Street Glaciers in the Colorado Front Range

See page 42
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The APWA Reporter, the official magazine of the American Public Works Association, covers all facets of public works for APWA members including industry news, legislative actions, management issues and emerging technologies.

WINTER MAINTENANCE ISSUE

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Using technology to enhance your community

Ronald J. Calkins, P.E., PWLF
APWA President

Technology is advancing faster today than at any time in human history. The need to perform effectively is even more important today because people in your communities expect quicker and better results. Budgets are tighter and businesses must find faster, more creative ways to deliver services with fewer resources.

This poses some unique challenges for all of us in a variety of ways. We have the need and the desire to provide better services. Today’s new technology can be disruptive if not designed and implemented carefully. The development of geographic information systems (GIS) has allowed public works agencies to maintain a much more comprehensive database of their infrastructure than was possible a decade ago. And in part, this can represent a problem rather than creating an enhancement in the workplace. For example, if we know so much more about all of our road signs, what difference does this actually make if it doesn’t make our community a better place? And if having all this data does not make a difference, then was all that work putting the information into GIS really worth it?

This example points out a potential pitfall of new technology. If one does not embrace and actually use evolving technology, then what good is it? The value of new technology is that it should facilitate better communication, improve data integrity, and enhance productivity. It should make work more efficient and easier to understand, easier to administer, easier for wider participation in a project and provide better communication. For example, gathering information about activities in winter maintenance is notoriously difficult, relying as it often does on hand-filled time sheets, completed in the early morning hours after a night of hard work. But this process can be automated relatively simply by using sensors to measure how much material (rock salt) is being applied and where, how many hours the plow has been deployed, and where and when the snowplow has been at work. Deploying this new technology would certainly (once the bugs have been ironed out, and there are always bugs) be an improvement and eliminate the need for tedious paperwork.

But if all we get from new technology is fewer handwritten forms (as an example), we are not utilizing this technology to its full potential. Maintaining and enhancing productivity in the workplace is only a part of the equation. Delivering exceptional customer service has become a key differentiator in top
organizations today! We should take pride in utilizing faster methods of answering customer complaints, for instance about when the plow will get to their street. We can keep track of materials placed in environmentally sensitive areas, which helps us mitigate impacts of winter road maintenance activities. We can track the performance of our snowplow cutting edges, determining which ones last for the most miles. Providing consistently better service with pride to our communities using new technology should be our goal. And no doubt, there are other things we can do with today’s technology that we have not yet even considered.

If we have the ability to install new technology in our workplace and do not use it to its full potential we are not providing our communities with the service they deserve. Take pride in allowing yourself to embrace change and to figure out the best use of new technology. Ask yourself how best to improve your operations and improve your community. Strive to bring government and citizens closer together and work to find creative ways to use technology, thereby improving the overall value of your organization.

“Systems thinking is a framework for seeing interrelationships rather than things, for seeing patterns rather than static snapshots. It is a set of general principles spanning fields as diverse as physical and social sciences, engineering and management.”

– Peter Senge, The Fifth Discipline
Advocacy matters!

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

Congress debates many policies that impact the public works profession including infrastructure funding and DOT regulations. Congress takes into account the opinions of experts who know exactly how the legislation will impact their communities when they consider legislation. As public works professionals, you know exactly what is needed to design, build, operate, and maintain our national infrastructure that is essential to our nation’s economy and way of life. Congress must hear from you to ensure the decisions they make don’t have adverse consequences in your community. Advocacy matters because it allows you to share your expertise with Congress and influence public policy.

Advocacy takes many forms including voting in your local elections, visiting your Member of Congress, writing your congressional leaders, or even submitting testimony to a congressional hearing. The APWA staff in Washington, D.C. is here to help you become the best advocate for your community. Our program, APWA Advocates, can help you become more involved and make your voice heard!

APWA Advocates is a U.S. grassroots advocacy network of members formed to promote APWA’s legislative priorities through outreach and education. APWA Advocates’ purpose is to give APWA members all over the

Board of Directors election results

The 2016 Board of Directors election closed on August 7, 2016, at midnight. On August 11, 2016, Daniel L. Brown, Director, APWA Kansas City Metro Chapter, serving as Head Teller, verified the results. A total of 95 ballots were cast. A ballot for every position was not necessarily cast. As of July 1, 2016, there were 28,808 members of APWA. Regional Directors are elected by members voting in their specific region. The membership of each region varies in number.

Election results are as follows:

- **Bo Mills**, PWLF, President-Elect: 92 votes; Write-ins Aggregated: 0 votes
- **David L. Lawry**, P.E., Director-at-Large, Engineering & Technology: 92 votes; Write-ins Aggregated: 0 votes
- **William E. (Bill) Spearman, III**, P.E., Director-at-Large, Environmental Management: 89 votes; Write-ins Aggregated: 2 votes
- **Stan Brown**, P.E., PWLF, Director-at-Large, Leadership & Management: 89 votes; Write-ins Aggregated: 2 votes
- **Kathleen B. Davis**, Director-at-Large, Transportation: 92 votes; Write-ins Aggregated: 1 vote
- **Keith Pugh**, P.E., PWLF, Director, Region III: 14 votes; Write-ins Aggregated: 1 vote
- **Doug Layton**, P.E., PWLF, Director, Region IV: 24 votes; Write-ins Aggregated: 0 votes
- **Maher Hazine**, P.E., PWLF, Director of Region VII: 4 votes; Write-ins Aggregated: 0 votes
- **Jill Marilley**, P.E., PWLF, Director of Region IX: 4 votes; Write-ins Aggregated: 0 votes
APWA Advocates currently has over 1,200 APWA members in more than 350 United States congressional districts. As an APWA Advocate, APWA Washington staff will send you periodic updates on legislation that affects public works and infrastructure, and calls to action encouraging you to contact your congressional representatives.

Since its origin, Advocates have weighed in on many issues that impact public works including the passage of transportation funding legislation, blocking burdensome federal regulations, and the passage of water infrastructure legislation. As an APWA member, you will be enrolled in the APWA Advocates program so you can advocate on behalf of your profession. To learn more about the APWA Advocates program, visit http://www.apwa.net/be_involved/apwa-advocates.

To learn more about what's happening in Washington, D.C., check out the APWA Washington Report at https://www.apwa.net/resources/washingtonreport and visit the APWA Legislative Action Center (LAC) at http://cqrcengage.com/apwa/. The LAC is the platform APWA Advocates use to contact Congress about public works-related legislation. The LAC is also a source of updates on the latest public works news in Washington, D.C. The APWA Washington Report is a newsletter delivered to your inbox weekly with the latest updates on U.S. national legislative and regulatory news affecting public works and public works professionals.

Tracy Okoroike is the former Government Affairs Associate for APWA, but is still passionate about infrastructure and advocacy!
Winter Maintenance Subcommittee: Tools and facts to assist our APWA members

R. Mark DeVries, PWLF
Lead Consultant, Transportation Weather Consulting Group
Vaisala Inc., Louisville, Colorado
Chair, APWA Winter Maintenance Subcommittee

Your APWA Winter Maintenance Subcommittee is comprised of winter maintenance professionals from all over North America. They make up one of the most active subcommittees in APWA. They help deliver education and products regarding winter maintenance to APWA members and beyond. Many are involved in committees and associations outside of APWA as well. The wealth of knowledge this subcommittee brings, and the years of practical and academic experience, makes it one of the most prestigious subcommittees of its kind.

APWA members reap the benefits of this professional group in so many ways. The subcommittee helps plan and deliver the APWA North American Snow Conference, the premier event in snow and ice management. Almost 70% of the sessions at the conference had subcommittee involvement at the last conference. In addition to the conference, these members worked with APWA staff to develop the APWA Winter Maintenance Supervisors Certificate Program. This one-day workshop covers all aspects of winter maintenance. It includes testing, and upon completion, a certificate from APWA. This workshop is put on at the Snow Conference and at chapter events across the U.S. and Canada each year. It is delivered by subcommittee members that developed the course. It is one of the most successful programs APWA currently offers.

The subcommittee is also responsible for yearly Click, Listen & Learn sessions. It developed and helps evaluate the APWA Excellence in Snow and Ice Control Award. The members deal with media requests and contribute articles for the APWA Reporter and other publications as needed. Subcommittee members help maintain the website and participate and respond to the infoNOW requests. Many of the members are requested presenters at outside workshops and conferences both here and internationally as well.

Two recent items I would like to bring to your attention are the “Open Your Winter Toolbox” series in the Reporter and the “Salt Brine fact sheet.”

For those involved in winter maintenance, it is a year-round event. It is obvious that during the winter, agencies must deal with snow and ice events as they happen. But during the rest of the year agencies must go through the process of resupplying and preparing for winter. This may include many different areas, such as budgeting, policy updates, training, preparing equipment, and procuring and storing materials. This is also the time that agencies will review data from the previous year and make decisions about implementing new technologies or new programs. The Winter Maintenance Subcommittee determined it would be useful if members had more information on these subjects at their disposal. So each month in the Reporter there has been a column entitled “Open Your Winter Toolbox.” Subcommittee member Dr. Wilfrid Nixon has been the author of these articles with input from other members. Each article is on a different subject but involves tools, technology or programs that agencies can implement to improve their operations. I highly recommend reading these and, of course, previous articles are available through the Reporter web page or subcommittee web page at www.apwa.net.

The other item the subcommittee produced this year is a “salt brine fact sheet.” This two-page document is meant to aid agencies and the media when questions arise regarding its usage. This document can be found on the APWA website and on the subcommittee web page as well. This document was produced because there was so much misinformation in the media and because agencies needed factual information when they received a media request or complaints from customers. I believe it’s going to be a very useful document.

I suggest you visit the APWA Winter Maintenance Subcommittee web page. Become familiar with its members and the great work they’re doing.

R. Mark DeVries can be reached at (303) 262-4084 or mark.devries@vaisala.com.
MARK YOUR CALENDAR!

PUBLIC WORKS EXPO
ORLANDO
AUGUST 27-30, 2017

Imagining Tomorrow
CPFP certification conveys instant credibility to others in the public works field

Richard E. Battersby, CPFP, CAFM
Manager, Equipment Services Division
Bureau of Infrastructure and Operations
City of Oakland, California

As APWA’s nationally recognized Certified Public Fleet Professional program is a valuable tool and resource that any public works fleet employee should invest the time to explore. It is not only an industry-respected certification program, but also serves as a skill assessment tool or “report card” of an individual’s strengths and weaknesses by subject area, and enables focused subject area improvement as well as general professional development.

I first heard of APWA in 1998 while working on an alternative fuel vehicle deployment project at the Oakland Airport alongside City of Oakland staff. At the time, I had previous public works-type experience serving in the U.S. Army Engineer Corps and Directorate of Logistics, but was not currently working in the public works field. At the time I was impressed by the organization and individuals who comprised its membership, but it would be eight more years before I actually became active in APWA. And little did I know at the time, but some 15 years later APWA and the CPFP certification would play a significant role in leading me to proudly join the ranks of the City of Oakland Public Works Department.

Let me back up a moment here and clarify that I had been a working automotive, power generation and heavy equipment repair technician since 1983. I had also been participating in the National Institute of Automotive Service Excellence (ASE) certification program since the mid-’90s and at one point held over 40 active certifications. Additionally, I had been participating in fleet industry professional organizations such as the National Association of Fleet Administrators (NAFA) and Public Equipment Managers Association (PEMA) almost as long, so I was no stranger to certification programs or professional trade organizations. It seemed a perfectly natural progression that I immediately joined APWA when I was appointed Fleet Manager for the APWA Accredited County of Contra Costa, California in 2006, and then subsequently elected to pursue the newly announced Public Fleet Professional Certification.

Even though I had previous experience in the field and prior certifications, I did not rush into the CPFP certification. I carefully reviewed the suggested study materials and networked with colleagues in the industry on topics that I felt needed improvement. The APWA Congress (now the PWX) also proved to be an invaluable opportunity to network and learn from educational sessions presented by the best subject matter experts in the industry. I actually think I learned as much if not more from my peers than from the study materials. But when I finally decided I was ready to take the CPFP test in 2008, I felt prepared but not particularly confident. It was with great pride and a bit of relief that I accepted my CPFP certification in June 2008, and then recertified in 2013.

