gives Buffalo Grove confidence in the salt application data used to drive their decision making.

While calibration should be standard, there are still many public works departments that are skipping this step. Luke Kronstedt, the Assistant Superintendent of Streets for the City of Stevens Point, Wisconsin, went to an APWA Winter Maintenance Supervisor Certificate Training held in conjunction with the 2016 APWA Wisconsin Chapter Snowplow Roadeo in Green Bay, Wisconsin. Calibration was a best practice emphasized in the training. When Luke came back to the public works shop after the training, he started asking questions about how Stevens Point calibrated their trucks.

Luke found that there wasn’t a consistent calibration program. “I had our mechanics go through the calibration process and quickly discovered that we had a very wide range of settings,” Luke said. “We asked drivers what settings they used and had the mechanics document the pounds per lane mile spread at 20 mph for the drivers’ preferred settings. The settings ranged from 441 pounds/lane mile to 1,584 pounds/lane mile. Our target application rate was 240 pounds per lane mile. We recalibrated all of the trucks for this target and made new settings cards for the drivers to have in the trucks, to allow them a range of application rates based on changes in pavement temperature.”

Luke didn’t know how the change would be received. “I really thought I would have a lot of pushback about changing spreader settings,” he said. “Once we had the chance to explain the reasoning behind it, the crew understood and...
accepted the change. Many of our crew enjoy the outdoors and they did not want to spread excessive salt—salt that ends up in our lakes and rivers.”

Stevens Point not only implemented a practice that reduces environmental impact, they also saved the city a significant amount of money in the process. The winter of 2016 was not harsh by Stevens Point standards, but the city saw savings estimated at $70,000 due to the reduction in salt use by properly calibrated trucks. Looking at this on a per-truck basis, their furthest-out-of-calibration truck, which had been spreading 1,584 pounds per lane mile, saved $47 per lane mile spread, directly as a result of calibration.

There are also regulatory reasons to implement calibration. Stevens Point operates under a Municipal Separate Storm Sewer System (MS4) General Permit. In Wisconsin the general permit states, “If road salt or other deicers are applied by the permittee, no more shall be applied than necessary to maintain public safety.” The general permit also mentions equipment calibration among the winter maintenance practices in the permit. Knowing what rates are currently being applied is the first step in implementing salt reduction best practices for a stormwater permit.

If you want to save money, reduce environmental impact and implement best practices included in your MS4 General Permit, how do you start calibrating? There are calibration guides and training videos to help you though the process. APWA’s Snow and Ice Control Field Handbook for Snowplow Operators includes a simple calibration guide for manually-controlled spreaders. Video-based calibration training or hands-on calibration workshops may be available through the LTAP Center in your state.

For ground speed-controlled spreaders you can use your spreader manufacturer as a resource, since some steps of these calibrations are specific to the controller model. Buffalo Grove brought their spreader controller supplier to the public works facility to teach staff proper calibration techniques. Learning the manufacturer’s tricks of the trade helped Buffalo Grove dial in precise calibration.

Calibration is not difficult and it does not require sophisticated equipment. The equipment can be as simple as a hanging scale, five gallon buckets and a tarp—items that can be bought locally. You can begin implementing your calibration program now at a very low cost, and start saving money and reducing environmental impacts this winter.

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his month’s article spotlights a golf team, led by Public Works Golf Supervisor, Tim Pfannenstein, of Tempe, Arizona, Field Operations Division. Tim has worked for the City of Tempe Public Works Department for 20 years, focusing on golf maintenance and moving between the City’s two golf courses in various roles. His motivational abilities and leadership skills inspired his team to think outside the box and accomplish great feats across both courses, in record time and well under budget. How did he do this you ask? Tim’s answer is simple: “We attack each day with a fury and safely accomplish as many tasks as we can by working cohesively as a unit. It sounds cheesy but that’s how we roll. We rest when we get home.”

What do you do when you get between a rock and a hard place? If you ask Tim he’d tell you to “add more rock!” Keep this in mind for later in the article. For the past 20 years, Tim has been the Golf Supervisor, maintaining the City’s two unique golf courses, Rolling Hills and Ken McDonald. Rolling Hills, fondly called the Desert Gem, sits nestled amongst the beautiful red rock of the Papago Mountains and has majestic views. It is an 18-hole executive course and perfect for playing that last minute “emergency 9.” Ken McDonald, affectionately called the Hidden Gem, is tucked away in a neighborhood community with tall pine trees and sprawling greens. According to Tim and most likely all of you reading this, he has the perfect office.

To fully understand the impact Tim and his team made at both golf courses you need some background information. Shortly after Tim became the Golf Supervisor, the economy started to transition and slowly decline mirroring the decline in golf nationally. This resulted in scaled-back funding for the golf team as well as for all City departments and a drastic cut in staff. The remaining funding that was allocated to golf was focused mainly for the upkeep of the greens, which is the bread and butter of any golf course. All the “extras” such as updating the pro shop, restrooms, landscaping, course improvement, driving range and the restaurant were put on the back burner. Tim said, “From 2002-2010 it was all about the balance of reducing expenditures while maintaining a quality product for our customers. We had to get creative and start doing things differently in order to cut our costs but without compromising our results.” The golf team has long embraced the mantra, “DO MORE WITH LESS.”

With a change in the entire golf operations business plan in 2011 the golf enterprise fund stabilized and has begun a transition back toward the glory days. Now let’s fast-forward to 2018. The economy is back on an upward swing and the team has the course conditions and the greens at both courses in the best shape they have been in for years and, according
to many golfers, better than most of the private courses in the valley. However, the entryway appearance walking up to both courses was less than inviting due to years of deferred investment. Tired, dismal and outdated landscaping and vegetation at both courses did not match the Golf Tempe brand image the team was creating with their meticulously maintained fairways, tee boxes and lush greens. It was time to refresh, revamp and revitalize the “front door” and overall first impression of the courses. The million-dollar question was…how do they landscape to make a BIG impression but still require low maintenance (allowing the staff to continue to focus on the course conditions) with little to no funding?

According to one of Tim’s colleagues, almost anything is possible when you start to think “outside the box” and that is exactly what the golf team did. They completely transformed the front entrance and back planters at both golf courses, turning them into pieces of landscaping art. What were once barren, dirt planters, were turned into beautiful eye-catching rock cactus gardens. How you ask? The team tapped into their creative side by upcycling wood from the City’s compost yard to create unique, one-of-a-kind log planters which Tim made himself. These, along with relocating unused boulders and the addition of two different colors of landscaping rock, brought depth and dimension to the areas and really made them “pop.” Not only was the entrance transformed with unique and robust low-watering landscape, but by thinking outside the box and repurposing and reusing the City’s own materials, the team kept the project environmentally friendly, low maintenance and well under budget.

Daily, one can hear golfers commenting on the one-of-a-kind landscaping with positive and delightful remarks. One golfer said, “Wow, I can’t believe how incredible everything looks. It is truly a work of art!” Another was heard saying, “With any great golf course, the beauty is always in the details.”

Tim suggested that one of his staff members, Paul Taylor, who is also an artist, bring his talents to the project by etching the City’s golf logo into wood which is a real crowd pleaser and beautiful piece of art. Paul said, “I appreciate Tim providing me with the opportunity to use my artistic skills with his creative ideas. He’s allowed me to venture into new forms of art I wouldn’t have thought of otherwise.”

But it didn’t stop there. With the team hearing all the positive comments from golfers and being excited about the fresh look themselves, they were ready to tackle more which meant the front streetscape. Instead of ordering rock from the quarry, they kept the job in house by repurposing unused river rock from their own backyard to give the entrance a fresh new look. Add to that, two new giant log planters created from the compost yard and transplanted Agave from a parks project, and voilà!

All in all, the landscaping at Rolling Hills, along with the streetscape and redesigning at Ken McDonald, was completed from start to finish in only four months. But even more impressive is the total amount spent for all three projects: $3,500! This would not have been possible without Tim’s leadership and planning skills, but more importantly it was Tim’s ability to connect with his staff and motivate his team. Seeing Tim haul rock, dig holes, relocate boulders and work long hours, in the Arizona sun, alongside his crew to make this vision a reality was all the motivation they needed to keep going. Tim’s team knows he would never ask them to do something that he wouldn’t do himself which he clearly demonstrated during these project renovations. Tim and his golf crew really rock! (pun intended).

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Relationships between countries, as recent news will attest, can be complicated. A beautiful aspect of public works is the forced practicality, and close comradery worldwide, between public works professionals. The challenge of providing for many of the most fundamental human needs instills a sense of shared responsibility. These needs don’t change with borders, language, or culture. Rather than compete, public works practitioners naturally want to cooperate, and help their peers around the globe face the mounting challenges of our profession. APWA is the largest public works organization in the world and, as such, we have a great opportunity to facilitate the dissemination of the best global solutions in our field.

In the past year the APWA International Affairs Committee (IAC) has worked diligently to further develop relationships around the globe, and help provide our members with the most up-to-date information and technology, while also helping provide access to the extensive knowledge and expertise of our members to our global partners. This work is conducted through three subcommittees, each focused on a specific area of outreach: the Internal Collaboration Subcommittee, the International Exchange Subcommittee, and the Jennings Randolph International Fellowship Subcommittee.

The Internal Collaboration Subcommittee was established to work in partnership with APWA Technical Committees to identify emerging ideas and technologies in other countries and strategize how to bring these technologies to APWA members. Members may have noticed that we have added an International Perspective sidebar to critical articles in the APWA Reporter with links to further information on how our partners around the world are dealing with the items addressed in the articles. We hope that this will be a quick
way for our members to learn about developing technologies and alternate solutions in a quick, easy way. With increasing collaboration between the IAC and the Technical Committees, we have made great progress toward assuring that, through their membership in APWA, members get the best information available.

The International Exchange Committee has also been very busy! They are crafting two formal education opportunities for our members. The first is a winter maintenance session for PWX in Kansas City. We have curated a group of leading experts from around the world to assure that this session is highly informative for those who deal with winter maintenance challenges, and are looking for creative solutions. The second training will be a webinar series on autonomous vehicles. We have a group of international experts who have spent many months refining this training, and we are confident that it will be most informative as we all find ourselves engaging with this new technology.

Our Jennings Randolph International Fellowship Subcommittee had another highly successful group of applicants for this very competitive fellowship. They selected and awarded two fellowships this year: Mr. Jason Waldron will study approaches to the implementation of modern streetcar systems within the public right-of-way and the development of smart city policies in Auckland, New Zealand and Sydney, Australia, while Ms. Helena Sullivan will focus on bridge programs and projects, and how aging infrastructure is prioritized for repair or replacement in Sweden. We encourage anyone interested in this program to review the application requirements on APWA’s website. We have sent dozens of members around the globe on public works study tours, and hope to send many more as we continue to work to stay on the cutting edge of our industry. To this end, the Jennings Randolph International Fellowship Subcommittee is working on additional funding sources for public works study tours and mechanisms to gather and disseminate information about the lasting impact of this program both domestically and abroad.

APWA members can take great pride in the global reach of the organization, and the wide influence it has in public works. The IAC will continue to work closely with our partners and friends from all corners of the globe to collaborate, cooperate, and share as we all face the challenges of creating the backbone of civilization, wherever we may be.

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A systematic approach to reducing risk, liability and potential construction delays associated with subsurface utilities

A San Diego perspective

Annie Sibug Aguilar, P.E., M.ASCE, President/CEO, San Dieguito Engineering Inc., Solana Beach, California; Vic Bianes, P.E., Public Utilities Director, City of San Diego, California, and Past Chair, APWA UPRROW Committee

Preface

APWA’s National Utilities and Public Rights-of-Way Committee (UPROW) has been a strong advocate of using Subsurface Utility Engineering (SUE) to reduce the risks associated with locating and mapping underground utilities. This method designates mapping Quality Levels of underground utility locations for utility relocation design, utility condition assessment, communication of utility data to all stakeholders, utility relocation cost estimates, implementation of utility coordination requirements, and assistance during the design phase to avoid issues during the construction phase. SUE is most beneficial at the conceptual design...
phase during the preparation of the scope of work, assisting in establishing the project schedule and preparing risk evaluation. Non-destructive geophysical methods are typically utilized to determine the presence of utilities and to mark their horizontal location on the ground surface. Utility testholing using techniques such as vacuum excavation are used to expose and record the precise horizontal and vertical position of utilities. This utility information is recorded and placed on schematics and shared with the design team. A conflict matrix is also created to compare the collected utility information against the proposed project to identify conflicts and develop mitigation strategies. SUE has gained support worldwide as a suggested best practice to mitigate costs associated with project redesign, construction delays with their associated costs, and to avoid liability from damaged underground utilities. This article highlights the use of SUE for a number of critical complex projects in Southern California and the benefits to private organizations, public agencies and utility owners.

Although Subsurface Utility Engineering (SUE) has been around for over 30 years, it has really become more prevalent in the past 10 years. SUE has been gaining traction nationally, more specifically in the San Diego County region. It is an engineering practice that has evolved considerably over the past few decades, combining civil engineering, land surveying, and geophysics. It uses several technologies including geophysical locating using ground penetrating radar (GPR) and other locating means. The use of SUE has become a routine requirement on highway projects in states such as Florida; however, not yet in California.

Using the ASCE standard, “CI/ASCE 38-02, Standard Guidelines for the Collection and Depiction of Existing Subsurface Utility Data,” published and distributed in 2003, a systematic approach to depict existing utilities is universally established. The intent of this standard is to present a system of classifying the quality of existing subsurface utility data. Such classifications allow project owners, engineers, and contractors to develop strategies to reduce risks, or at a minimum, to allocate risks due to existing subsurface utilities in a defined manner. This document can be used as a handout or as part of a specification. It assists engineers, owners, and contractors in understanding utility quality level classifications and their allocations of risk.

In 2000, our firm, San Dieguito Engineering, Inc., formed a subsidiary company, AirX Utility Surveyors, that use geophysics to locate existing utilities and mark them in the field. In conjunction with the Professional Land Surveyor and Professional Engineer, we
have formulated a systematic approach to map existing utilities beginning with obtaining record as-built drawings and performing site investigations to collect field data of located utilities, and rectifying those utilities with already mapped existing utilities. The final deliverable is a 2-D plan and digital CAD file depicting existing utilities that provide designers Quality Levels for each of the utilities designated. Utilities could be designated as Quality Level D (QLD), Quality Level C (QLC), Quality Level B (QLB) or Quality Level A (QLA), which are the quality levels rated from lowest level to highest level respectively. QLA is not needed at every location, only where conflicts are anticipated with proposed construction; therefore, QLD would generally be sufficient where there is no proposed construction. (See photo on p. 90)

Based on our experience, when we were tasked to perform SUE we experienced savings in the hundreds of thousands of dollars by averting conflicts in the field during construction due to this systematic approach to locating and documenting existing utilities.

In 2009, San Dieguito Engineering (SDE) located in Solana Beach, California, was contracted to perform as Utility Lead for the San Diego International Airport’s Terminal 2 Landside Expansion project. As part of the Basis of Design, our team was required to relocate all the existing utilities within the footprint of the proposed Elevated Departure Road (EDR). In addition, we were required to provide BIM modeling for the proposed sewer and water locations. It was another opportunity to use the systematic approach that we developed for SUE as it is well documented that SUE is well suited for projects such as airports, military bases, hospitals, and educational institutions.

During one of our site investigations, we discovered a manhole cover marked “water authority,” only to find out that there were no as-builts for this utility company, and the manhole was populated with conduit. When we opened the lid, we saw a large number of cables and fiber optic lines inside the manhole. We contacted the local communications company, as we suspected it was the main communication duct bank servicing the entire San Diego International Airport. When our team met with the utility representative, their as-built drawings indicated the connection point was in Terminal 1. We disagreed and revealed the content of the Water Authority manhole and concluded that the connection point was actually in Terminal 2. By performing geophysical locating to identify the location of the communication line from Harbor Drive to Terminal 2, along with slot trenching using vacuum excavation under the EDR to attain the depth of the joint trench, we initiated a redesign of the EDR foundation to avoid conflict with the main communication duct bank that was discovered during the SUE process.

In 2013, SDE was once again contracted to provide utility mapping for over 20 miles of right-of-way for the San Diego region to support a major statewide endeavor to achieve the goal of orderly and cost-effectively replacing all natural gas transmission pipelines as directed by the client. As part of the contract, our SUE mapping required up to two years of proposed utilities and structures to be mapped from the date we started utility record research. Once again, during the research phase of the SUE process, we discovered a “future” City of San Diego sewer that was still being designed, that would cross the proposed gas replacement pipeline. The sewer line was not yet approved at the time of utility mapping. As soon as the plans for the “future” sewer line were approved by the city, we were notified and provided a copy of the approved plans so that we could immediately update our existing utility map. When the drawing was reissued to the designers, the designers had taken the conflict with the proposed gas line design into account and were able to redesign the line prior to start of construction which derailed a major conflict between the “future” sewer and proposed gas line. This conflict was realized during the design phase as part of the SUE process.

Another application of SUE was in 2017, when our firm was selected to provide subsurface utility mapping for three major hospital campuses for Scripps Hospital. To obtain record plans for the hospital campuses, it was imperative to interview the Construction Facilities Manager who witnessed the construction of the most recent improvements. Utilizing a systematic approach to obtain and catalog the as-builts drawings, along with applying our in-house labeling and layering protocol developed over the years for the digital CAD files, the location of as-builts for future construction was easily accessible. Geophysical locations of existing utilities were surveyed and several meetings were held with onsite Facilities Departments for each of the three campuses to ensure accurate depiction of existing utilities. The mapping was completed for all three
In support of the growing practice of SUE, ASCE created the Utility Engineering and Surveying Institute (UESI) in October 2017. UESI offers professionals working within the utility, pipeline engineering, and surveying/geomatrics communities the opportunity to network with others and shape the future of the industry by participating in technical activities, conferences, and the development of internationally recognized standards. In April 2018, the first UESI Surveying and Geomatics Conference was held in Pomona, California. Impressively, over half of the seminars were related to SUE. It was inspiring to hear that the Florida DOT has been using SUE for years, and AECOM’s Alec Grkovic is also using BIM for clash detections on his Design-Build project, although not for construction purposes.

It brings me great joy to see other firms and states embracing SUE more readily. Locally, I can personally attest that these local agencies and companies, San Diego County Regional Airport Authority, the local gas and electric utility company and Scripps Health, were wise to invest in SUE to reduce the risk associated with unforeseen utilities that could result in costly construction delays. It was possible to construct seven miles of gas pipeline over 1½ years without any major utility interruptions, beginning with record research to construction of the new pipeline for service, in areas congested with many abandoned and undocumented utilities. SUE is a valuable tool when utilizing a trusted utility locating company and qualified Professional Engineer and/or Land Surveyor to rectify found existing utilities collected in the field with QLC and QLD. It is an invaluable tool when performed properly. It has been proven to save time and money on construction projects. The City of Fresno has SUE specifications that can be readily used for local agencies. Why not include this in the design phase and save money during the construction phase? This is where the future is going.

SUE is here to stay. ASCE announced a new ASCE Standard 38 which will be published this year to better define the depiction and responsibilities of the SUE provider. There are numbers of full-service SUE firms that perform the engineering, surveying, and geophysics for their projects in other parts of this country, that are using laser scanning technologies and GPR arrays to depict existing conditions. With emerging technologies, clients are requesting augmented reality to depict existing utilities and future improvements in conjunction with SUE. I am excited to see where the future of SUE takes us, and the new technologies that we will include to ensure that no stone is unturned when investigating subsurface utilities. I also look forward to seeing more agencies and owners requiring SUE on underground projects to help reduce the construction costs, and avoid delays on projects in our region.

ref: https://www.fhwa.dot.gov/programadmin/history.cfm

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Who is NASTT and What is Trenchless Technology?

NASTT is a not-for-profit engineering society of individuals, public organizations and private companies with strong beliefs in the practical, social and environmental benefits of trenchless technology. NASTT strives to advance trenchless technology and to promote its benefits for the public and the natural environment by increasing awareness and knowledge by providing technical information, research and development, education and training.

Trenchless technology is a progressive civil engineering process for the installation, replacement or renewal of underground utilities with no or minimal excavation and surface disruption. These innovative methods have been used successfully for all underground utilities including water mains, storm and sanitary sewers, gas mains, electrical and fiber optics conduits. When employed in urban areas, substantial benefits are realized including dramatically reduced disruption to vehicular and pedestrian traffic, to business activities, to residential areas, and to environmentally sensitive areas.

How Can Condition Assessment and Pipe Diagnostics Help Municipalities?

With the aging infrastructure of many North American communities at a critical level, using a non-intrusive method to identify and record the internal condition of piping is essential. This information can allow municipalities to plan for smaller construction and more environmentally-conscious footprints which helps to mitigate interruption to the operation of businesses, traffic patterns and society in general.

Today’s advancing technologies have gifted utility owners with high-resolution imagery cameras, tethered and non-tethered inserted devices, ultrasonic scanners, acoustic hydrophone sensors, high frequency pipe penetrating radar and many other new innovative tools that provide...
vital information such as pipe wall thickness; interior and exterior corrosion; and estimated life expectancy and risk assessment data.

Using these powerful assessment tools, municipalities and the contractors they work with can prioritize assets and develop the ideal rehabilitation option for their specific situation. In best case scenarios, these technologies allow limited infrastructure budgets to be allocated to the critical areas in the system identified as top priority. In addition, there is less to no disruption in utility service, traffic flows or local businesses during both the assessment period as well as during the construction phase.

Specialized Centers of Excellence for Research and Industry Growth

With all the benefits of trenchless technologies in mind, NASTT has developed trenchless method-based Centers of Excellence within the organization. The first Center of Excellence focuses on the trenchless pipe bursting method and its full breadth of capabilities for potable water, gas, electrical and sewer applications.

Establishing a group focused on driving excellence within the discipline of pipe bursting will create energy and engagement with the trenchless industry and beyond, while continuing to fulfill NASTT’s mission to advance trenchless technology and promote its benefits. The Pipe Bursting Center of Excellence will provide leadership in education, standards, training and elevating the profile of the method throughout the construction industry. In addition, this specialty group will work on the refinement of best practices and act as a resource and forum for utilities, contractors and manufacturers to share information and continue to move the pipe bursting method forward.

To solve North America’s increasing infrastructure needs, it is important that new technologies are continually developed and advanced to market. Through research along with hands-on utility management, these issues can be addressed in the most environmentally, economically and socially responsible ways.

For any questions contact NASTT at 888-993-9935 or e-mail info@nastt.org.

Sources: Papers presented at NASTT’s 2017 No-Dig Show: Wauwatosa Uses Multiple Condition Assessment Tools to Make an Informed Rehabilitation Decision; Piero Salvo, P.Eng., M.Eng., GAME Trenchless Consultants, Montreal, Quebec, James Wojcichowicz, P.E., City of Wauwatosa, Wauwatosa, Wisconsin, and Paul Pasko III, P.E., SEH Inc. Minnetonka, Minnesota; Trenchless Rehabilitation Method Selection and Prioritization Using Advanced Condition Assessment – A Department of Transportation Case Study; John Bowles, Inversa Systems, Fredericton, New Brunswick, and Dallas McCready, Inversa Systems, Fredericton, New Brunswick.