Having previously participated in nationally recognized certification programs such as ASE and NAFA’s Certified Automotive Fleet Manager (CAFM) programs, I can state affirmatively that the CPFP certification is the single best certification for a public works fleet professional to possess as it is a direct reflection of the particular knowledge, skills, and competencies required to perform successfully in the public works fleet and equipment management environment. While other certification programs also fairly assess and evaluate the knowledge, skills and abilities required in the automotive and equipment maintenance management fields generally, the CPFP is the only certification specifically designed to certify fleet managers from the perspective of a public works operation.

Since becoming certified, I have had the honor to be employed by two APWA Accredited organizations and the skillsets developed or honed during the certification and testing have been invaluable in successfully completing the reaccreditation process. I have used my CPFP knowledge of budgets, policy, fleet management, and many other topics to solve problems and improve efficiencies for my employer and to assist other public works professionals in my area. It is always humbling to be sought out for advice and guidance by
Solutions that fit.
Connecting you to better snow fighting solutions, Cargill Deicing Technology is your supplier of answers for safer roads. Our effective deicing products and environmentally conscious anti-icing solutions fight dangerous winter conditions and help reduce the amount of chlorides in the environment, helping you provide safer roadways.

To learn more, contact 1.800.600.7258 or visit www.cargilldeicing.com.

colleagues and others in the industry, but it has been especially rewarding to be able to assist other fleet managers become CPFP certified and assist other public works agencies with the APWA accreditation and reaccreditation programs.

Over the years since, I have come to realize that the CPFP certification conveys instant credibility to others in the public works field and most are aware that those who have earned the certification have demonstrated the knowledge, ability, and most importantly the dedication required to pursue and complete the rigorous program. I have noticed over the past few years that more and more job postings for fleet managers are listing certifications such as the CPFP to qualify those who possess them for additional qualification pay. I know for a fact that being a CPFP enabled my advancement in our profession by playing a big role in successfully moving to positions of greater responsibility.

I have been extremely fortunate and grateful to receive advice and guidance from many mentors in the fleet industry over the years. These words of wisdom, freely given from those who had already “been there, done that,” saved me from engaging in countless futile struggles and helped guide my career. In particular, prior Professional Managers of the Year in Public Fleet John Hunt and Sam Lamerato both encouraged me to pursue the CPFP certification which proved to be great advice. The APWA Certified Public Fleet Professional has helped me immensely in my career, and has benefitted my employer many times over. I highly recommend participation in the program by anyone interested in professional growth and development as a public works fleet manager. The content outline provides an easy-to-follow road map to success, and the recommended study materials are spot-on and relevant. By way of this narrative I am hoping to pass along some advice of my own. Enroll in the CPFP program and start now! It is the single best investment you can make in yourself and your industry.

Richard E. Battersby can be reached at (510) 615-5487 or rbattersby@oaklandnet.com.
Recognize Your Leaders

Nominator’s Name: Larry Miller, CPII
Candidate’s Name: Sean Lanier, P.E., CFM
Candidate’s Title: City Engineer, Public Works Director
Candidate’s Agency/Organization: City of Ocala
Candidate’s City/State: Ocala, Florida

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

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

Please describe the reason that the candidate is being considered for recognition.
Sean spearheaded the City of Ocala’s effort to improve its Community Rating System (CRS) score from the Federal Emergency Management Agency (FEMA). The CRS score affects premium reductions for flood insurance policies obtained through the National Flood Insurance Program. In October 2015, Ocala received its Class 3 (previously a Class 8) rating from FEMA. This new rating was accomplished in under a year. At the FEMA certificate presentation in front of the City Council, Mr. Brian Cune, Emergency Management Director for the State of Florida, stated, “I’m going to use Ocala as a model for the rest of the state and the rest of the nation for what is achievable through the Community Rating System.” Ocala is one of two cities east of the Mississippi River with a CRS Class 3 rating or better. Ocala’s rating tops all cities in the state of Florida.

How was the candidate’s leadership ideas/actions brought to the forefront?
Through Sean’s leadership, Public Works has moved away from a “reactive” mindset towards a “proactive” mindset by aggressively and creatively addressing stormwater infrastructure challenges, adopting a preventive approach to maintain system capacity, diligently pursuing flood prevention and developing a stormwater management plan. He vetted all the current operational processes and designed and implemented additional processes to help the City of Ocala maximize activity compliance to obtain the highest possible rating. This has been Sean’s top priority for Public Works since his arrival at the City of Ocala.

Who did the candidate work with to help bring this idea/action forward?
Several City of Ocala Departments contributed, as well as the support of elected officials and City leaders. Sean spent many hours communicating directly with FEMA personnel, researching floodplain management activity criteria and requirements. Sean would be the first person to tell you this was a team effort.

Did the candidate experience any challenges when trying to implement this?
Yes. The CRS program contains numerous floodplain management activities that encompass a broad spectrum of processes and goals which can be accomplished through a wide variety of tasks. Taking the time to thoroughly assess organizational actions can result in points being awarded. The key is having an open mind when looking at these actions and understanding how they fit into the different floodplain management activities. You must be able to thoroughly and concisely explain that relationship.

Are there steps/processes that, when looking back, the candidate could have done differently to make this idea/action even more successful (lessons learned)?
Don’t wait until the end of the evaluation and scoring period to request your agency’s score. Early and frequent communications with FEMA staff will help clarify what specifically qualifies activity requirements. Getting the FEMA rater’s assessment and feedback during the process allows the submitting agency the ability to explain the organizational actions and activities relationships that the FEMA rater may not fully understand. Be persistent!

E-mail submissions to bstein@apwa.net
For more information about these programs or to register online, visit [www2.apwa.net/Events](http://www2.apwa.net/Events). Program information will be updated as it becomes available. Questions? Call the Professional Development Department at **1-800-848-APWA**.

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### 2017

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<td>August 27-30</td>
<td><a href="https://www2.apwa.net/Events">2017 PWX, Orange County Convention Center, Orlando, FL</a></td>
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The 2017 computer-based testing schedule for the APWA certification programs has been added to the APWA Certification website. Testing blocks for 2017 have been scheduled for January, March, May, July, September and November. The full exam schedule along with all applicable deadlines can be viewed at [http://www.apwa.net/credentialing/certification](http://www.apwa.net/credentialing/certification). APWA's certification programs provide a strong benefit to the public works industry and ultimately to our communities by providing recognized hiring and promotion standards that will lead to an improved workforce and improved delivery of services.

Current program candidates who have not yet scheduled their exams are encouraged to take advantage of one of the remaining exam dates in 2016 or one of the new exam dates in 2017. Individuals who are interested in exploring the possibility of participating in one of APWA's certification programs can find more information on each of the programs at [http://www.apwa.net/credentialing/certification](http://www.apwa.net/credentialing/certification).
Stalking the big bamboo

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

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

With warmer weather upon us as I write these lines, those of us in the southeast and other moister parts of the country may be appreciating—or perhaps ruing—the accelerated growth of bamboo. This widespread grass, while less all-covering than the notorious kudzu vine, includes species that are among the fastest-growing plants on earth. Once they take root in a garden or by the roadside, keeping bamboo contained to a small area can become a serious challenge.

Anyone who has travelled in southern Asia, however, cannot fail to have noticed the widespread use of bamboo for multi-story scaffolding in construction of modern buildings and in the structure and enclosure of more modest dwellings. Lightweight yet strong, bamboo stalks—culms—have obvious appeal as a building material. Google “bamboo bridge” and “bamboo school” for some interesting example structures.

As with any woody product, termites, borers, and fungi can be a problem for long-term survival of bamboo, but treatments with borax and other chemical preservatives have increased the material’s potential utility. Now researchers are studying bamboo’s microstructure to learn how better to take advantage of bamboo’s attractive combination of lightweight and strength.

It turns out that the material at the edges of a bamboo rod is actually denser and stronger than what is on the inside—remember, the culms are hollow—making bamboo sort of a naturally-occurring composite material, like plywood. The researchers sliced samples of bamboo from the inside out, measuring the hardness, stiffness, and strength of each section, then used their data to develop a model to predict the strength of a particular section of bamboo. They found that bamboo is stronger and denser than North American softwoods like pine, fir and spruce. The scientists, architects, and manufacturing engineers doing the research imagine turning bamboo into a versatile construction material similar to currently available plywood, slicing the culm into smaller pieces and reassembling them to form sturdy blocks.

Bamboo’s rapid growth rate provides the incentive. One species of bamboo now widely used in China, for example, can produce stalks over 60 feet tall in a few months. These mature within a few years, much faster than a pine’s decades-long development. The wood-products producers figure that a bamboo forest can produce more material and faster than a pine plantation of similar size. Places like China, India and Brazil, where bamboo is abundant, could benefit from both domestic use of the product and exports.

There is more to learn. Only a few species of bamboo have been classified, and the current research is producing new insights into the microstructure of bamboo. The research may enable very different ways to design and produce more sustainable materials for buildings and other structures. In the meantime, I must keep bamboo from taking over my backyard!

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 articles for the Reporter, he writes occasionally on civil infrastructure and human settlement at www.andrewlemer.com.
OPEN YOUR WINTER TOOLBOX

What is anti-icing really?

Wilfrid Nixon, Ph.D., P.E., PWLF
Vice President, Science and the Environment
Salt Institute, Alexandria, Virginia
Member, APWA Winter Maintenance Subcommittee

If you have been keeping track of winter maintenance stuff lately, you will almost certainly have come across the term “anti-icing.” In all likelihood, if you have heard of it you will have heard it described as something akin to the best thing since sliced bread. Which, in my opinion, it is, at least in the context of winter maintenance, but what actually is it? If you are thinking of upping your game in the field of winter maintenance, knowing about anti-icing is a great place to start, and the first thing to know is what it is and what it involves.

First off, anti-icing is a strategy for handling winter storms. It may include certain tactics, like using liquids, but it is more than just those tactics. Just using liquids in your winter maintenance does not necessarily mean that you are anti-icing, and equally, you can still anti-ice without using liquids, although it is in most cases much more difficult.

The strategy of anti-icing is a series of tactics designed to prevent snow or ice from bonding to the pavement during and after a winter storm. The reason to pursue this strategy is that snow or ice that is NOT bonded/frozen to the pavement can be easily plowed off the pavement, resulting in a safe driving surface. Given that the strategy is about preventing a bond between snow and pavement from forming, that means you have to do things both before and during the storm to stop the bond forming.

If you look into the chemistry and physics of what happens on a road surface when snow or ice and road salt is present, it gets surprisingly complicated. The good news is that we do not need to go into the details of what happens, other than to know that we have to keep a relatively thin layer (a few thousandths of an inch thick, in practice) liquid (i.e., not frozen) if we are to achieve our goal of preventing the snow and ice from bonding to the pavement. As we have discussed in previous toolboxes we do not need a lot of material to prevent the bond, but we have to keep it around and effective for long enough that we can avoid dilution and refreeze at the road/snow interface.

As soon as we put road salt (whether solid or liquid) down on a pavement where snow is falling and melting, the salt begins the process of dilution. In fact, that very process of dilution is part of how salt serves as a freeze point depressant. Which means that any given application of salt, whether applied as a solid or a liquid, comes with a time to expiration. If you do not plow and reapply within a certain amount of time (unless the snow stops falling soon after your application) that undesirable bond between snow and pavement will form.
This might help to explain why anti-icing is a bit more than just using liquids. Yes, in most cases, the first step in anti-icing is applying liquids prior to the start of a storm. But anti-icing also means regular applications of material (typically in the form of pre-wet or treated salt) during the storm, all with the intent of preventing that bond from forming.

So, that is the strategy of anti-icing, and when it works it can be extremely effective. How effective, you ask? Well, according to some studies done by the Minnesota Department of Transportation, if you were to compare the same storm treated in two different ways (one using anti-icing, the other being more reactive, and not starting treatment until the snow/pavement bond has formed) then with anti-icing you will use about a quarter of the quantity of salt as the more reactive method, and you will have roads at least as clean and snow-free as that method not only after the storm, but during the storm too. Another key point to consider is that most crashes in winter storms happen toward the start of the storm, so anything that improves the road condition in the early part of the storm (which anti-icing does) is going to significantly reduce the number of winter storm-related crashes (and studies suggest that this too is indeed the case, with some studies suggesting that crashes are reduced by as much as a factor of six by using anti-icing).