For clarification or verification of article contact Jenna Hale, NASTT Marketing Manager, 888-993-9935 or jghale@nastt.org.
Utility Coordination Committees: Maximizing collaboration and coordination long before you dig

Rouen Liu, Permits Engineer, Hawaiian Electric Company, Inc., Honolulu, Hawaii

Why can’t the underground utilities all be in the same trench? The benefits are you dig one time, bury all the lines, water, storm drain, electrical, sewer, communications, pave it over and be done with it for the next 50 years.” How one wishes this could be true. The reality of placing utilities within the rights-of-way comes with many challenges. Meeting the challenge starts with constant community educational efforts. Understanding of the various private and public budget constraints, safety concerns, operation and maintenance requirements, varying asset management strategies and priorities all play a part.

Fortunately, Utility Coordination Committees, with forward-thinking leadership, have been able to promote improved communication, cooperation, and coordination and have provided a venue where everyone sharing the rights-of-way can have shared common goals of safety and protection of the general traveling public. The need is real, evident, and beneficial to all stakeholders. So how do you form a coordination committee or better yet, we hope the question being asked is, “How do we make our existing coordination committee better adding real value to the members?”

Generally, utility company representatives and local and state government public works agencies will have a vested interest in the committee. But contractors, consulting engineers, community planners, and others can also play an important part in effecting improvements in this area and should not be excluded. More specifically, some feel that most problems can be resolved by those directly involved in day-to-day construction and maintenance activities. Others feel that those responsible for planning such activities are key. Most agree that individuals with both types of responsibilities must be involved in programs to improve coordination. Whomever you choose to be a part of the committee process must believe there is an opportunity for getting something out of the effort put in.

Any project needs to have a champion, dogging and pushing towards milestone after milestone to achieve the goal. In the early stages, involvement of top supervisory personnel is needed to give the activity the priority it deserves. A well-organized approach to forming the committee will go far to show top management, and the community, that proper steps are being taken to make it a productive activity warranting their support.

The Purpose of the Committee

Utility Coordination Committees can generally be described as follows:

1. The purpose of the Utility Coordination Committee is to bring about improved communication, cooperation, and coordination among the people who are in any way responsible for placing or disturbing below-ground or overhead utilities, by establishing an effective, harmonious working relationship among municipal utilities,
private utilities, governmental agencies, engineers, and contractors serving a common goal for the safety and protection of the general public.

2. The second priority is to effect improved planning, construction, maintenance, and operational policies and practices related to all facilities commonly located within the public rights-of-way through an officially recognized, voluntary, cooperative association of individuals and bodies who have vested interest as granted by state law, franchise, or permit.

Your own committee participants will likely modify each of these statements, which will be dependent on the situation. The point is that each committee’s described purpose may consist of several common elements but written to reflect local values and needs.

Other points to consider and covered in the next publication update (expected in 2019) of the How-to-Book of Utility Coordination Committees:

Maximizing Collaboration and Coordination
Utility Coordination Committees may be part of an existing organization, such as an APWA chapter, or may be a totally independent entity. The advantage of being part of an existing organization is making use of existing programs or resources. Here are a few organizational elements which should be considered to help with success of the efforts:

1. Subcommittees and Task Forces
2. Formal Communications
3. Executive support

Utility Coordination Committee Programs and Projects
Utility Coordination Committees should start a list of typical programs and projects which may be of interest to the participants. Some examples:

1. Coordination scheduling of utility, infrastructure, and commercial projects
2. Promote development or improvement of excavation notification programs such as One-Call systems
3. Promote the use of established standards
4. Coordinate capital improvement programming
5. Review relevant state/provincial and federal legislation and regulations
6. Outline training programs for field personnel

What to Remember
The best format for a Utility Coordination Committee is one developed by those in the local community and one which fits the needs of participants. The most important items to remember when forming a committee are:

1. Keep it simple. Don’t become overly sophisticated in the beginning.
2. Be sensitive to the needs of the people in your organization. They make it work.
3. Provide value – make a difference!

The Benefits
Do Utility Coordination Committees work? Yes they do, and the participants will get out of them what they put in. Here is one example with several beneficial outcomes:

Anybody hanging around Utility Coordination Committees long enough will see cycles of performance within the rights-of-way. The example used here is a period of really poor pavement restoration. Several users of the rights-of-way who were digging up the roads to replace deteriorating utility assets did not achieve minimum quality standards for restoration. Perhaps it was a combination of shortfalls—new contractors in town, inexperienced labor, and shortage of inspectors to police the restoration. Whatever the reason, several years go by with substandard work and before the municipality has a chance to make corrections, the public complaints start to occur way too often. To compound the matter, elected officials decided to cut the repavement budgets for a few years too many. Along comes a new administration and it’s time to clean up the mess. They dictate, “Curb to curb repaving including full intersections if you touch our roads!” Oh my gosh, the next UCC meeting will be a fun one. After the dust settled, thanks to a fair-minded Director of Facility Maintenance who took criticism and comments to heart, the utilities with programs to maintain their underground assets in the paved rights-of-way had a chance to work out a solution that would not “break the bank.” Basically, trenching in larger, higher-volume roads will now require one full lane width of paving covering the trench excavation. Of course, all backfill and compaction standards were to be followed. Since there was still a shortage of inspectors, the City doubled the warranty period. In return, the various utility owners in the rights-of-way promised more training and increased scrutiny of their contractors hired for trench restoration. The result: There was a bit of a transition period to include the new requirements in project drawings and to implement training but amazingly it worked! In about 18 months, the roads started looking better, fewer public complaints were received, and the utility owners were more receptive to the City’s Facility Maintenance Department’s needs because the Director made the effort to find a solution that all users of the public rights-of-way could agree to.

In conclusion, Utility Coordination Committees are a valuable asset that can benefit all stakeholders existing in or managing the right-of-way. Maximize the benefit from your efforts!

Thank you to the support of the APWA Utilities and Public Rights-of-Way Technical Committee. References from The How-To Book On Utility Coordination Committees last published in 1997 by APWA. Rouen Liu can be reached at (808) 543-7245 or rouen.liu@hawaiianelectric.com. 🤗
Regardless of the space we call our workplace, we all come to work each day with an expectation that we will go home to our families the way we left them, safe and in good health. We all have safety programs that include safe driving, proper lifting, identifying work risks, and eliminating them to reduce the potential that something bad might happen.

Consider one more measure to keep you and your fellow workers safe. This measure is not about hard hats, safety vests or protective toed shoes but rather education and awareness—about Cross Bores. Once you know about a potential Cross Bore exposure you can evaluate ways to engineer the risk out or minimize an occurrence.

**Identifying the Cross Bore Risk:**
If you’re not familiar with the term “Cross Bore,” understanding is a key first step to ensuring your own personal safety. A Cross Bore is “The inadvertent installation of a new utility line, using a trenchless excavation method, that breaches an existing non-pressurized line, which may go undetected until such time the breached line fails or becomes clogged.” The most common example is a sewer line that accidently has a utility line bored through it but does not initially impact the operation of the sewer. This type of installation is known as a “legacy Cross Bore,” meaning it already exists.

Through a series of questions, we will attempt to put the issue of Cross Bores in perspective and explain why a collaborative approach must be considered.

**Why are there Cross Bores?**
With the increasing cost of permitting, construction and restoration of open trench underground utility installation, trenchless excavation technologies are becoming more common and provide a number of benefits. Clearly the use of trenchless technologies is expected to increase as America rehabilitates its aging infrastructure. And after decades of trenchless installations, you can’t wave a magic wand and make all legacy Cross Bores disappear.

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**Cross Bores: Managing risk through education and awareness**

*Eric Swartley*, Senior Manager, Pipeline and Public Safety, UGI Utilities, Inc., Middletown, Pennsylvania; *Mike Kyle*, Executive Director, Lancaster Area Sewer Authority, Lancaster, Pennsylvania
Excavation contractors have been utilizing trenchless methods for over 40 years and regarding the creation of Cross Bores they will tell you it’s the classic chicken or the egg argument. Ironically this timeline aligns very closely with the development of One Call Centers across the U.S. Initially with the advent of these trenchless technologies, the benefits were easily identified though the equipment was costly. Additionally, much like the newest marvel drug, no one pays attention to the negatives or side effects unless you are directly affected by them. Reductions in restoration costs and productivity gains were realized in a substantial way and businesses went to work making the trenchless technologies more affordable.

Early on there was very little guidance or regulation detailing how trenchless technologies would be applied and what precautions needed to be in place. In most cases assumptions were made on the vertical and horizontal location of existing underground facilities and a best efforts basis to avoid damaging them was applied. One Call laws started to bring a focus on damage to underground facilities but at a much slower rate than the use of trenchless tools. Consider if a water or electric line was struck, it created quite a stir and the facility was repaired and the crew moved on. All the unknown breaches that resulted in a Cross Bore may fail over time and be repaired or become a legacy Cross Bore and lie dormant with the potential to one day become a catastrophic event.

What has been learned about Cross Bores?

- You don’t necessarily have to have natural gas serving your property to have a potential Cross Bore.
- If a Cross Bore is not disturbed it does not present a safety risk. Many Cross Bores reported recently were installed decades ago and present no risk until the Cross Bored line becomes clogged and action is taken to clear the clog.
- It has been stated that when an aggressive auger utilized to clear a sewer line comes in contact with an electric cable or plastic gas line it feels much like a tree root.
- No one expects to see a utility line installed through their sewer line, so they proceed to use an aggressive means to clear a clog when one occurs.
- While the focus is on sewer and septic systems, any underground non-pressurized facility can be the victim of a Cross Bore.
- All companies do not have equal risk for Cross Bores. If prior construction practices included a high number of trenchless installations the risk for Cross Bores will be greater and vice versa.

A Pennsylvania or national issue?

The issue of Cross Bores has no bias or geographic boundary and has the potential to exist in any location where trenchless technologies were the method of installation of underground facilities. Since 1976 when the first Cross Bore-related incident was reported in Wisconsin, a dozen other states across the country have documented incidents, several having multiple reports. So, the question for a utility company, be it gas, electric, cable, etc. is did your installation crews or subcontractors use trenchless excavation to install your existing facilities? If the answer is yes, you have the potential for a Cross Bore through a non-pressurized facility.
such as a sewer, culvert, septic line, or stormwater system.

Nationally the Cross Bore issue has come front and center in a number of industries such as excavation, public utilities and various industry associations. Public utilities across the country have embarked on legacy inspection programs to address identified Cross Bore risk in their distribution systems or to assess if they have risk and if so to what extent. Natural gas utilities in particular have been the most proactive in response to investigating legacy Cross Bores.

The Cross Bore Safety Association has developed a website that provides information covering all aspects of Cross Bores. The American Gas Association has generated white papers specific to Cross Bores and the responsible use of trenchless excavation technologies while the North American Society of Trenchless Technology (NASTT) is a leader in design considerations and installation procedures for trenchless technologies. NASTT has produced a guidance document, “HDD Good Practices,” which has been adopted by many design and installation contractors. There is no shortage of available resources and guidance today.

In our state of Pennsylvania, the Board of Directors at Pennsylvania One Call got wind of Cross Bores in late 2013 as the result of a Public Utility Commission inquiry with member natural gas distribution companies in the state. Recognizing the potential safety concerns these previous excavation installations presented, they formed a Cross Bore Task Force to evaluate the issue and determine what their role should be.