So, anti-icing works really well and is extremely effective. Except, like all strategies, sometimes things go wrong. What sort of things can go wrong with anti-icing?

The first thing that can go wrong is the weather. And it can go wrong in a number of ways. If a storm begins with rain rather than snow, then any liquid you put down prior to the storm is going to become ineffective very rapidly. So, if there is a good chance of the storm starting with rain, you might use pre-wet solid salt rather than salt brine. The drawback to this is that while the pre-wetting process minimizes the loss of salt due to traffic, it does not eliminate the losses. However, if a storm begins with rain, or might begin with rain, you are much better off using pre-wet salt than either not pre-treating the road, or pre-treating the road with salt brine and hoping it hangs around long enough to work.

In addition to the rain problem, we can also face issues if the pavement is above freezing at the start of a storm. The problem here is one of those “good news, bad news” situations. The good news is that if the pavement is above freezing, it will melt any snow or ice that falls on it, at least for a while. However, as the snow and ice melt, they are pulling energy out of the pavement, which over time will reduce the pavement temperature below freezing (if the storm lasts long enough). The challenge here is knowing when to put down your first application of material. If you place it too soon, then the falling and melting snow will dilute it out and it will not have much benefit. If you wait too long, however, then the snow will have begun to freeze to the pavement.

This might suggest that this anti-icing stuff is perhaps a bit tricky. That is both true and not true (a bit of Winter Zen for today!). The basics are pretty straightforward. Apply material in the appropriate form (most of the time as a liquid brine) before the storm starts, then reapply material (typically as a pre-wet solid) when you plow during the storm. Adjust your application rates to take into account the pavement temperature (if it is warm, use less), the sort of precipitation (if it is sloppy snow, use more; if it is dry snow, use less), and the cycle time (the longer it is, the more material you will need to apply to prevent bond formation before the next plowing and application occurs).

The challenge with anti-icing is when the storm is not behaving properly (it is always good to blame the weather, or if not the weather, you should at least blame the weather forecaster!). In particular, storms that could be snow, or could be rain, or could be sleet can be particularly tricky to deal with; you know the sort of storms—the type that occur at the start of the winter season when, completely inexplicably, people who have lived in winter states all their lives have completely forgotten how to drive on snow! I call those types of storms “edge storms,” for two reasons. First, in those storms you are always on the edge of a transition between snow or rain, or between sleet or snow, or your pavement temperature is always just on the edge of freezing. Second, these are the sort of storms that will drive you to the edge of your patience (and sometimes beyond). We will take a look at them next month (just in time for the first storms for most folk, but probably too late for the folks up in the mountains!).

The other thing to remember about anti-icing is that it IS a whole strategy. You are not going to be able to pick it up overnight. Most agencies that have changed from a reactive strategy (let the snow start to fall and build up, then deal with it) to anti-icing have found it can take up to five winter seasons to get all the kinks worked out, although they are doing anti-icing pretty well, most of the time, by their second season. So, it does take time, but would it not be good to get to your desired level of service using about a quarter of the material you need to use today? If so, it is probably time to take a really good hard look at anti-icing.

Wilfrid Nixon can be reached at (703) 549-4648 or wilf@saltinstitute.org.
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Leadership in Winter Maintenance

**Bret Hodne**, PWLF, Public Works Director, City of West Des Moines, Iowa, and member, APWA Leadership and Management Committee; **John Scharffbillig**, Director of Public Works Fleet Services, City of Minneapolis, Minnesota, and member, APWA Winter Maintenance Subcommittee

In this edition of the Leadership by Discipline series, Leadership and Management Committee member Bret Hodne, Public Works Director for the City of West Des Moines, Iowa, and Winter Maintenance Subcommittee member John Scharffbillig, Director of Public Works Fleet Services for the City of Minneapolis, Minnesota, discuss leadership in winter maintenance.

Winter maintenance is an area of critical importance for many public works agencies around North America. As the world around us continues to evolve, it is apparent that people do not like the idea of being immobile. Whether the impact is on the “just in time” shipping industry, workers trying to get to their jobs or even the mother that wants to take her kids to the mall—expectations are high. As a public works professional, you may do a stellar job in many of your operational duties, but do a less than desirable job of managing winter storms and your department may be labeled as a “poor performer” by the public you serve.

So let’s take a look at what leadership in the area of winter maintenance looks like currently and where it is headed in the future. In recent years there has been a lot of change in the area of leadership. The workforce is turning over in record numbers due to retirements. This has led to some significant “gaps” with many new staff members entering the profession. Along with the challenges of training this new generation of employees, another twist is their more common belief in the philosophy of, “I work to live, not live to work!” So with regards to the area of emergency management and handling winter storms, where are we heading?

In the area of leadership, what does that look like for a manager trying to get schedules in place when planning for an emergency event? Let me share a few thoughts on this. In terms of looking into the past, the senior workforce knew when winter weather was coming. They would simply wonder, “Okay, what time is it going to happen, when am I going to get called in, is it going to be a heavy snow, will I be working overtime and do I have things ready for the event?” The new employee is saying, “Nice skating weather, great powder to go skiing or is my sled ready to go trail riding?” This is a change from the work crew mentality of the past. Not all new employees are in this frame of mind, but it is definitely more prevalent than in the past. Cowabunga dude!

So where do we go from here? As leaders, we need to be aware of the changing generational trends and implement methods to ensure that employees understand and are willing to meet the expectations of their respective jobs. A leader will have to take the time to explain to them what the levels of service are for the organization and what is going to be required to reach these goals. Crews also need to know that their performance may be measured and how this process works.

As a leader, now that you have outlined your expectations, the next question is how are you going to train this new employee? The better question is what training is going to be needed.

“Yes, you will be expected to be an environmental steward, statistician, investigator, mechanic, equipment operator, PR person, listener, coach and even a safety specialist.”
by both new and seasoned staff? For new snowplow operators, you will need to ensure that they meet all of the requirements to maintain their CDL, educate them about “why we do what we do,” and instruct them on the proper use of deicer chemicals. So what does this mean for the supervisor? Probably lots of time and effort to make sure all of the necessary “checklist items” have been completed. Next off, the entire winter maintenance team needs to know the expected levels of service for the agency. For a leader this needs to be clarified before answering any questions from the public. Other things that leaders are going to have to be prepared for are “how are you going to deal with upset residents, how are you going to work with other impacted departments, and how are you going to collaborate and coordinate with your fleet staff to ensure that equipment is ready for the storm?”

Being a leader in today’s profession can be challenging to say the least. In days past, being successful may have meant just simply going out and doing a good job of plowing the snow. In today’s world numerous reports are required, new technologies are emerging at a rapid pace, training employees on safety and new operational practices is vital, and dealing with everyone wanting instant information is becoming the standard. On top of all that, how is today’s leader going to deal with residents or agency leaders who have unrealistic expectations?

As a leader in your organization you will be wearing “many hats.” Not only will you be required to have your crews trained and prepared, you will have to understand the environmental impacts and rules for chemical applications, you will need to recommend levels of service to your respective leadership, you may be your agency’s media expert during the storm, you will be a public relations guru, and the list goes on and on. Yes, you will be expected to be an environmental steward, statistician, investigator, mechanic, equipment operator, PR person, listener, coach and even a safety specialist.

Well, we have covered a lot of ground in what it may take to be an effective leader in the world of winter maintenance. While it is becoming more challenging as the world around us changes, it can be a very rewarding career if you are willing to adapt and obtain the tools for success. Luckily for today’s leaders, there are numerous educational opportunities to gain more insight on effective leadership in the area of winter maintenance. Each year, the American Public Works Association sponsors the North American Snow Conference which provides attendees with the opportunity to learn about new technologies and operational practices from across the globe.

Along with the educational aspect, the benefit of networking with other winter maintenance professionals can be invaluable. The APWA Winter Maintenance Subcommittee has also developed and administers the Winter Maintenance Certificate Supervisor course to help train professionals in the various areas involved with managing winter weather events. Along with these opportunities there are other regional and local training opportunities for today’s professional to take advantage of.

While the road ahead may be a little “bumpy” the decision to become a leader in the management of winter storms can also be very rewarding. Knowing that you are making a significant impact in the safety of the motoring public, getting children to school or getting commodities moved across the roads in your jurisdiction should make anyone proud to be in this profession. Being prepared, properly trained and connected into what is going on in the profession will probably be the key to success as we move into the future.

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China, Slovakia and the South Pacific join IFME

The IFME organisation is steadily growing with membership applications from the associations representing China, Slovakia and South Pacific (encompassing Fiji, Papua New Guinea, Samoa, Tonga, Vanuatu, Cook Islands) being approved at the Ottawa meeting. The IFME Board looks forward to welcoming our new members at the next board meeting to be held in Sweden in November.

China will be represented by the China Municipal Engineering Association (CMEA), Slovakia by the Slovak Chamber of Civil Engineers (SKSI) and the Pacific Islands by the South Pacific Engineers Association (SPEA).

Competency standards for municipal/public works engineering

The IFME Board gave in-depth consideration to a proposal from our member from Finland (Finnish Association of Municipal Engineering, i.e., FAME) to establish competency standards and certification for municipal engineers. This initiative will incorporate leadership, management and technical competencies, and will include the specific communication competencies required by municipal engineers to communicate with their councils and communities. The Board held a workshop with the outcome being a pathway forward that will aim to achieve certification for municipal engineers that is internationally recognized. Further work will now be undertaken by the Finnish Association and reported back to the IFME Board.

New website for IFME

The new IFME website has gone live at www.ifmeworld.org providing the latest in professional image and website functionality.

The new website has a new “Member Countries” page for all countries/associations. All currently known Upcoming Events from around the globe are listed and searchable, and there is a Global Infrastructure News stream that has now been implemented. A foundation platform is now provided for a new IFME technical library and video library where all IFME Technical Briefs can be uploaded. The new IFME website is responsive, so that it now works on desktops, laptops, iPads/tablets and iPhones, etc.

On the administrative side, the new website will also provide a discussion area and library for the IFME Board, including an archive area for past agendas and other corporate documents.

Membership fees

The IFME Board is undertaking a review of its membership fee structure. In the past, membership fees have been based on membership numbers of the member country association. However, some associations have individual members, some only have corporate members and others have a hybrid. The new membership structure adopted in principle at this stage is based on revenue bands for the associations. This better reflects a capacity of an association to pay.

Business Plan

A new Business Plan has been adopted by the Board defining its vision, mission, values, business activities, and programs and work tasks of IFME. Progress with the implementation of IFME tasks will be reported and reviewed at each meeting.

Technical reports

Our first best practice paper (winter maintenance) is almost ready for publication, and a number of technical briefing papers have now been uploaded into the website library. Technical visits are arranged around our IFME Board meetings are also written up as technical briefing papers.

Asset management

Infrastructure asset management is of important interest to member countries of IFME. A report was presented on a number of activities of member countries. Our gNAMS subcommittee promotes sound asset management through presentations at conferences and other opportunities.

Mentoring

The IFME Board is considering the establishment of an international mentoring program for municipal...
engineers. This proposal is in the early stages, so more information will be considered at the next meeting of the Board. There was strong interest indicated to have the scheme that might allow member countries and their membership to participate in a globally coordinated program.

The idea being considered is that member countries could promote the scheme within their own countries under a joint program coordinated by IFME. The cost could be sponsored by member countries or offered as a fee for service to their members. Further information on a similar program conducted by IPWEA and what could be the foundation for an IFME Mentoring Program can be found here: https://horizons.chronus.com/p/IPWEA-mentoring/about.

Joint meeting of the Boards of IFME & CPWA

On the day before the IFME Board meeting the two Boards of IFME and the Canadian Public Works Association (CPWA) met to discuss infrastructure asset management and sustainability issues. This provided a valuable opportunity for the 14 countries that attended the Ottawa meeting to represent and to discuss and share information, practices and knowledge about these important global public works issues.