What became apparent to the Task Force was that Cross Bores present a two-tiered challenge:

1. First was the issue of legacy Cross Bores which exist today and pose a potential public safety exposure. Explained previously was how Cross Bores were created and that incidents have occurred across the country. In this article we will outline some of the tools available to reduce the risk of having a legacy Cross Bore-related issue/accident. Currently Pennsylvania is one of the states without a reported Cross Bore incident and it is the goal of the Cross Bore Task Force to do what we can to maintain that status.

2. The second tier is the prevention of future Cross Bores which requires a review and possible change of current construction practices involving the use of trenchless excavation methods to eliminate Cross Bore potential. If you talk to the directional drilling industry, a significant obstacle to preventing Cross Bores is that sewer utility owners do not mark out sewer lateral locations when a One Call dig notification is placed due to issues of ownership or being non-locatable with current locate technology as they are generally non-metallic. The Pennsylvania Water Environment Association (PWEA) Fact Sheet (visit www.pwea.org) provides an excellent summary of the actions that can be taken to support preventing Cross Bores.

A real strength of the Task Force is its diverse representation as it includes plumbers, wastewater operators, public utilities, excavators, trenchless contractors, CCTV inspection companies and regulators.

The PA One Call Board tasked the Cross Bore Task Force with providing recommendations to the Board regarding actions they could take rela-
tive to Cross Bores in Pennsylvania. A real strength of the Task Force is its diverse representation as it includes plumbers, wastewater operators, public utilities, excavators, trenchless contractors, CCTV inspection companies and regulators. It was intended to have as many stakeholders represented as possible, ensure that the opportunity for input exists, and operate as collaboratively as possible in developing recommendations.

The Task Force recommendations were finalized in 2015 and covered both the legacy and prevention aspects of Cross Bores. They are listed below in condensed form:

From a legacy perspective:

• Develop a One Call ticket for situations when drain clearing is required and a Cross Bore is suspected.

• Develop a Cross Bore awareness program that provides messaging and resources to all affected stakeholders with an initial focus on drain clearing, sewer system operators and rental centers.

From a prevention perspective:

• Promote a code change in Pennsylvania that requires any new or replaced non-metallic underground utility line, such as a sewer lateral, to be locatable using current industry locating technology.

• Promote an initiative to have all underground facilities marked out for a One Call notification, at minimum within the public right-of-way.

• Develop a specific safe digging education module for excavators working in Pennsylvania utilizing trenchless excavation technologies.

• Develop an automated system response to an excavator placing a One Call ticket when the method of installation is trenchless. The message would remind the excavator of the Pennsylvania requirement to follow the HDD Good Practices.

Putting tools in place and raising awareness

In response to the Cross Bore Task Force recommendations the One Call Board incorporated a number of the suggestions into their Vision Goal structure in 2016 that allocates budget and resources which put a number of initiatives in motion.

The items below are a listing of One Call actions taken or underway in Pennsylvania relative to Cross Bores:

1. Added Cross Bore information to the One Call website (2015).

2. Incorporated information specific to the use of trenchless excavation such as directional drilling in the Excavator Training modules that One Call Liaisons present across the state.

3. A “Call before You Clear” Emergency One Call Ticket type for those engaged in drain clearing activities went live July 27, 2016 and is initiated by calling 811 and reporting a potential Cross Bore. In response to these reports the utility company members of One Call treat the ticket as an emergency response and can support determining if an intersection with their line and the clogged sewer line exists.
Until all legacy Cross Bores are eliminated, raising the awareness of all stakeholder groups remains a priority.

Pennsylvania took advantage of incorporating the Cross Bore effort into its One Call Center which is not the norm. The rationale was that there was already a GIS-based, efficient and effective communication system in place at PA One Call. The utilities and municipalities in Pennsylvania are already required to be members of One Call, so an additional benefit of membership and the forum provides for consistent messaging across the state.

What can I do as a sewer owner/operator to prevent Cross Bores and incidents?

- Take steps to make all new private underground sewer lines locatable—in order to prevent future Cross Bores. Technical specifications you can incorporate into your construction standards are available through the Lancaster Area Sewer Authority (LASA) website www.lasa.org.

- Most Cross Bores occur at the 6” or 4” sewer lateral. Call before you clear any sewer laterals.

- Consider marking any underground sewer facilities that you have location information on, regardless of whether the underground facility is owned by your agency or is private. The “Good Samaritan” clause of the underground protection law protects facility owners provided the marking is done with due care.

Summary and conclusions

In summary, until all legacy Cross Bores are eliminated, raising the awareness of all stakeholder groups remains a priority. The education of the public as well as industry partners regarding the potential risk is a must and a path that a number of organizations nationally are supporting. The prevention of future Cross Bores requires a focus on the responsible use of trenchless excavation technologies. A definition of insanity is “doing the same thing and expecting a different result” which suggests if your past construction policies didn’t consider the potential for Cross Bores your new policies must.

Hopefully a benefit of this article is that it provides a comprehensive look at Cross Bores and their origin. Most importantly the reader walks away educated on the risks associated with these hidden threats and a heightened level of awareness in regard to how to address them safely. There are a variety of factors that go into determining if a Cross Bore exists. When in doubt leave it to the professional plumbers, drain cleaners and utility workers to be sure and most importantly to be safe.

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Additional sources of information regarding legacy Cross Bores and Cross Bore prevention:

- PA One Call – http://pa1call.org/pa811/Public/POCS_Content/Resource_Center/Cross_Bore.aspx

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Are you worried about the future of the civil engineering field after you retire? Have you ever asked yourself, what can I do to help promote a career in civil engineering? If you answered “yes” to either of these questions, do not fear! You are not alone.

The ever-evolving field of civil engineering requires a constant stream of innovative, fresh ideas—fueled by people who challenge the status quo, and question how we improve our quality of life throughout Minnesota, the nation, and the world. With the retirements of the Interstate-era engineers, demand for the civil engineering profession has been on the rise. Since the early 2000s, the Minnesota Local Road Research Board (LRRB) has been actively involved in promoting the civil engineering field to better account for the increased demand.

According to the Minnesota Summit on Civil Engineering Workforce Development (November 2000), the Minnesota Workforce Center projected a 28 percent growth rate in civil engineering positions throughout the state. A similar problem existed with civil engineering technicians, where an 11 percent growth rate was anticipated. Unfortunately, with rising growth rates, “The output of engineering graduates was at a standstill in the early 2000s.” An alarming gap was growing between supply and demand.

In response to the growing disparity, the Minnesota LRRB hired SRF Consulting Group, Inc. to develop a Toolkit for a Career in Civil Engineering for city and county engineers to use as ambassadors to reach out to students and engage with them about a career in civil engineering. The Toolkit, created in 2004, includes resources that promote a civil engineering career in Minnesota and consists of a video, PowerPoint™, Fact Sheet, Brochure, and Survey Report. The Toolkit was made public on the LRRB website and distributed statewide to every high school and to each of the city and county engineers with the hope that these materials would be presented to juniors and seniors at local high schools.

Although the Toolkit proved effective, there continues to be a huge problem. Who is going to solve tomorrow’s problems?

Legislative established in 1959, through apportionment of the gas tax, the LRRB supports and funds $3.6 million in transportation research projects with a local emphasis. Over the last 15 years, the LRRB has sponsored more than 200 individual research projects.
need for civil engineers. According to the Bureau of Labor Statistics, civil engineering employment is projected to increase 11 percent between 2016 and 2026—a figure that is well above average when compared to all other occupations. Further, civil engineering technician employment will grow by nine percent. These increased job opportunities are not only due to the nation’s aging infrastructure and rise in capital investments, but in part because of the number of retiring civil engineers and civil engineering technicians. The supply of civil engineers in the labor market far exceeds civil engineering technicians by almost 1:3, supporting the importance of STEM-related training.¹ Thus, there’s no better time to explore the field of civil engineering than now.

To further address the growing need for civil engineers and technicians, the Minnesota LRRB tasked SRF with evaluating new outreach strategies in 2017—this time targeting a younger audience, as opposed to high school students. The outcome was an animated video focused on middle schoolers, which explores the world of a civil engineer, and provides a correlating website that includes detailed information about the field, as well as steps that students can take to become a civil engineer. The Minnesota LRRB created the video and website to be relevant nationwide, not Minnesota specific.

What can you expect when you watch the video?

The video aims to generate excitement around a career in civil engineering and motivate students to investigate more. The video highlights what young people today are most interested in:

- Solving problems
- Working with the latest technologies
- Making the world a cleaner and safer place
- Creatively addressing math and science

The video also educates students on what civil engineers do, such as building skyscrapers and tunnels; designing roads, rail and air systems; building transportation systems to get people to work; and developing water purification systems. It also features various sub-disciplines within civil engineering such as transportation, municipal, structures, etc.

The website was built to replace the standard materials included in the Toolkit, provides an interactive, dynamic platform that allows students to explore the content on their own terms. Written in easily understood language, the website contains graphics, games, and links—it’s a tool that was created with younger students in mind.

The Minnesota LRRB continues to work with STEM educators to circulate the video and website and promote civil engineering and civil engineering technician careers in schools. As a part of this ongoing effort, the Minnesota LRRB calls others to unite in this effort and use the LRRB video and website as a resource. Engineers are often asked to come to schools and present about their careers, and we hope that you consider using this video and website as part of your presentation!

Watch the video here: https://youtu.be/7dBi_3NLWIA

Get more information here: https://becomeacivilengineer.com/

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Northern Nevada is a community known for its natural beauty, breathtaking mountain vistas, year-round recreational opportunities and, more recently, its growing ability to attract big-name employers such as Tesla, Switch and Apple. While there will always be a place in Nevada for wild horses, neon signs and casino gaming, the area's revitalization and diversifying economic climate is now attracting new technology and manufacturing jobs and residents to the Reno-Sparks area at a rapid pace, leading to an increased demand for transportation solutions that work for northern Nevada's 21st century needs.

Transportation planners anticipated the need for a new roadway connecting south Reno with east Sparks nearly 60 years ago, known then as the Tahoe-Pyramid Link, when regional leaders envisioned a vibrant, growing and thriving community. After years of planning, engineering, environmental analysis and extensive public outreach and involvement, the Regional Transportation Commission (RTC) began studying the alignment for the final segment in 2007. When the design and right-of-way acquisitions were complete, the RTC broke ground on this long-awaited project in 2012. The SouthEast Connector is the last piece of this vision to help complete the transportation network needed to accommodate the growth which was projected decades earlier.

Now, as new residential and commercial development in the region strained existing local infrastructure, the RTC of Washoe County’s recently opened SouthEast Connector Project is easing traffic congestion on other major northern Nevada roadways by providing a safe and time-saving alternative option for commuters. This $300 million investment in the community, which was 100 percent locally funded with voter-approved indexed fuel tax revenue, created and is supporting jobs, reducing commute times, increasing recreational opportunities and helping to create a more sustainable place to live, work and recreate.

The new roadway, named Veterans Parkway, stretches 5.5 miles from the intersection of Greg Street/Sparks Boulevard at the northern end in Sparks, to the intersection of Veterans Parkway/South Meadows Parkway at the southern end in Reno. The road is three lanes in each direction and has two new, signalized intersections at Mira Loma Drive and Pembroke Drive in Reno. The posted speed limit, established by the local jurisdictions, is 45 miles per hour throughout the corridor. The project includes 104 box culverts and 13 individual bridges including one pair over the Truckee River which are the longest bridges in the community.

Before the project ever broke ground, the RTC held hundreds of public meetings to invite the community to participate in the public process. Community engagement and support of the SouthEast Connector was critical at all phases of the project, and the RTC arranged for tours of the project while it was under construction. Inviting the community to be a part of the project before it started and during the con-
One of the RTC’s project goals from the very beginning was to work with the community to build a road that would blend seamlessly into the natural environment. The Reno-Sparks area is well known for its natural, high desert beauty and diverse recreational opportunities, including its proximity to Lake Tahoe. With input from a community working group the RTC established, which was comprised of a broad representation of community stakeholders, the roadway was designed and built using natural colors that matched the corridor’s scenic beauty with surrounding hillsides and mountain views, helping to blend it into the natural scenery. The RTC was able to create a project that feels like it was meant to be there, long before it even opened.