Technical visits

The IFME Board takes the advantage of being in a city to also participate in a technical visits program. Visits were undertaken to PPP Canada, where the Canadian organization demonstrated to the IFME Board the process used in Canada to have a PPP municipal project approved and funded through the federal government; and the City of Ottawa light rail construction project which is scheduled for completion in 2018. Ottawa presently has the highest use of public transit in Canada. Please see the technical briefing papers on these topics that are uploaded onto the IFME website.

Planning for the next IFME Board meeting is well advanced. This meeting is to be held in Kiruna, Sweden in November 2016.

Ross Vincent can be reached at ross vincent. thames@gmail.com; Chris Champion can be reached at chris.champion@ipwea.org; and Doug Drever can be reached at doug, drever@shaw.ca.

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The City of Fort Collins, Colo., is determined to become carbon neutral community-wide by 2050. Currently working toward the goal of 20% reduction below 2005 levels of greenhouse gas by 2020 with an 80% stopgap goal for 2030, the City is on an ambitious course to say the least. Part of this reduction strategy calls for the use of natural gas fuel in larger vehicles which have traditionally been powered by diesel fuel or gasoline.

During 2015-2016 winter operations, the City of Fort Collins used Compressed Natural Gas (CNG) plow trucks for the first time. Compressed Natural Gas is the fuel of choice at the City of Fort Collins for trucks three-quarter ton size and up as part of its plan to utilize Alternative Fuel Vehicles (AFV) while reducing greenhouse gas emissions. The Regional Air Quality Council (RAQC) provides support for the additional cost of these AFVs. The RAQC assists with regional public/private initiatives to reduce emissions from the transportation sector, mobile sources, and other sources in the Denver metropolitan area and the Denver Metro/North Front Range Ozone Non-Attainment Area.

The cost on the latest City of Fort Collins snowplow trucks purchase was approximately $45,000 for the CNG system. RAQC covers up to 80% of the incremental AFV cost on heavy-duty trucks resulting in a net cost of $10,000 to the City for alternate fuel capability. RAQC also covers up to 80% of the AFV cost on light-duty trucks (up to $7,000) and medium-duty trucks (up to $25,000).

Our Utilities Department purchased the first two CNG plow trucks for last winter’s snow operations. The trucks, equipped with front plows and granular spreaders, are powered by the Cummins 9 liter engine. Our operators reported that they like the trucks. The CNG trucks run quieter and purportedly have sufficient power for snow operations.

We currently have six more CNG tandem plow trucks on order that will hopefully be available for the upcoming winter season. Four of these will have front and wing plows, and 2,500 gallon liquid tanks. The other two new CNG trucks ordered will use a front plow and granular spreader.

The new CNG trucks will be used year round including summer construction for asphalt work and pipe-laying.

The six new trucks, scheduled to be delivered by the end of 2016, are specified with the now-available Cummins 12 liter CNG engine. The 9 liter engines are rated at 345 horsepower with a torque rating between 1150-1300 lb/ft. We simply were not assured that the 9 liter engines would work well enough pushing a front plow and wing. Operators reported that the 9 liter engines did not have sufficient power to pull a trailer and equipment on an incline. The 12 liter engines are rated at 400 horsepower with a torque rating of 1,450 lb/ft. We decided to delay receiving the trucks from the first of the year until now as July is the first run of 12 liter CNG trucks.
Previously, I have always ordered all snowplow trucks with front-mounted hydraulic pumps; however, the CNG Cummins 12 liter engine does not have front-mount power take-off (PTO) capability. The engine manufacturer will not certify sufficient cooling capacity when the PTO shaft is run through the radiator. If you purchase the CNG 12 liter engine, the only alternative is to utilize the Allison transmission to power the hydraulic pump. You can have a front-mounted hydraulic pump on the 9 liter engine.

It is also important to note that the CNG tanks mounted behind the cab increases the length of the plow truck 27”. Due to the additional length, the plow trucks did not fit in our garage and it was necessary to reduce the dump body from the standard 14’ down to 13’ to allow the trucks in plow configuration to be parked inside the garage. Before parking vehicles inside a garage, there are building codes and fire codes that you need to adhere to. Our equipment garage has to be equipped with a continuous mechanical ventilation system and detection system to continuously monitor natural gas which activates at not more than 25% lower flammable limit (LFL).

The first three CNG trucks we purchased have 60 gallon CNG tanks behind the cab which is not sufficient for snowplowing. At a rate of approximately 3.5-4 miles per gallon, the plow trucks cannot make it through a 12-hour shift without refueling one or two times. Consequently, we now specify 120 gallon CNG tanks combination—behind the cab tank (75 gallon) and a frame rail tank (45 gallon). During snow storms, we utilize our transit facility for fueling located eight miles from our snow operations material facility and parking garage. Snowplow drivers on the north end of the city can take over an hour to travel to the fueling facility, get fueled up and back into service during snow operations. In order to reduce that time, a CNG station is being added to the north end of the city which will cut our out-of-service time by 40%.

At the slow fill fueling system located at the City’s Water Department facility, CNG usage is not captured for each plow truck, but we will have that capability soon. The City has been working with a private vendor to build...
The community’s first commercial, fast fueling station and we are also proposing a plan for an onsite CNG fast fueling station at the Streets Department. We will soon have an older CNG site resurrected at our main Fleet shop. These additional fueling stations will result in more efficient fueling. A 60 gallon CNG tank takes approximately 15-20 minutes to fill at a fast fueling station. This is certainly more desirable and efficient than the slow fill system that takes overnight. Keep in mind that if you are building a fueling station, it helps if it is located next to a high-pressure gas line for quicker fill-ups.

The City of Fort Collins recently took delivery of a CNG fueled Freightliner Cascadia semi-tractor. This truck hauls material from the City Water Reclamation plant to the disposal area 30 miles out. Shown in the pre-delivery photo, the tank is nearly identical to what will be on our tandems with one exception. The stacked array will have one less tank and will be flush with the top of cab on the Freightliner 114SDs.

We also equip lighter duty trucks with CNG. We have taken delivery on our first two F-550 utility beds with dual fuel capability for use by the Light & Power Department as well as a utility bed dedicated CNG F-550 for the Water Department. The tanks are installed in-bed on the utility body floor.

As we move forward, eventually all our trucks will be replaced with CNG trucks. Converting to CNG plow trucks has been a learning experience for the City of Fort Collins. We discovered the engine that is effective for snow removal operations, and learned that larger size gas tanks are needed to prevent extra trips to the fueling station. As you consider CNG trucks, evaluate your repair and parking garage capacity and ventilation as well as your fueling station capabilities.

Larry Schneider can be reached at (970) 221-6615 or lschneider@fcgov.com.
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www.apwa.net/conferences/cfp
Once again, for the third year in a row, one of the sessions at the APWA Snow Conference was on the Top Ten Issues in Winter Maintenance. And, as previously, the session was a very interactive and freewheeling ninety minutes of in-depth discussion and debate. The goal was to identify the big issues that keep people up at night, as regards winter maintenance, and we certainly found a bunch of those, but we also discovered something else as well, which we will touch on at the end of this article.

We asked participants to think in three broad areas: current problems; changes they are facing; and what the future will bring. Table 1 shows the issues that were identified as current problems.

Not surprisingly, this overlapped quite a lot with topics from the prior two years. The environment, and how winter maintenance impacts the environment (specifically both surface water—lakes and rivers—and groundwater), remains a key concern for road agencies, and the desire to be able to measure the residual salt on a roadway stemmed directly from that issue. The idea behind that is if you know how much salt remains on the road at the end of a storm (or perhaps directly before your next storm is about to begin) then maybe you can use less salt fighting the next storm. Experience has shown us that it is far from easy to measure that residual salt level, but it remains an important goal!

Also becoming an area of concern is the issue of bike paths. Increasingly, cities are being expected not only to provide bike paths but to maintain them in the wintertime as well as in the summer. This is an issue that our colleagues in Scandinavia have worked on for a number of years, so we will see what information we can get from them for future conferences.

When it came to areas of change that agencies were facing, Table 2 shows what was uppermost in the group’s mind.

<table>
<thead>
<tr>
<th>Table 1: Current Problems</th>
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<tbody>
<tr>
<td>Blending</td>
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<tr>
<td>Bike Lane/Road Winter cleaning</td>
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<tr>
<td>Drifting – when not to treat but plow only</td>
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<tr>
<td>Measuring residual salt on roadways</td>
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<tr>
<td>Getting buy-in from operators to change the way we do snow maintenance</td>
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<tr>
<td>Buy-in from city leaders for AVL (automated vehicle location)</td>
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<td>Better weather forecasting</td>
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<td>TLC – Toward Less Chlorides</td>
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Again, we see some echoes from previous sessions, as well as echoes regarding the current problems identified above (bike lanes, anyone?!). Perhaps a key concern, especially among the younger attendees in the session, regarded the whole issue of succession planning and career development. Some attendees expressed concern that they may be promoted into jobs for which they have not been prepared or where the responsibilities are unfamiliar. This obviously raises the whole issue of succession planning and knowledge management. There are other workplace issues that are also of concern, and may reflect issues with a changing workforce. This is an area where we obviously need to put some effort going forward. Next year’s conference will include some sessions on this!

The third area, the future and what it will bring, raised its own concerns, as expected, and the issues identified in the session are shown in Table 3.

Table 2: Areas of Expected or Needed Change

<table>
<thead>
<tr>
<th>Need for specialized bike lane equipment</th>
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<tbody>
<tr>
<td>Promotion into unfamiliar territory</td>
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<tr>
<td>Stronger unions/softer employees</td>
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<tr>
<td>Equipment needs/buy-in by stakeholders workers and ratepayers</td>
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<tr>
<td>Low bidder issues</td>
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<td>Snow barrier at pedestrian ramps</td>
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<tr>
<td>Level of Service Demands</td>
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<tr>
<td>Adjusting to changes in deicing chemicals</td>
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<tr>
<td>Succession planning gaps/impacting knowledge</td>
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The issue of new technology was, not surprisingly, a major concern, because most of the attendees had experiences in which a supposedly wonderful new technology had failed to work. They also had experiences where the new technology had worked wonderfully, so it clearly can bring benefits, but how do you tell the good from the bad in this regard? And if the new technology does indeed increase efficiency, does that mean a smaller workforce?

There was much discussion about driverless cars, but also a recognition that at this point we do not know enough about what benefits and drawbacks they will bring to think about how we need to adjust our winter maintenance for them (if at all). There was also discussion about how connected vehicle technology might make it possible for snowplows to get priority at signalized intersections. Again, the issues previously raised were echoed in this session (someone obviously has some concerns about bike lanes...) but there is an important issue about money spent on new construction versus money spent on maintaining existing infrastructure.

Sadly, our politicians do not seem interested in cutting ribbons on a newly plowed road, only on a newly constructed road.

Sustainability and environmental concerns remain a source of worry for agencies, although perhaps less so than in the past, as many attendees noted that there were resources now that allowed them to show how their winter maintenance actions are indeed sustainable. One interesting issue that had not previously been raised concerned the use of compressed natural gas as a vehicle fuel, and how this might impact the requirements for maintenance garages (no naked flames, for example, which may mean that some gas heating units have to be replaced).

There was one other thing that arose, not so much as a need or a concern, but more as an observation. It was noted that by having these conversations, and by sharing similar conversations happening elsewhere in North America on the whole field of winter maintenance, we are helping to strengthen our “community of practice.” Just knowing that other folks have to address similar problems to you, and that some of them may have found solutions to some of those problems, can be enormously helpful as a way of minimizing sleepless nights. To the extent that this session at the annual Snow Conference has helped to build our community, we hope that we have also managed to reduce some of the anxiety levels in our community. Given that, you will likely see a similar session at next year’s Snow Conference too!

Wilf Nixon can be reached at (239) 231-3305 or wilf@saltinstitute.org.
Applications are now being accepted for the 2017 Jennings Randolph International Fellowship Program funded through the Eisenhower World Affairs Institute.