At the RTC, we like to say that the SouthEast Connector is an environmental project with a road running through it. Part of the project is located next to one of the region’s most well-known wetlands areas. While beautiful, the natural quality of the wetlands had deteriorated over time. During the Comstock mining days, mining runoff from the historic nearby mining town of Virginia City had left mercury in the water, and noxious invasive weeds, such as whitetop, had taken over. The RTC worked with environmental experts to develop and execute a plan that allowed the RTC to remove and sequester more than 22,000 pounds of mercury from the wetlands by encapsulating it under the roadway. Crews removed noxious weeds and replaced them with native vegetation and new cottonwood and willow trees. The RTC also removed more than 3.8 million pounds of trash from the project area. Detractors suggested these efforts would destroy the natural wildlife and their habitat and deter their nesting and migratory patterns at these wetlands. Today, the wetlands are returning to a more natural ecosystem. Deer and birds, including bald eagles, geese, egrets, and pelicans, among other wildlife, continue to make the area their home in a more sustainable and healthy environment year round and seasonal migration. The abundance of wildlife in the area today have allayed concerns previously expressed.

The SouthEast Connector is also located within a floodplain, making the roadway design and engineering process even more critical. Initially, residents who lived close to the project site were concerned that the road could cause flood waters to pool unnaturally. The RTC engineered a design to mitigate flooding. The design and construction allowed for box culverts to be built under the roadway throughout the project. These culverts would allow water to spread out naturally along the floodplain. Crews also removed additional dirt from the project site, creating a bathtub-like effect and allowing more space for water to pool during a potential flooding event.

The RTC had the opportunity to see how this design would work when the region experienced a significant flooding event in January 2017. The roadway and flood mitigation improvements performed as it was designed to work, mitigating the effects of floodwater on the surrounding area. In addition to the traffic-mitigation and environmental benefits of the project, the road is also built above the floodplain, which will now allow emergency first responders the ability to access neighborhoods during a flooding event where access was not available in previous flood events.

In addition to shortening commute times for drivers, the project’s multi-use pathway, which runs the length of the road, is already a destination favorite among northern Nevada’s outdoor enthusiasts who like to run, walk and bike their way around the Reno-Sparks community.

The RTC continued project-site tours throughout the building process, allowing residents to see how the road and flood mitigation will function, and also giving the public the opportunity to ask questions and learn more about the project. The RTC’s project manager led the tours, which began with a project overview presentation followed by a guided vehicle tour throughout the project site. Residents had the opportunity to get information directly from the RTC project team, which helped to alleviate residents’ concerns, provided factual engineering and environmental information, and build support for the project.

Now that the project is complete and open to traffic, the community is already enjoying the benefits of the SouthEast Connector project. In addition to shortening commute times for drivers, the project’s multi-use pathway, which runs the length of the road, is already a destination favorite among northern Nevada’s outdoor enthusiasts who like to run, walk and bike their way around the Reno-Sparks community. The road is connecting people to recreational and employment opportunities and contributing to the region’s significant economic revitalization. The SouthEast Connector represents an engineering and environmental public works achievement that has enriched a community and improved the quality of life for all its residents.

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Public agencies challenged by text messaging blitz

Bonnie Page, General Counsel, Smarsh, Portland, Oregon

It’s 6:00 p.m. I am rushing out of the office. As I close the door on the workday, I remember that I forgot to tell my boss he needed to sign a set of documents before 10:00 a.m. the next day. Do I go back inside, sit down at my desk and type an e-mail? Do I pull out my phone, open my e-mail app and begin typing? Nope—I fire off a quick text message reminder. Our professional lives are powered by text messaging, just as our personal lives are. When we want to get ahold of people quickly, we text them. That statement is as true for those of us who work in the private sector as for those who work in the public sector.

Public sector entities, however, are legally required to retain communications under public records or freedom of information laws. Most states require electronic communications to be retained for at least one year, regardless of whether the communication is sent via e-mail, social media, or text message.

In a recent Smarsh survey, 70% of the public entities surveyed allow employees to use text messages to conduct public business but 46% of those surveyed don’t have a way to ensure those records are retained, searchable and easy to produce. Plus, many organizations allow employees to use their personal devices (BYOD) but do not have a comprehensive BYOD management solution or policy. Many of the entities who allow employees to use their own device rely on those employees to search for and produce their own text messages in response to public records requests. The practice is inefficient and creates risk that the public entity will not produce all of the records it is legally required to produce.

In addition, in most cases state statutes give public entities no more than 14 days to produce the records. When a public entity receives a request for text messages, the entity cannot rely on carriers to produce these records. Carriers often do not retain the records (which is a violation of public records laws if the entity is not retaining them) or they are not able to provide the record within the statutorily defined time period.

Because of limited resources, and the challenge associated with capturing text messages and managing devices, we have seen an increase in litigation or administrative action concerning the use of text messages to conduct public business. In light of the available technology this litigation is costly and, quite frankly, a waste of taxpayer dollars.

Text message archive solutions exist and are inexpensive on a per-user basis. These solutions capture and allow records managers to search for and find requested records as quickly and easily as conducting a Google search—greatly reducing the time, effort and cost associated with responding to records requests. As stewards of public resources, state and local governments should implement technology tools that allow for the capture and efficient production of electronic communications.

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On the morning of Thursday, April 26, 2018, three hundred seventh and eighth-graders donned gardener’s gloves and climbed into a nondescript drainage ditch at Lake Braddock Secondary School in Burke, Virginia, a verdant suburban community located about 20 miles southwest of the nation’s capital.

The ditch is nothing special, just a shallow depression with some large stones and a caged drain to slow rainwater that runs off an expansive parking lot, a sea of impervious asphalt. Other than retrieving errant balls hit or kicked from adjacent athletic fields, this is probably the first time the students have ever even noticed the stormwater basin.

Under a crisp blue sky, with a gentle spring breeze blowing, the students work together to enhance the functionality of the basin by installing 1,000 native perennials. Once established, the plants will transform the basin from a simple ponding area into a bioretention area, essentially a natural sponge that absorbs stormwater runoff and excess nutrients from lawn fertilizer and pet waste.
The planting event is part of Revitalize, Restore, Replant! (R3), a new outdoor educational program in which freshwater ecologists from Fairfax County’s Department of Public Works and Environmental Services (DPWES) use stormwater management facilities at schools as outdoor learning labs.

“This has become one of our most successful partnership programs with Fairfax County Public Schools and helps create a meaningful, non-traditional environmental education experience on school property that students and teachers can use for many years,” said Danielle Wynne, ecologist and head of the Stormwater Planning Division’s Watershed Education and Outreach section.

Elaine Tholen, former environmental stewardship program manager for FCPS and Get2Green program founder, says she loves working with Danielle and her team. “We have been able to work with students on school ground practices so that the students know the decisions they make about land use at school, at home or in their neighborhoods can have an impact on watershed health,” said Tholen. “Taking the students from project inception through implementation is one of the best project-based learning experiences I have seen for both students and teachers.”

Wynne and her team purchased the plants from a local nursery and arrived early to dig starter holes using an auger attached to an electric drill. Preparing the site beforehand allows students to concentrate on the plants and the purpose of the event, which is made clear during numerous interactions with the ecologists throughout the morning.

For many kids, this is their first experience planting anything. Wynne begins by explaining what freshwater ecologists do because she never misses an opportunity to introduce freshwater ecology as a future career. She’s trying to change the stereotypical idea of a scientist as an old guy in a white lab coat huddled over a microscope in a dimly-lit basement. “As female scientists, part of what we do is show girls of all ages that science is for everyone,” said Wynne, referring to herself and fellow ecologists Samantha Duthe and Anna Haley. “Science happens everywhere, all the time, with all kinds of different people, and that they themselves are citizen scientists. It’s good to make that connection,” said Wynne.

She then explains the function of the stormwater basin in which they’re standing. The students learn their school is located within the Pohick Watershed (one of 30 in Fairfax County), which means stormwater flows directly from school grounds.
to Pohick Creek, the Potomac River, Chesapeake Bay, and, eventually, the Atlantic Ocean. Then Wynne explains the purpose of the R3 planting project. She shows them the native plants’ long roots and explains how they create pathways for water to infiltrate compacted soils and reduce runoff.

The perennials are planted in groups, which will make it easier for students to identify the plants when they return to pull weeds. Students will water the newly installed plants every two to three days until they take root. Once established, the native species, which are adapted to Northern Virginia’s soils and climate, will be self-sustaining.

Discarded black plastic containers are stacked high after the students finish planting black-eyed Susan, two varieties of milkweed, juncus (a tall grass), and irises. These native varieties will prevent erosion and create habitat for bugs and birds. “It’s like a mini ecosystem right on their campus,” says Duthe. Maintenance of the upgraded basin will be overseen by the county’s public works department.

“It’s an incredibly gratifying experience where students take ownership and pride in their work and learn some valuable lessons about their connection to their local ecosystem,” said Wynne.

Donna Volkmann, PreK-12 resource teacher and Get2Green coordinator, says she plans to identify and connect more schools with R3. “Students in FCPS care about their environment, and DPWES is providing opportunities for our students and teachers to engage in environmental stewardship,” said Volkmann.

R3 is just one of many experiential learning programs Wynne has created in partnership with FCPS. Staff from the Watershed Education and Outreach section provide mentoring on science projects, speak to classrooms via Skype, bring creative craft projects to STEAM events, run a floatables monitoring program, and conduct lab activities in the field and classroom, such as geomorphology, stream insects, Chesapeake food webs, and the Stream Crime Investigation lab for high school students.

Watershed Education and Outreach staff interacted with 3,500 students at 40 events in 2017, and 60 more are
scheduled for 2018. “For us, it’s not always how many kids we see, but what’s the impact we can make on the kids we do see,” said Wynne. Outreach and education programs are scheduled around the ecologists’ intensive monitoring times. “It’s a hard balance, but I think it brings something special to the education component, that we are scientists first who happen to enjoy education,” said Wynne.

Wynne has spent a dozen years cultivating relationships with FCPS science teachers and curriculum writers to provide programs based on specific FCPS standards of learning. “Understanding the needs of the school is where I think we went from trying a few things to creating a program,” she said. Watershed programs are now offered to elementary, middle, and high school students to create multiple touchpoints throughout their scholastic careers. Wynne worked with elementary science specialist Jill Curry to rewrite the fifth-grade Field of Science Unit, which uses project-based learning to teach how humans impact local streams and, ultimately, the Chesapeake Bay Watershed. Students conduct bacteria and aquatic animal surveys, study plants, and present a stream story. “This unit is going to create a whole class of citizen scientists who will understand their connection to the environment,” said Wynne.

“Danielle has blazed a trail for FCPS and DPWES-Stormwater collaboration, creatively connecting our curriculum writing process to the real work of scientists in the field,” said Curry. “It’s invaluable for our students to have the opportunity to work hand-in-hand with a scientist like Danielle to solve real problems in their schoolyards.”

As of mid-May, 4,710 plants have been installed on eight campuses by 860 students in the R3 program. “Fairfax County streams will be a little cleaner, our schools a little greener, and our students more connected,” said Wynne. R3 recently earned a 2018 Achievement Award from the National Association of Counties, in the Civic Education and Public Information category.