The Jennings Randolph International Fellowship Program supports participation at a public works conference of one of APWA’s international partners and a public works study tour in that country.

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For details and application go to:
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APPLICATION DEADLINE: NOVEMBER 15, 2016, MIDNIGHT CST.
Technology improves winter driving safety for the City of Lethbridge

Lee Perkins, CET
Transportation Operations Manager
City of Lethbridge, Alberta
Member, APWA Winter Maintenance Subcommitte

Weather presents considerable challenges to the winter maintenance manager, both in terms of safety and operations.

From a safety standpoint, weather reduces pavement friction, thus increasing the potential for collisions when vehicles are traveling too fast for the conditions. Under these circumstances, the posted speed limit at a location may no longer be safe and appropriate. Consequently, new approaches are necessary to influence driver behaviour when inclement weather forces a delicate balance of safety and efficient operation. Among these approaches is the use of weather/road surface conditions monitoring systems, variable speed limit signs, and variable message signs.

Variable speed limits (VSLs) are speed limits that change based on road, traffic, and/or weather conditions. VSL is one of the actions identified in the Alberta Road Safety Engineering Toolbox (searchable database of top 77 measures) of the Alberta Transportation report, Methods of Reducing Collisions on Alberta Roads (2010). VSLs have been used to restrict speeds during a winter storm that results in poor driving surface conditions, ultimately improving driving conditions. Documented evidence shows that a VSL system can result in a reduction of 45% in all collisions and 20% reduction in injury collisions.

The City of Lethbridge became one of the first municipalities in Canada to implement a VSL on a 3.5 km section of Whoop-Up Drive located in the Oldman River Valley. Whoop-Up Drive is a 90 km/h roadway facility with slopes of 6-7% and annual average daily traffic of 50,000 vehicles per day. This section of the roadway has experienced a significant number of collisions including multi-vehicle pileups related to snow/weather events. The new VSL system has been in operation since October 2014 and anecdotally, has helped in reducing collisions during recent weather events.
The Lethbridge project included researching the hardware and communication options, creating enforcement tools for digital speed limits (traffic bylaw amendment), procurement of equipment, and construction and operation of the VSL system. “We considered several options in the implementation of the VSL system,” said Ahmed Ali, Transportation Engineering Manager at the City of Lethbridge. “The lowest cost option consisted of variable-message board trailers and seven side-mounted speed limit digital signs.”

Permanent power is provided to the VSL signs while the message boards are solar powered. “We also purchased a set of generators to boost batteries of message boards,” Ali said. “It seems the message boards are not draining power and we have rarely used the generators. In future, we intend to replace the message boards with permanent side-mounted message boards.”

The selected VSL system consisted of:

- Two variable-message trailer units
- Seven side-mounted MUTCD-compliant speed signs
- Cell phone/modem communication
- Capital cost – $120,000
- Annual maintenance cost – $3,000

Lethbridge’s Traffic Bylaw 5834 was amended on November 24, 2014 to include:

- Prescribed speed limit is subject to change on Whoop-Up Drive in response to changing road and/or weather conditions, and
- The change to the maximum permitted speed shall be reflected on the digital speed limit signs.

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VSLs are invoked using a protocol issued by the City Manager, who is authorized to change the speed limit. A public service announcement and record of speed changes are also required as information for speed enforcement. The City of Lethbridge Transportation Department worked closely with the Lethbridge Regional Police in the operation of this VSL program.

Data collected at all locations shows that the lowered speed limit signs have yielded excellent results—the 85th percentile speed limit between 60-70 km/h during the speed reduction of 60 km/h. No collisions were reported on Whoop-Up Drive during weather events when the speed was reduced.

Information from a road weather information system (RWIS), which was recently installed on the bridge decks, has proved to be a useful tool in forecasting freezing surface conditions and supporting the decision to lower speed limits.

The introduction of auto vehicle locators (AVL’s) has increased accountability for the Transportation Maintenance Department. Once the RWIS reports a possible freezing condition, a text message is sent to the storm watch worker who is required to check the bridge deck within fifteen minutes of being notified from the station.

Communication of the lowered speed limit has become instrumental in reducing the risks for motorists. In addition to the conventional methods of radio, TV and local newspapers, Facebook and Twitter have quickly become the number one communication tool to reach customers. The ability to control the message and “push” positive posts has enabled the City of Lethbridge to notify ten thousand-plus subscribers immediately which, with reposts and retweets, reaches the vast majority of residents within minutes.

For additional information and questions, contact Ahmed Ali (Ahmed.Ali@lethbridge.ca), Transportation Engineering Manager, Infrastructure Services, or Lee Perkins (lee.perkins@lethbridge.ca), Transportation Operations Manager, City of Lethbridge.
The harsh winter season of 2013-14 had a significant impact on winter maintenance agencies throughout the country. The cold temperatures and frequent heavy snowfalls led to a shortage of road salt that hampered snowfighting efforts that season and increased demand and prices for the 2014-15 winter season.

While no one can control the weather, there are winter maintenance practices that can help to reduce salt costs. “When the FHWA (Federal Highway Administration) learned that state DOTs (departments of transportation) were running out of resources to fight snow, we began to work with states to find ways to help solve the problem,” said Gabriel Guevara, transportation specialist at the FHWA Office of Operations.

FHWA partnered with the Clear Roads winter maintenance pooled fund to create the Manual of Best Management Practices for Road Salt in Winter Maintenance. This manual, published earlier this year, collects best management practices (BMPs) related to buying, storing and applying salt that can help winter maintenance agencies meet their performance goals at the lowest possible cost.

A flexible guide
The guide reviews about 20 BMPs related to road salt, but it’s not a traditional, bulky manual that sits on a bookshelf collecting dust. “It’s really a bunch of individual handbooks put together for convenience,” said Wilfrid Nixon, vice president of science and the environment at the Salt Institute and co-author of the manual with Mark DeVries, lead consultant for Vaisala and chair of APWA’s Winter Maintenance Subcommittee.

Each practice is described on a single page, front and back. That format makes it easy to separate information about each practice and share it with the relevant personnel in easily digestible chunks—or laminate the sheet and put it in a common room for people to review on their breaks. “There’s a lot going on in winter maintenance, and it’s difficult to change practices when everyone’s so busy,” Nixon said. “We’re hoping the format of the manual will help to make change as easy as possible.”

The broad scope of the guide means that every winter maintenance agency should find information that addresses its specific challenges. “One state may need to address its procurement processes while another may need to look at storage,” said Clay Adams, bureau chief of maintenance at the Kansas Department of Transportation. Kansas, for example, didn’t face the same supply issues as many other states because there are three salt mines within the state’s borders and the DOT has storage for 150 percent of its average annual salt needs. “There’s always interest in reducing application rates, though, so there’s something in the manual for everyone,” Adams said.

Best practices in review
In the procurement phase, agency practices can have an immediate impact on the price of salt. Offering vendors flexibility in delivery times, offering multi-year contracts, requesting bids early in the year and accepting salt deliveries before the winter season are all practices that can lower costs. Minimizing vendor risk by tightly specifying salt quantities (thus reducing the range between a minimum guaranteed amount of salt that the agency agrees to purchase and a maximum that the vendor promises to supply if needed but that the agency is not obligated to buy) will also typically reduce salt prices. Midwinter deliveries typically increase costs since demand is at its highest and weather conditions can hamper deliveries.

Naturally, these practices require adequate storage capacity to implement. Additional emergency stockpiles can also reduce costs by giving agencies the flexibility to buy salt when prices are low and rely on their existing supplies when prices rise. Facilities shared among multiple agencies can, in some circumstances, allow for larger facilities than the agencies could build independently, although partnership agreements need to be carefully defined (see photo #1).
“We’re trying to increase our salt storage capacity, so this guide is going to inform that process and hopefully provide ideas of how to do so,” said Jeff Pifer, operations section leader at the West Virginia Division of Highways Maintenance Division.

The benefits of having adequate storage capacity can be undone if the salt isn’t stored properly, so the manual addresses BMPs for salt storage facilities. Best practices require salt to be covered and stored on an impermeable pad to avoid negative environmental impacts. A conveyor system that fills the storage facility from the top is the only way to utilize the facility’s maximum storage capacity and is safer than simply pushing salt into the building (see photo #2). Newer facility design options include multiple access points, stations for brine making, liquid storage and equipment for reusing wash water.

The third section of the manual collects BMPs related to road salt application. These practices have the potential to produce significant material savings: Prewetting salt can reduce consumption by 30 percent in some circumstances, and anti-icing can reduce use by up to 75 percent (see photo #3). A flowchart in the manual helps users determine the situations in which anti-icing is likely to be effective.

The final section provides a brief overview of the procedures necessary to obtain federal reimbursement after storms that are severe enough to be declared disasters.

**Spreading practices by spreading information**

There’s nothing radical in the manual. “I think it’s fair to say that most of this information is already well-known,” Nixon noted, and the benefits of the BMPs have been demonstrated. But change in any organization can be a challenge, so these practices aren’t yet universal. Clear Roads and the researchers hope collecting the information in one place can help spread the practices by keeping information readily available and easily accessible.

“Different states operate in different environments and under different
constraints,” Pifer said. “This is a one-stop shop to learn what’s happening in other states and a place to start researching when you’re looking to make a change.”

The application guidelines in particular should be valuable to DOTs on an ongoing basis as well. “A lot of agencies, including my own, conduct winter training,” said Tim Peters, local policy and technology engineer at the Illinois Department of Transportation and manager of the Clear Roads project. “This manual should be useful in a training environment as DOTs prepare for winter.”

While Clear Roads comprises state DOTs, the guide is also applicable to local agencies. The DuPage River Salt Creek Workgroup (DRSCW), an organization of wastewater treatment agencies in northeastern Illinois administered by The Conservation Foundation, has shared the guide with its members through its website and will be discussing it in technical workshops. “What I really like about it is that you can point a public works department to the guide so they can start the learning process,” said Stephen McCracken, DRSCW project manager. While the information is available in bits and pieces elsewhere, “I don’t have another single resource that can do that.” That information can help encourage implementation and justify the investments in equipment that implementation sometimes requires.

The manual can be downloaded for free at http://clearroads.org/project/roadway-salt-best-management-practices/. A webinar about the manual is also available on the web page. For more details, contact Tim Peters at (217) 785-5048.

Greg Landgraf is a senior research and writing associate for CTC & Associates, which provides management services for the Clear Roads Pooled Fund. He can be reached at (773) 314-3370 or greg.landgraf@ctcandassociates.com.
What is the best succession plan for an organization’s snow and ice operation? There is no exact answer because every organization is different. For the past three years the APWA North American Snow Conference has had a breakout session entitled, “What are your Top 10 Winter Maintenance Issues?” I attended the 2014 and 2015 sessions and was not surprised that succession planning made the Top 10 for each of those years. I missed the 2016 session due to a presentation conflict but also heard it made the “short list” again. Wilf Nixon helped manage the sessions above and he has written an article in this issue highlighting all of the Top 10 subject matter; it’s a good read, too!

Succession planning seems like it is a new “buzz term” that is being thrown around in the days of information overload. But that is not the case. If one Googles the term “Succession Planning in Public Works,” you will get 798,000 results in 0.42 seconds! The top hit is an APWA Reporter article entitled “Succession Management Planning” that was published in December 2004 and another article in 2006 entitled “Succession Planning in Tempe (AZ).” Credit is deserved to the organizations that were looking at it 10 years ago. But this is not a new ideology; it has been thriving in the public and private sectors for years.

So, what is your organization doing right now to make sure that your snow and ice operation will stay on track in the event of personnel turnover? Retirements? Promotions? Succession plans vary in each organization. It can involve a wide range of personnel from the front line up to and including senior management. Does your organization have a succession plan? Is it followed? What kind of depth does the plan have? The key is that every succession plan is tailored to its specific organization; “one size does NOT fit all!” And, keep in mind that most snow and ice manuals are considered live, working documents that are always changing with the technology, protocols, level of service, etc. Is it safe to assume that your succession plan should be a live working document, too? As long as the organization’s core values do not change too much, then the plan should be pretty solid, but there should always be room for minor adjustments. The other key component to a succession plan is the personnel.

Should education and training be part of a succession plan?
We had a discussion with our CIO who put the technology into perspective for the public sector. The tech of today fluctuates like a heartbeat and is constantly moving up and down at a rapid clip. The speed and cycle of municipal government is at the pace of a turtle running a marathon; we will get there, eventually. Five to ten years ago, as long as the managers and supervisors stayed super sharp with the tech, everyone was okay. But since that time, technology is changing so rapidly that organizations need to make sure that the equipment operators are up-to-date with what types of technology are out there, too! Engage them in discussion about seminars, equipment shows, publications, etc. Some of the best ideas come from the front line. There are all kinds of classes and seminars on the local, state and national levels that help the operators attain knowledge outside their immediate environment. Encourage them to attend equipment shows to see what kind of technology is out there for them to use. What kind of refresher training do you organize for your current equipment before the winter season? Front-line personnel that embrace training and strive to gain more knowledge may be your diamond in the rough that could move up in the organization.

And, in order for the front-line personnel to embrace new and emerging technology, the mid-level and upper-level managers need to be 110% behind it. Do the senior- and mid-level managers understand the pros and cons of the technology? Promote the technology by making the job easier in lieu of making it more efficient. Personnel will appreciate
the insight to making their work more fluid.

Is decision making during snow events part of a succession plan?
When evaluating the current condition of your infrastructure after a snow event, gather data from your mid- and low-level supervisors in order to make an effective decision about the storm event operations. Unless you can drive every single roadway in your respective area of responsibility, you will need to compile data from your supervisors to decide what your plan is. At this time, you are making the decision simply based on their input. What parameters have been established in order to gather the data? Is there a standard operating procedure in place for them to refer to? Has the level of service been established for all to understand? Every organization has a different level of service. It is imperative that it is communicated to the personnel performing the work. Keep the lines of communication open at all times.

Where does institutional knowledge fit in with your succession plan?
A 25- to 30-year employee with a great work ethic is a great source of knowledge. Institutional knowledge can be a double-edged sword in the public works industry. A stellar employee who takes pride in their work that has 25-30 years of institutional knowledge is priceless. A below average to mediocre employee with 25-30 years of institutional knowledge who knows just the right amount of work to get the job done is your greatest challenge.

Snow and ice operations are a necessary evil for the public works industry in the colder climate areas. It is a force of nature that we have to deal with and we do our best to make sure that the community doesn’t miss a beat. No one can dictate what the best succession plan is for your community. A good first step is to perform a self-assessment of the operation. Organizations that have considered APWA Accreditation, are currently working towards it or have completed it, are a step ahead. And remember, “one size does NOT fit all.”

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Charting a new course

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Member, APWA Winter Maintenance Subcommittee

“Change before you have to.” – Jack Welch

While Alaskans enjoy all that their beautiful summer has to offer, most are unaware that preparations are already underway for winter. Salt and other winter chemicals are being delivered. Orders for abrasives have been placed. Expendable edges for plows and graders are en route from the manufacturing plant. A brine-making facility upgrade is complete, and highway and airport maintenance employees are already asking to know when the winter shift schedule will be posted. As far off as winter seems from looking outside, it’s right around the corner for Alaska.

All this planning might seem ordinary to a casual observer, but this winter will be anything but routine for the Alaska Department of Transportation & Public Facilities (ADOT&PF). The department’s Maintenance & Operations (M&O) section is charting a
new course as it plans and implements a results-based winter maintenance program. This program comes as staff members have shifted to more proactive methods and strategies, spurred on by a visionary leadership team that supports new technologies and ideas.

ADOT&PF has changed before it had to. Furthermore, economic circumstances have demanded a change in operations in the upcoming winter season. The winter maintenance team will be in unfamiliar territory, utilizing new systems and practices as it strives to deliver the best possible product to its customers who rely on Alaska’s transportation network.

Reduced funding for winter maintenance

With the sharp decline in the price of oil, Alaska has lost much of its planned revenue, forcing all state agencies to make difficult choices as the state reduces its budget. Winter maintenance operations on state-maintained facilities are funded primarily through unrestricted state general funds. Because of this, ADOT&PF’s M&O section saw a 20 percent budget reduction over two years.

These budget cuts have impacted the M&O section in many ways. Budget decreases resulted in losses of equipment and staff to the point where highway maintenance stations had to be closed to meet funding constraints. The M&O section also shifted maintenance district and station boundaries to account for the stations that were closed. Workloads increased for all personnel from boots-on-the-ground equipment operators to the administrative staff that supports frontline forces. M&O leadership reconfigured plow routes and winter maintenance priorities to provide adequate coverage and align with responsibilities assigned to the remaining maintenance stations. A winter maintenance priority map was posted to the department’s website along with expected response times for each road priority level. In addition, managers examined shift schedules and crew composition and adjusted those to balance customer service with the resources available.

Many of these decisions have only been made on paper, but managers realize the plan must remain fluid once the crews begin executing them. The goal is to implement, assess and refine these new processes and continue to look for more efficiencies as the winter progresses.

Results Based Alignment and other initiatives

These myriad budget-influenced changes coincided with the implementation of several other initiatives and process changes ADOT&PF had in the works. For the past 18 months, the department has been building a Results Based Alignment (RBA) program. When complete and operational, this program will provide a road map of how each task undertaken supports a core service in the department’s mission to “Keep Alaska Moving through service and infrastructure.” With an organization as diverse and geographically spread out as the state of Alaska itself, implementing RBA has caused ADOT&PF to change the way it does business, keeping a keen eye toward efficiency and effectiveness.

In addition to creating this service delivery framework, the department is still adjusting to a new statewide accounting and procurement system. ADOT&PF also is pursuing a new statewide data management system for equipment, pavement and maintenance. The department recently held a kickoff meeting for this system. The management systems selected will be built off the same platform and able to share integrated data across systems to better support managers in decision-making to modernize, preserve and operate Alaska’s transportation infrastructure. Staff has overall welcomed these changes since some of the current management programs are decades-old and in dire need of upgrading and replacement, but so much change at once can be overwhelming.

Charting a new course has been a daunting task for all involved. More work and uncertainty remain as many of the plans and systems have yet to be performed or utilized in real time. But scrutiny of the ADOT&PF winter maintenance program has had unanticipated benefits—efficiencies have been discovered and old processes refined. The need to be proactive in responding to winter storm events also has been realized and reinforced.

As with any new adventure, there is apprehension and uncertainty among the M&O team, and the challenges that remain are abundant. However, charting a new course leaves the door open to limitless possibilities. No matter the budget outlook, the department’s overall goal has never wavered: support its mission to “Keep Alaska Moving” by implementing a dynamic, fluid and decisive winter maintenance plan.

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Best Value versus Low Bid

A look at the winter maintenance community and snowplow cutting edges

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Member, APWA Winter Maintenance Subcommittee

As presented through established and ongoing research, there exists ample evidence and reason to migrate toward quality, performance, and life-cycle costs as defining decision factors related to purchasing processes. The benefits associated with best value procurement versus low bid are being recognized and embraced on many levels. Such is not necessarily a new practice as it has been well documented for many years.

A 2000 Environmental Protection Agency report, “State and Local Government Pioneers,” detailed efforts of agencies seeking best value purchasing options as a means to securing and implementing environmentally preferred purchasing options. Government agencies across the country were noted as adopting this concept as illustrated by the purchasing processes used by the states of Minnesota, Massachusetts, Connecticut, California and various others. The benefits of best value purchasing were identified as allowing purchasers the option to consider a wider variety of factors including performance, life-cycle costs, and environmental impacts, thus moving away from detailed specifications to desired preferences and detailed product requirements.

The National Cooperative Highway Research Program (NCHRP) proposes best value procurement as a process wherein price and other key factors can be considered in the evaluation and selection process to minimize impacts and enhance the long-term performance and value. Wherein price has traditionally been the major factor in consideration, best value procurement allows other factors, such as qualifications, schedule, quality, and performance-based criteria, to be used in evaluation and selection.

While this type of change within the government purchasing community can be a slow and controversial transition, the established and ongoing research provides a conduit to facilitate the transition. Numerous studies have been completed which support a broader view of options illustrated through technology superiority, long-term performance criteria and life-cycle costs.

Included among the studies are findings that support such as related

“As long as the differences and diversities of mankind exist, democracy must allow for compromise, for accommodation, and for the recognition of differences.”

– Eugene McCarthy (1916-2005), member of the United States Congress from 1949 to 1971
to winter maintenance. A recent study (September 2015) completed by the Western Transportation Institute for the Clear Roads Pooled Fund Project, “Benefit-Cost of Various Winter Maintenance Strategies,” which summarizes past work that documented the quantified and non-quantified costs and benefits of a sample of maintenance strategies, illustrates that the lowest initial cost is not necessarily the best strategy or the best value in the long run.

Preceding the 2015 research, Clear Roads published research related to the development of the Cost-Benefit Analysis Toolkit – Phase I and Phase II (2010 and 2013) providing a venue for highway maintenance managers to justify the costs of new materials and equipment. Phase II expanded upon the options made available for analysis and provided refinements to improve usability. Through the benefit-cost analysis the research provides needed validation for the selection of various strategies, equipment options, and treatments creating opportunity that may have otherwise been lost.

The winter maintenance community, through ongoing field testing, evaluation, and research, has been drawing attention to the advantages of best value procurement. Work related to snowplow cutting edge selection is a classic example of such. Due to lower initial cost, agencies traditionally used steel or carbide blades with a shorter useful life than high-performance systems. As documented through available research and evaluation, there now exists a strong migration to better quality, longer lasting, and higher performance edges that in the end offer a much higher benefit-cost value.

The initially less expensive steel and standard carbide cutting edges are yielding much higher life costs than that of the higher performing series, creating lost opportunity through frequent down time for service and blade changes, and proving a lower level of service for plowing and removal. The 2015 Clear Roads Pooled Fund research project summarizes research and field testing related to these comparisons drawing from work as undertaken over several years’ time at numerous DOTs across the country including Minnesota, Iowa, Ohio, and North Dakota that clearly validate the benefits of the higher performing series.

Research recently completed (August 2015) by Akron University for the Ohio Department of Transportation, “Investigate Plow Blade Optimization,” supports the approach of encouraging agencies to move away from low bid of initial cost as the deciding factor in the purchasing process. Under the “Benefits” section of the report as found in Section 1.2 on page 2, the report states, “....Several benefits are expected from the outcome of this project. One important benefit is the information ODOT will gain regarding the quality of the available blades. This knowledge may be used in the decision making process for widespread incorporation of specialty blades and other new technologies into ODOT’s winter maintenance fleet.”

A review of the various research and field testing evaluations as completed to date provides critical information for supporting the purchase of such high-performance systems. Based upon increased performance, reduced life-cycle cost, and operator/end user feedback, these systems are far superior to the traditional steel and standard carbide blades. A summary of the survey of DOT plow blade evaluations as listed in the 2015 Ohio DOT “Investigate Plow Blade Optimization” from Maine, Nebraska, New Hampshire, Pennsylvania and North Dakota DOTs reports the differences through notations such as “...the best in reduced wear,” “outlastin standard blades” and “lasting three to four times longer...and up to five to ten times longer.” Additionally, the report details a system that “......lasted through both winter seasons and is still on the truck and ready to be used for a third season.”

The report also shows that in similar evaluations during 2008 to 2010, Iowa DOT noted “....that after prices for carbide increased, the extra costs associated with the high performance blades were deemed to be a cost-effective investment with a cost per mile of less than half of a standard carbide blade. A trial period in 2008 determined that some systems reduced noise and vibration in the cab, and were found to have three to four times longer wear, and “cleaned the roadway better than traditional blades.”

For those seeing support for the purchasing and implementation of various winter maintenance strategies, equipment options and treatment selections that do not fall into the “lowest initial cost category,” the path may have become a little easier to travel. The current and ongoing research provides a method for validation and proof of benefit as found in the best value procurement model. In moving forward an environment is created allowing practitioners the opportunity to effectively and efficiently offer desired levels of service. By migrating toward quality, performance, and life-cycle costs as defining decision factors related to purchasing processes, one may now embrace technology and advancements that have traditionally been out of reach.