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INTERNATIONAL PERSPECTIVE

Build a Bridge… & Get Over It!...® Engineering Camp 2017

Riverina Eastern Region Organisation of Councils (REROC) in partnership with career development organization COMPACT Inc. and supported by IPWEA Australasia NSW, held the Build a Bridge… & Get Over It! Engineering Camp in Wagga Wagga for the 11th time, in August 2017. Twenty-four students from Yr. 9-12 from Wagga Wagga, Gundagai, Tumbarumba, Tumut, West Wyalong, Harden, and Cootamundra participated.

Build a Bridge… & Get Over It! Engineering Camp is unique to the Riverina region and has proven success when of the 250 students who have participated to 2016, up to 30% have later engaged in some form of engineering, enrolling in tertiary study, gaining scholarships or entering cadetships, after attending the camp. This successful camp promotes civil engineering as a career of choice to students from across the Riverina and is unique in its approach with students experiencing all facets of engineering principles, through practical learning activities.

The students compete in four teams, participating in a variety of activities, allowing them to gain valuable experience and understanding of laser levels, compaction testing, forces in equilibrium and spatial coordinates. They then worked in their teams planning and designing a working bridge model. Once the models were created, the teams delivered a formal presentation of their model and were assessed and evaluated by their peers, with the Blue team being announced as the winner.

The winning bridge was constructed on the final day under the supervision of the mentor engineers. The winning team became the project managers and all other teams became the construction crew that worked under instruction from the project management team to build the full-scale bridge over a 19m span creek onsite at Borambola.

For further enquiries, please contact Megan Mulrooney at megan@compact.org.au.
Charting a route for success

Bob Pilat, Assistant to the Director, Niles Public Works Department, Village of Niles, Illinois

As the Niles Public Works Department reduced full-time staff because of the recent recession, and again in 2014 in line with an organization and management analysis of the department, they were faced with a large dilemma: how do they continue to provide the level of service for snow removal that residents have come to expect even though staffing levels have been reduced?

Over the past several years, Niles Public Works took numerous steps to increase the efficiency of its snow and ice control operations including new equipment, chemicals, application rates and training. However, one of their more remarkable accomplishments has been the optimization of our salting and plowing routes, and using Garmin navigation units to provide in-cab turn-by-turn directions for the new routes to drivers.

Niles, Ill., is a northwest suburb of Chicago with 30,000 residents, and maintains 115 lane miles of Village roads and 63.62 lane miles of state highways within the Village via an agreement with the Illinois Department of Transportation.

In the past, the Village created snowplow areas manually. Adjustments to the plowing areas were made from time to time because of increased traffic, lane miles, personnel availability and changes to equipment. However, an actual route with turn-by-turn directions for each area did not exist. Drivers assigned to plow the same area often had different approaches, resulting in mileage, cycle time and deicing product variations.

Making matters worse, the department was again going to see significant turnover in staff due to upcoming retirements. This, combined with the use of seasonal employees to supplement the reduced full-time staff for snow and ice operations, resulted in a staff where almost 50% of the employees had less than five years of experience. Most had less than two years of experience. Quite simply they felt that routes needed to be optimized to reduce travel time, distance travelled and provide a more even distribution of the workload. These changes would also lead to decreasing the amount of deicing products used.

Snow Route Optimization

Public Works staff worked with a software company to develop optimized routes. Some of the other items addressed in this optimization were:

- Minimizing left turns and U-turns
- Minimizing crossing major routes at uncontrolled intersections
- Completion of the routes within time goals
- Prioritize routes based upon roadway priority
- Modifying routes based upon real-world realities

Several types of routes were created including:

- Salting only routes
- Plowing routes
- Cul-de-sac routes

“Route optimization with turn-by-turn navigation units works for us. While no two storms are alike, when comparing similar storms we demonstrated a 15.8% reduction in miles driven to complete the same task. This reduces our cycle time, costs and salt usage.”

– Fred Braun, Director of Public Works

New optimized routes with turn-by-turn directions were developed for each route; however, implementing the changes remained a looming challenge. Niles has typical suburban subdivisions, with streets that do not go through, dead-ends, cul-de-sacs, one-way streets and unique configurations. That, combined with the length of the route, would make it impossible for drivers to remember each turn for one route, let alone all of the routes. Moreover, with seasonal employees not knowing the streets of Niles, let alone the plowing routes, they wanted a better solution than having drivers constantly looking down at a map in a dark truck during adverse conditions. All parties knew that reviewing a multiple-page document for directions while driving is difficult and unsafe.

The Search for Navigation Units

When Niles started the project, their ultimate goal was to provide directions with a navigation unit many people use in their daily life. However, at each turn they were told this was not possible. The ability to provide turn-by-turn directions on a complicated route did not exist. Navigation

—
devices are designed to direct a motorist from Point A to Point B using the fastest or shortest route. Niles wanted a navigation unit that went from Point A to Point B, while plowing all the streets in between and in their desired order.

Two types of navigation applications were tested by the department, one in 2016 and the other in 2017; however, neither provided the functionality or mapping desired. As they had some limited initial success trying to configure an off-the-shelf Garmin navigation unit, they decided to fully commit themselves to this solution. While many obstacles loomed ahead, staff members were confident they could accomplish their goal. Through much trial and error, Niles was finally able to determine how to recreate the optimized routes using Garmin’s BaseCamp software and successfully upload it to a navigation unit.

Once the routes were developed and uploaded to the Garmin units, the next step was the most critical part—testing and feedback to improve the routes. In the fall of 2017, drivers took the Garmin units and test-drove the routes. Typically, they had someone with no experience whatsoever in the area drive the route to see if there were any issues. This was done to avoid employee frustration when the system was put during real-world situations and provide a system that left no routing uncertainty in the driver’s mind.

Sometimes drivers found a routing error. Even with the map and upcoming turn directions, sometimes the navigation units did not provide as much clarity as desired. Sometimes drivers came up with a better route. Sometimes a way to provide better service was found.

**The Real Test – During a Storm**

The routes were updated based upon the input; however, the real test was in real-world situations. Further refinements were made when the winter season started with salting runs, and then later in the season during plowing operations. For the most part, updates provided even more clarity, and the routes are now complete.

The navigation units first purchased from Garmin can also play audio messages for drivers when they reach a specific GPS point to remind them of hazards or unique circumstances. The fact these were ruggedized and water-resistant versions of a typical navigation unit was a bonus. However, Niles also purchased some less expensive units that offered a larger and clearer screen. They both work well and there are pros and cons to each.

To use, drivers simply select the route they are assigned from one of the 26 preloaded routes, follow the prompts, and the navigation unit will provide them turn-by-turn directions for the route. While driving, if a plow is unable to travel down a block for any reason, the driver can simply detour around the street or distance where the issue is, and the Garmin will get it back on the route. If the driver needs to leave the route due to mechanical breakdown, salt reloading or other reason, they are able to pause and restart the route with the unit providing directions back to the location where they left off.

Another added bonus is that staff can easily modify routes using the BaseCamp software. For instance, a bridge was undergoing reconstruction over the winter; therefore, the routes impacted by this closure were modified by staff and will be changed again next winter when bridge reconstruction is completed.

Not only is easy-to-read mapping available, drivers also have the ability to use the upcoming turn notification and be aware of the next four turns on the route.

Providing the route in an easy-to-understand format is vital to all transportation agencies’ snowfighting efforts. Successfully completing this project required managerial, technical and operations staff working together toward a common goal. Routes can be developed on a computer, but they do not always work in the real world. That is why operators must supply detailed feedback to the technical staff so changes can be made, and managerial staff must dedicate the financial resources to develop the routes and employee resources to test and implement the routes.

The combined effort of the Niles Public Works Department allows all drivers to more easily navigate the new routes and save a significant amount of time completing them in the process.

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Anyone who has traveled through Northern Kentucky along Interstate 75 has probably noticed the famous “Florence Y’ALL” water tower. What they may not realize is that they are traveling through a full-service city. Florence is home to 32,199 residents with a daytime population of 162,841. The City of Florence Public Services Department proudly serves this community with a staff of 67 full-time employees. The department consists of eight divisions: Water, Sanitary Sewer, Streets, Grounds, Fleet, Building Maintenance, Community Support Services, and Infrastructure Support Services. Florence truly is a full-service Public Services Department given the variety of responsibilities, but this only covers the surface of their work. Inside the department, they are working diligently towards a deeper purpose.

Public Services Director Eric Hall decided to implement a new strategic plan for the department in early 2015. This strategic plan involved narrowing down not just a mission, vision, values, and main goals that he feels represent the department and the city, but also a new reason to serve. Through developing and executing this strategic plan, the department has been able to relate the importance of their duties and assignments to how it affects the community. The mission statement “To enhance the quality of life in our community by serving others” is a true testament to the dedication that the department shows in their vast scope of work. “I think we all search for pur-
pose in our lives and what better way to fulfill that need than by serving others,” Hall says. “Yes, the strategic plan provides us with a blueprint but it’s our amazing staff that brings it to life!”

Values are not only a topic on the strategic plan but also something that is discussed and displayed on a daily basis. RICCH is an acronym the department created which stands for Respect, Integrity, Competence, Cooperation, and Honesty. These were chosen by the leadership team as the core values that represent the entire department. To help continually celebrate these core values, the department implemented a challenge coin. The RICCH Challenge Coin program is modeled after a long-standing military tradition. A member of the department can be nominated, by a peer or supervisor, for a challenge coin based on actions that demonstrate one of the departmental values. The nominations are evaluated by a peer committee and, if approved, are awarded during a monthly departmental ceremony. Once a recipient is awarded a challenge coin, the recipient may be “challenged” to produce the coin during regular duty hours.

The main goals developed for the plan are based on specific areas that the department has chosen to concentrate. SEECAPS or “Safety, Employee Development, Emergency Response, Customer Service, Asset Management, Professionalism, and Sustainability” were recognized as the main goals. The department has used these to develop many new strategies and programs based on the main goals. Performance measures were introduced last year and are division-specific and reported on a monthly basis to the entire department. Customer service is discussed in every monthly departmental meeting and sustainability is achieved through the comprehensive infrastructure forecast that outlines three- and five-year plans for allocations of budgets.

Another initiative that Florence Public Services has embraced is an extensive professional development academy. This proactive approach allows the department to implement training in leadership development as well as technical studies for future leaders. Each year promotable positions that are determined to be vacant in the next three to five years, due to retirements, are focused on in the studies of the succession group. This group requires members to apply annually and has already proven to be an effective means of preparation for the department’s future.

With so many innovative programs and strategies, it’s impressive how this department can grow and still achieve so much through their work. Florence is home to 169 lane miles on more than 370 city-owned and maintained streets. It also contains 132 miles of sanitary sewer lines, 142 miles of storm conduit, 7 pump stations, 150 miles of water main including 8,880 meters, 11 city parks including a skate park and the Aquatic Center, 26 city-owned buildings, over 200,000 square feet of city-owned landscape beds, and over 150 city-owned vehicles; all of which are maintained by the Public Services Department.

The eight divisions previously mentioned work diligently through multiple programs on an annual basis. Some of the programs include meter replacement program, manhole inspections, fall leaf removal, smoke and dye testing, playground equipment inspections, storm sewer phase II, hydrant flushing, sign retro-reflectivity, sump pump amnesty, and critical valve exercising among others. These programs are all ideas that have been developed and critiqued year after year.

Complacency is not an option in Florence. Holding to the highest professional standards, the staff members
from different divisions are required to earn licenses for their trades. Florence staff members hold Class I-IV Water Distribution Licenses, Class III-IV Collection System licenses, pesticide licenses, ASE certifications, and Road Scholar and Road Master certificates among others. The department also uses an extensive in-house safety training program that includes all OSHA mandates as well as other topics of importance to the staff’s safety.