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Street Glaciers

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Mother Nature is seldom predictable for the Front Range of Colorado (Fort Collins, Denver Metro, and Colorado Springs). Widely varying winter weather—snow one day, sub-zero the next followed by 50° and sun—can keep weather forecasters and snow response professionals jumping. Annual snowfall averages nearly five feet, but sunny days are also the norm in mid-winter. Freeze-thaw cycles occur almost daily and 20 to 24 snow events will occur from mid-September to early May. Because of these cycles of snow followed by sun and warm, ice will build up in shady areas of streets and sidewalks. Melt water will trickle down gutters, and when it enters shade from vegetation, fences, structures, etc., it will refreeze and accumulate to a significant size. This creates hazards for vehicles and pedestrians alike. In a few days these ice patches can become nearly a foot thick. Daytime pavement temperatures in sun-exposed areas can easily reach 60° when ambient temps are no more than 35°. As such, shaded pavement will remain well below freezing. With low sun angles in the mid-winter months, thousands of icy locations will develop, mostly on the south side of east-west streets.

Ice accumulated over sidewalks
Removal of the ice can be a challenge. The slow build-up will tend to result in hard ice that is well-bonded to the underlying pavement. Simply plowing it will have no effect; it takes heavy equipment, motor graders and front-end loaders to remove the ice. Operators of this equipment need to be skilled at working in tight quarters and adept at making precise and fine adjustments to grab the ice sheets without digging their equipment into the pavement. The logistics of ice removal are not simple. In most cases these locations are in residential neighborhoods. Supervisors will inspect these locations to prioritize the needs and schedule crews as warranted. Often this will involve posting “No Parking” signs a day or two in advance of the work to allow for a safe and clear work zone.

As the ice is removed from the street, there is always the decision to be made of what to do with it. Where possible, and if the ice is sufficiently soft, the ice can be spread on the sunny side of the street. Our trucks have sufficient
weight to crush the ice and the sun
can take care of the rest without
leaving a hazard to the public. This
only works if we are having a stretch
of decent weather at that time. The
second alternative is to haul it away
to a suitable dump site. This gets the
material out of the way, but hauling
is expensive; labor and equipment
charges can mount up fairly rapidly.
The equipment operators need to
understand the dynamics of how the
ice will react under pressure from a
motor grader. It is not like cutting
earth; the ice will resist and then
fracture. The “feel” of the ice can be
similar to what the operator may feel
if they have hooked a curb, so they
must be vigilant to avoid damaging
the underlying infrastructure. The ice
will rapidly wear the cutting edge on
blades as well, so frequent checks are
necessary to reduce the possibility of
expensive equipment damage.

Many citizens have the belief that
more aggressive plowing operations
would eliminate the likelihood of
ice accumulation. We have found
this is not the case. Denver and
many of the surrounding cities do
not plow residential streets, but
ice can accumulate with the same
frequency on plowed routes as they do on unplowed routes. The common denominator for all locations is shade. Even deciduous trees that have dropped their leaves will attenuate the sunshine enough to lower the pavement temperature to the point where melt water will refreeze. The melt water comes from locations other than the street pavement, so plowing has little effect. In some instances, it could exacerbate the problem by pushing snow into areas that alter drainage patterns and add melt water to susceptible areas.

City officials have discussed whether we should create routes to patrol for ice. While we know of certain areas where high expectations of ice buildup exist, every storm as well as the weather that follows it is different, so Denver has opted to rely on citizens to notify Public Works through the 311 system when ice has begun to accumulate. Supervisors are then dispatched to those areas to begin the assessment and prioritization process described above.

A fair amount of time has been spent by engineers and planners on what can be done to minimize the potential for ice accumulation. The two main factors are melt water and shade. Intelligent placement of stormwater inlets can reduce the amount of melt water that enters a shady area, but it is not practicable to install inlets upstream of every shady location. Poorly placed inlets, such as the one shown to the left, will be ineffective at preventing ice and collecting melt water. During the planning process for new developments, site designs that provide for maximum sun exposure on the south side of streets can help minimize the potential for ice accumulation. With small infill developments, reducing shade potential in winter with low sun angles is not always possible.

Ice cutting is and will need to remain a standard part of snow response for Colorado Front Range cities. We understand the cause; we know what to expect and have built crews to accommodate the public need. It is just one more nuance to the winter weather response and one that keeps us on our toes here in the great state of Colorado.

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Early June in Denver is the beginning of summer. Daytime highs hit the ’90s, nights are cool and it is the first stage of the severe weather season. The night of June 4, 2015 brought a weather event that few have witnessed. A little after midnight a small thunderstorm cell unleashed a shaft of hail on a small section of the city that resulted in our deployment of snow crews the next morning. An area in southwest Denver, maybe one square mile, received several inches of rain and pea-sized hail in less than one-half hour.

Because of the local geography, the hail/water runoff funneled into a two- to three-block area. At two in the morning, cars were carried down the street, drains clogged, and the streets were packed with two feet of compressed hail. Crews from Denver Street Maintenance deployed plows and heavy equipment first thing that morning to clear hail that had closed streets and packed tightly around cars. Within a few hours, streets were cleared, cars freed and things began to return to normal. This showed us that Mother Nature is still in charge and we should be ready to mobilize with snow response at any time.

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Clogged street in the aftermath
Plows used to clear paths
A winter storm is forecasted to move in and you are tasked with developing an operational plan. Many operational decisions will be made before the storm event is over. One question you may ask is: Could a Road Weather Information System (RWIS) program improve my operation? In the past, many winter professionals have been forced to rely solely on road weather information obtained from pavement conditions outside their jurisdiction. In some cases traffic patterns, pavement material, and other environmental factors could be much different than what is observed on their local networks. In West Des Moines’ case, much of the City’s pavement forecasts were developed utilizing road weather information from Iowa Department of Transportation (IDOT) interstate roadways. With the evolution of winter maintenance technologies and new leasing programs, there are now road weather information tools available to a broader base of end users.

The City of West Des Moines has deployed three Vaisala road weather information systems (RWIS) to monitor road conditions with a fourth one on the way. One of the units is a mobile weather platform (Condition Patrol DSP310) that is mounted on a supervisor’s truck. The other systems are a fixed mount RWIS station (Vaisala Guardian) that have been installed along major arterial corridors on traffic signal mast arms. The systems have been installed strategically throughout the city on different types of pavement to provide road conditions to our supervisors and contracted weather service provider.

The RWIS are accessed via a web page which can be accessed from any web-enabled device using personalized credentials. Furthermore, the systems report to a remote server via a cellular connection. This is a tremendous advantage for an agency that does not have staff to monitor and/or maintain an in-house server and database. These RWIS make use of a cellular connection to eliminate the need for a hardwired communication connection which eliminates in-house IT staff. All the equipment is continuously monitored by the service provider to ensure the functionality of all components of the RWIS.

These systems provide the agency with information related to road surface condition using infrared technology. By making use of infrared technology the pavement is not cut or drilled thereby reducing any concerns of pavement deterioration. The information collected by these systems includes surface temperature, and surface conditions of the road such as dry, wet, snow or ice covered. A measurement of thickness of water, ice and snow is given in millimeters and a friction coefficient is provided to determine slickness. Atmospheric conditions such as air temperature, relative humidity, and wind speed are also provided. The weather information from all units is obtained from remote sensors with the exception of subsurface temperature. Subsurface temperature is obtained only from the fixed RWIS units, using a subsurface probe. The stationary systems also have cameras to provide time lapse photographs on surface conditions. The mobile platform collects ambient as well as surface data “on the run” which allows the agency to get real-time road conditions wherever the unit is driving.

The utilization of these systems for winter operations has enabled West Des Moines Public Works Department staff to more effectively make informed decisions concerning deicer applications. While the principle of using weather information to guide granular and liquid application rates is not a new concept for City staff, they are now able to utilize real-time information obtained...
from their respective road network. Utilizing information gathered from the local road network takes much of the “guesswork” out of data interpretation. Staff can now make material application recommendations with increased confidence since they have accurate surface and atmospheric conditions specific to their road network. Furthermore, the data produced by these RWIS is utilized by the City’s contracted weather forecast service to provide site-specific forecasts and treatment recommendations.

By using the data collected on the local road network West Des Moines staff members feel as though they have the ability to make more informed decisions when it comes to material application rates for winter storms. The use of this data gives the agency the ability to operate more efficiently and confidently knowing the information being provided is obtained from the local street network. Using the data provided and the proper use of deicing chemicals has led to lower overall costs while maintaining a high level of service.

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A fixed mount RWIS station that has been installed on a traffic signal mast arm.
Lead with purpose

Tim Cassell
Regional Sales and Operations Branch Manager
Tovar Snow Professionals
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I challenge you to think back to that time you purchased your last vehicle and the excitement you had when you finally made that decision. The purchase was no surprise. You’d done your research, studied the history, and placed a value of what you felt was correct for the purchase you were about to make. It was not a simple decision but it was one you were confident in making. You thought you would be one of the few proud owners of this unique vehicle. It was a vivid image in your mind. Then to your amazement, on the first two days on the road you see five vehicles exactly like it! How could this be? The answer is simple: Awareness!

Our minds are amazing that way! We subconsciously create a mindset that can hurt or help us in family life, management style, leadership and even in the way we view other individuals. In the industries we manage, on the first two days on the road you see five vehicles exactly like it! How could this be? The answer is simple: Awareness!

In the car example above, you were convinced that your purchase was going to be somewhat of a rarity. You knew there were plenty of other people who purchased the same vehicle, but you did not realize to what extent. You then started noticing this so-called “rare vehicle” all over the place! Let’s look at this analogy in comparison to how we manage our people after this awareness has taken place.

What are you aware of in them? You know that you hired them because of the talent and potential you saw within them. Are you consistently aware of those positive traits? Or is the “vehicle” you continually see a reminder of their failures and weaknesses? These are questions we continually have to ask ourselves. What am I seeing and am I leading them with purpose?

A number of years ago the leadership in our organization realized a concerning trend amongst employee turnover. Every company has turnover; people leave for other opportunities or the company purges people that aren’t fulfilling the needed duties. What was noticed was that we were losing the most people that we wanted to keep and keeping the people that should have been asked to move on. The beginning effects could be seen throughout the company, and we knew if the trend continued it would increase in speed, eventually effectively changing the company at the core.

We knew that a change was necessary, and we needed to work on our culture to make sure that our values were expressed with clarity throughout the company. We wanted our employees to work together collaboratively and have the core values we believed in as a whole as part of that culture. Change is usually uncomfortable, but necessary. New habits needed to be formed in our managers, and team members. We obtained help to define our culture. “The Tovar Way” emerged from that process: a set of principles that we can use as a guideline to hire people that “fit” and as guidance on how to work and interact on a day-to-day basis. We ultimately defined what we wanted the culture to be and then went to work on striving toward those ideals.

Surprisingly, we started seeing positive results in creative thinking, team collaboration, and our culture almost immediately after we started to make the change. Our change in purposeful leadership started to create a culture of new accountability, and people who know their value. Slowly, the “blame game” decreased, and our company started to work together as a unit. After a few years we were able to realign our culture and created new habits. We now share “The Tovar Way” together on a weekly basis to maintain the foundation we have rebuilt. I can honestly say that we now have some of the strongest leaders and employees in our industry; a culture that creates value and accountability; an awareness of the correct “vehicle” in our management and people who
are driven by belief in themselves and our company. This obviously flows into the profitability, sales and customer retention across the company. Am I excited? Am I enjoying my work life? You bet I am, and that excitement in me as a leader cascades to my team.

Here are a few simple questions you can ask yourself:

- Do I manage each employee differently based on the individual?
- Do I highlight the strengths of my people?
- Do they know and understand the company vision and what value they bring to the company?
- Do I have negative filters in place when I talk to my team?
- Do I give them the time to generously listen to their needs?
- Do I truly inspire my team?

These are just a few questions we should be asking ourselves on a continual basis.