The emphasis on emergency response is something that allows Florence to shine. The department consists of multiple on-call groups and covers everything from snow removal to street sign repairs, water main breaks and sewer stoppages among others. “We expect to respond to any call within an hour,” says Operations Superintendent Adam Duncan. “Our staff sees this as a responsibility and opportunity to serve the community sometimes in the worst conditions in the middle of the night. We know the community is counting on us to deliver at these moments.”

The newest addition to Florence’s creativity is an app that was recently launched for the community to get more involved. The Florence Y’ALL app allows users to interact directly with Public Services by sending in requests from any smartphone or tablet. The user can provide photos, locations and descriptions of any issues they may notice. The app also keeps the community involved with upcoming events and allows utility payments among many other features.

Florence Public Services sees themselves as unique to other public works because of their desire and passion to collectively “raise the bar.” They are very thankful and appreciative to the city staff, council members and mayor who allow them to pursue their goals. “My job is to make sure that they have the support, the equipment and tools they need to get things done,” says Mayor Diane Whalen. “Our community deserves the best of the best, and that is what our departments strive to provide. By hiring the best of the best, and raising that bar, we ensure that Florence is indeed a unique place and that we stand out and are a place that others want to emulate. All city departments collectively work to make Florence a great place to live, work and play.”

“Better Services, Better Community” isn’t just the vision shared by Florence Public Services. It has become an initiative and a way of life for the department. A servant mentality is becoming engrained in the members of this department, and this shared vision allows everyone to contribute to a greater good. Florence has aspirations of becoming the best Public Services Department in the country and together they are making steps towards greatness.

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Warwick Avenue Stormwater Improvement Project

The Village of Westmont Storm System


Initial Conditions
During the larger rainstorms spanning over many years the Village of Westmont experienced some flooding conditions and inadequate drainage characteristics throughout the Village. The Storm Event that was “the straw that broke the camel’s back” occurred on April 18, 2013. The April 18 event consisted of approximately 7” of rain in a 24-hour period, or roughly a 50-year storm. The storm infrastructure for the Village of Westmont had several locations that did not handle this storm as expected by Village leaders and residents. To be fair, numerous neighboring communities experienced similar flooding conditions as were experienced by the Village of Westmont.

Discussions and meetings were initiated shortly after the storm by residents and Village leaders. Actions were then taken by the Joint Committee to ensure that the required and pending stormwater improvements would not lose momentum. These actions included the following:

- The Village created a 12-member Community Stormwater Management Committee.
- Civil engineers were assigned by the Village Board in March 2014 to complete a Stormwater Feasibility Study and prepare a Draft Stormwater Utility Ordinance.
- A Citizens Stakeholder Group was developed to present their community concerns and recommendations.

Of prime concern to both Village leaders and residents is that a number of residences were now taking on stormwater in the homes during large events. Previously there had been little history of homes taking on stormwater during large rain events. This trend was not acceptable to all involved.
The situation of increased local private flooding can be attributed to several reasons, which include the following:

- Increased urban development.
- Aging stormwater removal infrastructure.
- Recent weather patterns which seemed to bring larger storms than what were accustomed to.

The civil engineers’ Stormwater Feasibility Study Report was completed and recommended that the Village pursue approximately $30 million in stormwater infrastructure improvements. Upon receiving these results and recommendations, the Village then moved forward and worked closely with residents and community leaders to identify potential funding mechanisms to begin the Village of Westmont Stormwater Improvement Program.

The Village then scheduled a referendum vote on April 7, 2015 for the community to move forward and finance the Stormwater Improvement Program. Ultimately, what the Village leaders and residents agreed to be incorporated in this Referendum was a new half-cent sales tax. The proposed sales tax most importantly was dedicated to the Stormwater Improvement Program. The sales tax was appealing because it would encompass the residents as well as the involved non-residents to help fund the improvement program.

The referendum passed and the Stormwater Improvement Program became a reality. The tax was projected to realize $800,000 to $1 million per year for stormwater infrastructure improvements.

**The North Warwick Avenue Drainage Area**

Project funding had now been secured. Wasting no time, Village engineers initiated the Phase 1/Phase 2 Engineering on North Warwick Avenue in August 2015. North Warwick Avenue was the top prioritized corridor from the Stormwater Feasibility Report. During the April 18 storm the North Warwick Avenue Corridor experienced home flooding, street flooding and general neighborhood flooding for several days before the floodwaters finally receded (see photo on p.121).

The engineers’ concept is to work to incrementally reduce the stormwater load which passes through the sensitive North Warwick Avenue Corridor. It is planned that by removing and reducing the contributory areas into the depression areas of the North Warwick Avenue Corridor, this will dramatically reduce the volume of stormwater flowing into the depression areas on North Warwick Avenue.

The first project to be constructed will be to install a new storm sewer extending the existing 36” RCCP located on Warwick Avenue south of the Chicago Avenue and Naperville Road intersections. This storm sewer will be extended north of the Naperville Road intersection to the high point of the natural topographic contours.

It was clear to the engineers from the beginning that the success of the Warwick Avenue Storm Sewer Construction Project would completely depend on the successful crossing of the Chicago Avenue and Naperville Road intersections.

Chicago Avenue is a well-traveled east-west arterial roadway. The ADT approaches 20,000. Chicago Avenue was an old state highway. It was then reconstructed in 2005 as part of a Jurisdictional Transfer Agreement to the Village of Westmont. The reconstructed Chicago Avenue cross-section is a 30-foot edge-to-edge full depth concrete pavement with B:6-24 concrete curb and gutter.

Village leaders wanted to maintain the integrity of the concrete pavement and to minimize effects on traffic during construction. Therefore, the conceptualized construction process was to auger the new storm sewer under Chicago Avenue.

The Engineering Study/Design Process discovered that utilities located in the Chicago Avenue right-of-way included the following:

- Commonwealth Edison has a major utility duct travelling under and near the north edge of pavement.
- NICOR has a high-pressure gas main travelling under and near the south edge of pavement.
- The Village has a 12” water main travelling under and near the south edge of pavement.
- The FCWRD has an 8” sanitary sewer travelling under and near the south edge of pavement.
- T-Mobile, AT&T, XO Communication and ZAYO Communication have various fiber optic cables under and near the north edge of pavement.

It was becoming apparent that crossing through these utilities would be a complex undertaking.

The Engineering Study/Design Phase was completed in January 2017. The Warwick Avenue Storm Sewer Improvement Project was designed to provide the following:

- New 36” to 24” diameter RCCP storm sewer from Norfolk Street to Melrose Avenue.
- New local storm sewer improvements to connect to the new RCCP storm sewer.
- Relocated sanitary sewers, as required to facilitate the construction of the new storm sewer system.
- Relocated water mains, as required to facilitate the construction of the new storm sewer system.
- Rehabilitation and resurfacing of Warwick Avenue.
- New driveway aprons, new sidewalks and reconfigured parkways, as required.
- A 48” diameter steel casing will be augured and jacked under Chicago Avenue, to house the 36” RCCP.
• Chicago Avenue will remain open to traffic at all times throughout the project duration.
• Construction began in 2017.

Construction Phase

Engineers completed the design plans and contract documents to construct the 36” diameter storm sewer under Warwick Avenue from Norfolk Street to Melrose Avenue and crossing under Chicago Avenue, over 3,000 lineal feet. Bids were opened on April 18, 2017 and 11 contractors submitted bids. Elanar Construction Company was awarded the contract with a low bid of $950,000. Construction was to begin immediately in May and to be completed by November 2017.

Stepping back, during the design phase it became apparent that the project corridor and the proposed storm sewer alignment was home to numerous utility crossings. The design maintained the invert of the proposed 36” RCP at approximately 11’ deep to stay below the utilities. The utility companies responded politely to design engineers’ requests for information, but they know that few municipalities actually build 36” storm sewers today. When the plan was complete and advertised, the engineers then received numerous communications and updates from the utility companies.

The advertised design plan was to auger the 36” RCP under Chicago Avenue. As the communications from the utility companies increased during April, it became more apparent that the utility companies were not confident of the exact location of their infrastructure. It was becoming clear that the project success would hinge on sneaking the proposed 36” RCP through the existing utilities. And, anyone who has installed pipe knows that it is really not possible to “sneak” a 36” RCP anywhere.

The pre-construction meeting was conducted on April 25. At that meeting, because of the recent communications from utilities, the contractor was requested to prepare a change order to install the pipe under Chicago Avenue by conventional trench and fill method, as opposed to the trenchless auger method. Chicago Avenue would be closed during installation of the storm sewer and again during construction of the new Chicago Avenue concrete pavement. Construction began on June 5, and the utility interferences were addressed as follows:

![](image.jpg)
• T-Mobile and Zayo Communication relocated their fiber lines on the north side of Chicago Avenue in June.
• The contractor relocated various 8” sanitary sewers owned by FCWRD.
• AT&T relocated its fiber line located in the alley during July.
• The contractor was shut down for one week in July, while NICOR was forced to cut and cap its 4” high pressure main located on the south side of Chicago Avenue.
• The contractor relocated 12” water mains owned by the Village of Westmont.
• Field design change was required in July to avoid a COM ED duct bank located on the north side of Chicago Avenue, which was larger and deeper than anticipated by all.

   o To address this issue in more detail, this was the most concerning chapter of the project. The record drawings show the COM ED duct bank to be two feet deep and two feet thick.

   However, when we encountered this duct bank it was actually four feet deep and over four feet thick cast-in-place concrete duct bank. We were stuck! The Village engineers immediately came to the site to ascertain the situation. After a 30-minute conference it was decided to remove two sections of installed 36” RCP back to the centerline of Chicago Avenue. Elanar would modify and install a catch basin already on the project site. At this point we would begin to install the 20” diameter C905 pipe. We were then able to just fit this pipe under the COM ED duct bank. We were on our way again.

• AT&T relocated its fiber line on North Warwick in August.
• NICOR reestablished its 4” high pressure gas main on the south side of Chicago Avenue in September.

Completion of the new storm sewer was completed in September and correctly installed. Then, local drainage improvements were made, sidewalks were built, Chicago
Avenue was reconstructed, and Warwick Avenue was paved and landscaped. Final Inspection and Project Acceptance was conducted on November 9!

Lessons Learned

• Owner:
  ◦ Infrastructure improvements are not possible until funding is secured.
  ◦ Keeping the residents adjacent to the construction project continuously informed of the project status and progress will foster a community partnership.

• Engineer:
  ◦ Engineers perceive a 36” RCP as a 36” diameter storm sewer. Underground contractors perceive a 36” RCP as a 48” diameter heavy pipe. During a construction project through a developed corridor, it benefits all parties to have these perceptions as closely aligned as possible.
  ◦ Most utility companies have a pretty good understanding of where their underground utility infrastructure is located in the X and Y directions. And, most utility companies have a rather vague understanding of where their underground utility infrastructure is located in the Z direction.
  ◦ A big problem today in successfully completing an underground improvement project is abandoned utilities. Not only are the abandoned utilities left underground to be dealt with by future construction projects, but they are also removed from all updated utility atlases. Sometimes, the only person who can provide the necessary insight pertaining to the abandoned utility is the engineer or technician with decades of local experience.

• Contractor:
  ◦ A project team with a shared common goal can overcome almost any major conflict.
  ◦ Working on a complicated project behind a closed road condition will exponentially increase work efficiencies and project safety.
  ◦ When installing a new pipe through a maze of existing utilities, utilizing a thin-walled pipe will dramatically increase the chances for project success.

Conclusion: Project Safety
To conclude, and most importantly, there were no accidents during this construction project. During the Warwick Avenue Storm Sewer Installation Project there were no injuries to construction workers, local citizens, travelers passing through, or pedestrians. Further, there were no reported accidents or lost work time due to accidents. This construction project was a complicated project with constant inherent danger.

This successful project safety performance is partially due to the fact that the owner and the contractor and the engineer constantly stressed the following:

• Daily discussions pertaining to project safety.
• Constant attention paid to onlookers, pedestrians and traffic.
• Always work at a steady and safe pace.
• Always watch where you are walking.
• Always pay attention to the current situation.
• Never daydream.

Edward Kalina can be reached at (630) 796-2064 or ejk@enginesolutionsteam.net; Noriel Noriega can be reached at nnoriega@westmont.il.gov; and Mike Deubel can be reached at (773) 897-5268 or miked@elanar.com.
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Select the right fleet management system for your department

Keith Nicolson, CPFP, Fleet Manager, Benton County Fleet Services, Corvallis, Oregon

Just like any professional, fleet managers need the right tool for the job. With ever-increasing demands on fleet departments for increased data tracking, reports, financial accountability, analysis, or integration with other systems, selecting the right fleet management system can have a big impact on daily workloads and our ability to meet these ever-increasing demands.

Whether you’re currently using the pen and paper method, a home-grown system, or a known fleet management system, one of the first things to ask is whether your current system meets your needs or if you’re adapting your needs to meet the system’s ability. Too often, we find ourselves adapting to what we have and not making the software work for us.

Fleet departments no longer function in silos, and neither should your fleet management system. Take the time to identify your stakeholders and understand the needs of all involved. Part of this process might include helping others understand the need for change and how it might have a positive impact on their jobs. Taking the time on the front end can help ensure you get the right tool for the job and the support for the change.

Stakeholders
Fleet systems affect many other parts of your organization’s operations, so it’s important to identify your stakeholders. Typically, these stakeholders might include:
- Technicians and staff members
- Customers
- IT department
- Finance
- Other departmental managers

If you’re looking at a new fleet management system, you or your stakeholders probably have a current or future need that’s not being met. Take the time to evaluate your operation to determine what works well and where you’re trying to go. Try to identify any barriers that might be in place and pinpoint possible solutions. Investing time on the front end will not only help ensure you get the right tool for the job, but also provide you with information you will need for your purchase process. It’s one of the most critical pieces of the process.

Data integration: The need to integrate with other systems is becoming more common within our industry. For example, perhaps you want to import your fuel data transactions from your onsite fueling system or an external card lock. Without this data you will be unable to accurately predict things like preventive maintenance (PM) schedules, run equipment cost per mile, or life-to-date maintenance (LTD) maintenance costs. To avoid the errors and problems associated with double entry, you’ll want your fleet management system to integrate with your financial system for billing, rate recovery, replacement forecasting, etc. You might also want your system to tie into other areas, like payroll. Your fleet
management system is only as good as your data, and data integration helps keep that data accurate.

**System flexibility:** As your fleet grows, so may your needs—and you don’t want to purchase a new system every time your needs change. Look for a vendor that provides a system to meet your needs today and with the capability to configure their software for future needs.

**Ease-of-use:** As with any system, usability will be key not only for the administrative staff but also the technicians. If the system is not intuitive and easy to use, people will find ways not to use it. From the technician perspective, if you want staff to use real-time labor tracking, it should be quick and intuitive—ensuring accurate data collection while enabling maximum shop floor productivity.

**Implementation**
As part of your evaluation of a fleet management system, also consider your needs regarding implementation now—long before a purchase is made. Implementation is the make-or-break point for any software, so the time to outline your plan for getting the software up and running should be a high priority.

**Implementation services:** One strategy is to enlist the help of the experts. Many fleet management system developers have implementation services, which are generally designed to get you up and running quickly as well as reduce disruptions. Yes, it adds to the cost. However, when you calculate the costs of unused software sitting on your computer, implementation services usually look like a good deal.

**Training:** If there’s one area where you don’t want to skimp, it’s training. Ask about the training options available from the software provider. Typically, there’s three different types. Onsite training includes a software trainer that comes to your location and offers hands-on support using your data and your workflows. Classroom training is another offering, where your employees travel to a training center. Last, but not least, online training is efficient and affordable for organizations that need to train people in different locations with different schedules.

**Maintenance and support:** Fleet management systems often have programs that include software updates, support services, and other maintenance services. The idea is that you know whom to call when you have questions or issues. Software maintenance support varies by vendor, so ask questions during your initial research. Not all software support is equal.

A fleet management system is a big investment for an organization, so take the time to do it right. In the long run, the effort will save you time and money, both of which are in short supply with most fleet departments.

Keith Nicolson can be reached at (541) 766-6617 or keith.nicolson@co.benton.or.us.
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Seismologists have long warned us that a subduction zone earthquake off our coast is anticipated to cause far greater damage than a crustal quake along California’s San Andreas fault line.

The Cascadia Subduction Zone (CSZ) is the primary regional fault system in the Pacific Northwest and was created by the oceanic “Juan de Fuca Plate” subducting beneath the continental “North American Plate.” The subduction is occurring in the coastal region between Vancouver Island, British Columbia, and the Mendocino Triple Junction in northern California. The CSZ earthquake events have the potential to generate earthquake magnitudes up to 9.0, which translates into a duration of four minutes. Scientists estimate the odds of an abrupt release of CSZ forces in our lifetime to be roughly one in three over the next 50 years. The odds of “The Really Big One” are roughly one in 10.

In the Pacific Northwest, the area of impact is estimated to cover 140,000 square miles, including Seattle, Tacoma, Olympia, Vancouver, Portland, Salem, Eugene, and some seven million people. When the next full-margin rupture happens, the region will suffer the worst natural disaster in the history of North America. To put it in layman’s terms, scientists have been attempting to tell us for some time that by the time the shaking stops and the tsunami recedes, the area will be unrecognizable.

According to Oregon State University seismologist Chris Goldfinger, the gap between what we know and what we should do about it is getting bigger and bigger. He’s experienced firsthand a massive earthquake in the most seismically prepared nation in the world—the 2011 earthquake and tsunami in Tohoku, Japan. By many metrics, it will be as bad or worse to be there afterward: months, or even years, without electricity, drinking water, sewage systems, hospitals, etc. according to the State of Oregon’s map of impact zones (Figure 1) and estimated time to restore service (Table 1).

**Pipelines and Earthquakes**

Damage to pipelines is historically the primary reason for water system failures after an earthquake has occurred. The resulting water shortage for firefighting and extinguishing earthquake-caused fire ignitions has resulted in excessive, life-threatening fires. Extended durations of water shortages have an adverse effect on business operations, and having drinking water readily available is critical following seismic events (for emergency operations facilities, hospitals, etc.).

Water pipelines have historically been susceptible to earthquakes—in particular, shaking and permanent ground deformation (PGD) caused by liquefaction and related settlement and lateral spreading. Liquefaction is the process in which seemingly solid ground begins to behave like a liquid, to the detriment of anything on top of it. Lateral displacement results when a soil layer liquefies, with the soil layer above it sliding downhill. Lateral spreading can result in soil movement as little as one inch to tens of feet. Older pipes were installed using weak pipe materials and welds or...
unrestrained bell-and-spigot pipe, which contributed to damage or failure. Since the times when weaker or unrestrained pipes were prevalent, the pipeline industry has welcomed the use of materials that are more resilient to PGDs, including welded steel and restrained ductile iron.

**Lake Oswego–Tigard Water Partnership**

In 2008, the cities of Lake Oswego and Tigard, Oregon (Program Sponsors) executed an Intergovernmental Agreement (IGA) to form the Lake Oswego–Tigard Water Partnership. Lake Oswego’s water supply was near capacity, and major facilities were in need of expansion and improvement. The City of Tigard was in need of a secure, dependable supply of water. Together, the Program Sponsors have expanded and upgraded Lake Oswego’s water pumping, conveyance and treatment capacity to allow for delivery of finished water to both cities’ customers. The major elements of the improvements, presented in Figure 2, include 14,000 feet of 48-inch through 36-inch raw water pipe (RWP) and 45,000 feet of 48-inch through 24-inch finished water pipe (FWP).

**Pipe Material Selection**

Large transmission mains, generally 24 inches and larger, are typically installed with ductile iron pipe (DIP), welded steel pipe (WSP), or concrete cylinder pipe (CCP), with cost and operator familiarity again being typical selection factors. For this project, WSP and DIP were the materials initially selected for consideration. The evaluations focused on the following criteria:

- Pressure
- Layout
- Connections and Appurtenances
- Corrosion Control
- Constructability
- Linings and Coatings
- Availability
- Cost

During materials evaluation and design, it was determined that the use of double-lap welded, tape-wrapped or polyurethane-coated steel pipe (one of the most seismically resilient pipe materials) with a ¼-inch wall thickness and 36 ksi yield strength, would be appropriate for use on the project.

**Seismic Design**

The International Building Code’s (IBC’s) approach to generating a seismic design event begins with the anticipated ground movement from an event with a two percent probability of being equaled or exceeded once in 50 years, which corresponds to a 2,475-year return period. This ground motion is then multiplied by a factor of two-thirds for the base design load.

For “important structures,” such as schools, jails, and public assembly areas with more than 300 occupants, the ground motion is then increased by 25 percent. For “very important structures,” such as hospitals, emergency shelters, and police and fire stations, the design event is increased by a factor of 50 percent. When the base design load is increased by a factor of 50 percent, the subsequent ground motion becomes the original two percent in 50-year design event.

Water systems, including pipelines, are routinely defined as being “very important structures,” due to the need for drinking water and firefighting capabilities after earthquakes. As such, the design ground motion chosen for the RWP and FWP were the two percent in 50-year event, consistent with other elements of the Partnership’s program. This seismic event is also consistent with the highest design standard accepted around the world.

**Conclusion**

Damage to pipelines is historically the primary reason for water system failure after an earthquake has occurred, but their continuous operation is essential for fire suppression and drinking water supply following natural disasters. Steel pipe with double-lap welded joints and ¼-inch wall thickness will be able to accommodate this project’s design seismic event and associated potential liquefaction and settlement, minimizing the risk of citizens and firefighters having an inadequate supply of water following an earthquake.

Aaron Eder can be reached at (503) 220-5415 or aaron.eder@stantec.com.

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The Rockford (Illinois) Water Division and Fehr Graham, a Midwest engineering and environmental firm, received an award from the Rockford Chamber of Commerce for their unique public-private partnership, which has saved time and taxpayer money and is ensuring that the city’s water infrastructure investment program is a top priority executed transparently and efficiently. The partnership created an engineering “assembly line,” consisting of design, bid and construction inspection services, and contained public service components to educate the community. City staff remains effective and proactive in improving water systems, while Fehr Graham continues to prepare plans and secure approvals to advance various projects. For more information about Fehr Graham, please visit www.fehr-graham.com.
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2018 Aug. 26–29 Kansas City, MO
2019 Sept. 8–11 Seattle, WA
For more information, contact David Dancy at (800) 848-APWA or send e-mail to ddancy@apwa.net.

National Public Works Week: May 20–26, 2018
Always the third full week in May. For more information, contact David Dancy at (800) 848-APWA or send e-mail to ddancy@apwa.net.

North American Snow Conference
2019 May 19–22 Salt Lake City, UT
For more information, contact Brenda Shaver at (800) 848-APWA or send e-mail to bshaver@apwa.net.

SEPTEMBER 2018
17-19 National Rural Water Association, WaterPro Conference, Fort Worth, TX, www.nrwa.org
17-20 APWA: CSM, CIPP and CPFP Certification Exams (computer-based testing), (800) 848-APWA, www.apwa.net

OCTOBER 2018
3-7 Society of American Foresters, SAF National Convention, Portland, OR, www.eforester.org


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