There is one thing that I have struggled with in both my personal life and leadership position. I call it the “IF” syndrome. Let me explain with an example that relates to my family. My stepdaughter (14 years old) recently started a work program through her school with a local farmer working in the fields for two weeks. Her first day was both mentally and physically challenging. She came home and explained how hard the day was and that there was the possibility that she could back out. So in her mind she was saying to herself, “What if I just quit or take tomorrow off?” She went to work the next day, and it was about 10 degrees warmer and had to work even harder than the day before. She developed heat exhaustion and they let her sit out of work for a few hours that day. The “what if’s” became louder and louder in her mind, making the day seem to go by very, very slowly. When she got home that night, my wife and I had a discussion about the “what if’s” that were going through her mind and strongly encouraged her to stick it out—to make the decision that she was going to make it all the way through, so that she would feel much better about her decision once she made it. Well, long story short, she eliminated the “what if” possibility that night and changed it to a “how”: How was she going to start off the next day prepared for the long hard work day? She came home the next night with a smile and had more pep in her step after the long hard day. She made the decision that she was going to move forward, and realized how the “what if” created an unnecessary battle in her mind, which actually made the days seem a lot longer and tougher than they actually were.

Amazing!

I have done the same thing in my work and personal life at times, and realized that if I eliminate the negative possibilities of quitting in my mind, then it’s not about “if,” it’s about “how.” It remains surprising to me at how much more successful I can be by just simply making that decision.

We as leaders have a great responsibility and opportunity. We can positively grow or slowly harm a company on how we lead. Let’s do it with purpose and in the best interest of our people and our companies!

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Winter weather forecasting: your plan to succeed

Sara Croke
President
Weather or Not, Inc.
Shawnee, Kansas

Winter preparations are a critical component of operational budgets. Time spent redesignating routes, readying fleets, negotiating and purchasing materials, training operators at snow rodeos, and educating snowfighters at seminars or at the APWA Winter Maintenance Supervisor Certificate Workshop can all be key budget items that lead to a successful snow and ice season.

How much time and effort are you investing in reviewing your winter weather forecasting plan? This is not about evaluating a single data tool or checking your road sensors to make sure they’re still properly working. Public works operations that prioritize safety and carefully manage budgets must have a weather forecasting plan to be successful. Plans provide guidance to the snowfighting team, clarity to the public, and comfort to government councils and commissions.

Incorporating this five-step process into your current weather forecasting plan could save your team time and confusion when winter storms approach. That always improves safety and saves money in the long run.

An annual weather ops review should include the following:

What answers do you really need?
Listing operational decisions that are weather dependent is the best way to make certain that the appropriate weather factors will be considered.

For example, if your first concern is getting drivers and mechanics in safely, the first weather answer you need is when will roads deteriorate where my crews will be driving on their way to work? When the winter is in full swing, understanding the mid-range weather pattern may become a priority in order to plan for mechanical repairs and crew rest. Before asking for a specific day-by-day forecast, getting a good picture of the trending weather pattern such as a major snow a week for the next three weeks or early morning rush hour icing threats every other day for a week, may give you an answer that more directly aligns to the problem you’re trying to solve.

Matching operational decisions to specific weather data clues will likely vary throughout the winter. The preparatory goal is to think those through now so that when each scenario presents itself, you’ll be garnering the weather information that will drive your field decisions. That’s a cleaner, more concise approach to weather answers than sorting through irrelevant data sets of which there are a plethora.

Evaluation and training of weather tools
Whatever tools your command center uses, now is the time for a refresher course. Superintendents that have been eyeing the rain gauges for flooding or have been running asphalt crews ahead of radar to wrap up before the cold hits, need to get their heads into the “winter weather mind set.” Specific tools may differ from department to department. However, there are some common themes that can be addressed.

Dealing with a snow storm in Kansas City (photo by Jayson Prentice)
Evaluate your weather data tools for timing, accuracy and availability. Know where their information is derived from, then give it the appropriate weight in your decision-making process. A public website or Twitter feed that allows anybody to post without quality control checks should not be given the same weight as your proprietary Road Weather Information System (RWIS) that your trusted vendor routinely verifies. Recently, there were two weather posts in the Kansas City area that were bogus. One was for a 90 mph wind and the other was for a 73 mph wind. Neither could be verified by a deep radar wind analysis yet both had public works officials questioning if they should send crews looking for damage overnight. Never discount all anomalies as they can occur. However, evaluating which data sites your department is going to rely on before the snow flies and training every decision maker involved on how best to use them, should increase both the ease and reliability of your information tools this winter.

Most important, make certain that everybody is using the same tools! If it’s radar, which by the way is not as effective in showing snow as it is rain, be crystal clear which radar sites you want your team to utilize. During last year’s World Series Game 1, opening ceremonies were nearly cancelled because of radar misunderstandings. With several decision makers looking at radar that didn’t show drizzle, they were very concerned about why it was raining on their field but not showing on radar. When confidence in a decision-making tool is lost, unnecessary contingencies can come into play. If you’re thinking “drizzle, so what, it’s drizzle” remember that even a little drizzle with pavements dropping below freezing can quickly ruin your day too. All eyes on the same source at the same time matters!

**Forecast process**

Process? What process? We grab an app, peak at the RWIS, add and divide the difference between all the TV stations, and hit the streets. What’s wrong with that? The problem with an abundance of readily available weather information is that it invites the oversimplified use of data to solve complicated and highly consequential problems. A best practices approach to basic weather forecasting is as follows:

- Identify where your weather is coming from (this usually involves the jet stream)
• Determine the contingencies of how it could change as it approaches your area
• Fully analyze the current surface and road weather features in your vicinity
• Fully analyze mid-levels of the atmosphere (requires training)
• Consider operational factors, i.e., road treatments, traffic loads, etc.
• Combine all of the above to determine a base forecast and contingencies

The tools involved should be satellite imagery, surface data, road weather data, mid-level and upper air data, area quality controlled weather stations and eventually, radar. Notice that radar is neither the first nor only “go to” product. As a matter of fact, the misinterpretation and over-reliance on radar apps is the most common cause of horrendous field decisions both for winter and severe weather situations. Make it a part of your toolkit but get interpretation training lest your department be tricked by the colorful displays.

Questions to ask your meteorologist
Never ask a meteorologist, “What’s the weather going to do,” if you want the operational answer before the storm hits. They’ll draw you the whole picture when you only want to know if there’s any chance that the rain changing to snow at 10 a.m. tomorrow could possibly change over before or during rush hour. See how nicely that question plays into your operational decision to have or not to have a skeleton crew come in early tomorrow morning? This is the part of the process that should easily and effectively dovetail into the first step of our process: matching necessary weather information components to the possible operational decisions.

Getting everybody on the same communication plan is a critical component to emergency management which is what you’ll be dealing with as soon as somebody decides to drive on your snowy or icy road. If you have a private weather service, be certain to chat with them before the season starts. Invite them to your “Snow Rally” or whatever you call your snowfighters’ pre-season training and pep talk. The better they understand your pain and what actions their words and graphics will trigger, the better they can do their job which is to give you the greatest lead time possible to mitigate changing weather in a way that helps you improve road safety.
This is also a great time to be neighborly as the meteorologist is not the only professional with whom to exchange questions. Public works departments are an integral part of emergency management. That makes us a key partner when our communities are threatened, especially by Mother Nature. Okay, we’re really the lead first responder when it’s a weather threat but we do not operate in a vacuum. That’s why now is the best time to gather every agency that will be affected when snow and ice are on your doorstep.

The City of Columbia, Mo., is a shining example of how bringing everyone to the table, literally, can help winter storm operations run smoother for everyone: schools, hospitals, police, fire, DOTs, county agencies, surrounding communities and more. This annual gathering started in the ‘90s by now-retired Dennie Pendergrass of the Columbia Public Works Department. They had eight people in the room that first year, including their private weather service. The next year it was 13. Last year, there were over 50 officials including their local universities. The agenda is simple: What’s new in your agency that each of us needs to know about to better help our community be safe when winter weather strikes? This conversation assures mid-Missouri that anyone responding to snow and ice is on the same page or at least knows who they’ll call if they have questions. It’s amazing what putting a face to a phone number and job title will do to make emergency operations run smoother.

Decide then monitor

This last step is no different than any process your operation goes through regularly. Set a deadline for your decision that gives you plenty of time to implement it effectively, then monitor the situation for possible changes. There’s 100% chance that the weather will change. Being prepared for it makes it easier to adjust. Then you’ll make another decision and monitor and so on.

As your mechanics give your snowplows their tune-up to be ready for winter, leadership should be doing the same to your weather forecasting plan. It’s as vital to your operation as any equipment you’ll send out the door to fight Mother Nature this winter.

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“Chris Miller, Public Works Inspector, Springdale, Ohio, asks: “After several internet searches with little result, I am here asking this question. Last winter we had about two inches of wet snow with high winds that covered our LED traffic signal lenses followed by single-digit temperatures that effectively covered and adhered to the lenses. As most know, LED traffic signals produce little to no heat compared to their predecessors, the incandescent traffic signal light. Our issue and ultimately the reason for the question is that we would like to know what public works departments around the country are doing to prevent snow-covered LED traffic signals, short of heaters and special visors?”

Thanks for the great question, Chris. I wish I had a simple answer for you. We have discussed this matter several times since LED streetlights came on the scene. You mentioned having done internet searches with little success, and again, I feel your pain since I’ve done the same thing. Several task groups have been formed by the International Traffic Engineers (ITE) association. The solutions they have discussed include louvered vents on an industry standard tunnel visor; funnels across the signal face, snow scoop visors; spraying Rain-X on the lenses prior to a snow storm; spraying deicing products on the signal faces prior to a storm; and heaters, which seem to be rather expensive. It’s been a while since I asked our readers for their experiences so I’m doing so now. If you have found a successful treatment for LED traffic signal faces to prevent the collection of snow and ice, please share your experiences with me and I’ll get the word out to our readers. The industry doesn’t seem too concerned about developing a solution since the frequency of such “perfect storms” is so seldom that they do not see it as a major problem. However, if it’s impacting the drivers in your area, we all know that is a mega-major problem which needs an immediate solution. Good luck and send me your experiences to adaniels@apwa.net.

“I recently spoke with you about the problems rural counties (and cities, as well) have in getting a fair share of funding for planning, as well as other projects. We all know that the big cities/counties get all the money because they have ‘all the problems.’ Truth is, they don’t have any idea what real problems are. With people moving to the cities and suburban areas, it becomes increasingly harder for us to meet the needs of our residents to provide quality fiber optics, more public parking, and safer amenities for pedestrians, all of which might help us maintain our historic downtowns. Do you know of anything we might try?”

With a large percentage of APWA’s members from small cities and rural communities, you have struck a nerve! One of the more innovative programs I have seen lately is the “America’s Best Communities” contest. The Contest is a chance for cities and counties, which often fail to beat out larger urban areas for federal development funding, to win up to $35,000 to implement economic development plans which include several of the areas you mentioned. The Contest is sponsored by Frontier Communications, the Dish Network, CoBank, the Weather Channel and other smaller partners. As we are well aware, rural areas tend to have a higher percentage of people living in poverty than metropolitan areas, and they can’t always count on the federal government to help them realize many of their development goals. The major founder of the Contest stated, “Many rural communities have been left behind in terms of attracting businesses and staying vibrant so we wanted to create an environment where you can change the business model and change the community from the group up.” That includes what we do in public works to keep our communities the best we can. But sometimes you can’t do everything with nothing! Lots of times small rural areas can’t compete because of the lack of investment available to do so. However, as telecommuting becomes more common, people will have more freedom to choose where in the country they live. This could cause migration to urban areas to slow down if the technology and investments in rural communities are available. For...
Ask Ann... 

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Work truck shows support for brain cancer and breast cancer awareness

Mark Wegner, Superintendent of Highways at the Town of Cheektowaga, N.Y., lost his son Colon to brain cancer at age 19. Fortunately, the town allowed him to do something special by dedicating a work truck that would show support for both brain cancer (gray) and breast cancer (pink) awareness. The truck has been shown at numerous local events. One of those events included a 2015 Buffalo Bills football game, where they held a fundraiser in the parking lot, collecting fan autographs. Many people stopped by to see what was going on and shared their own heartbreaking stories. Those signatures were later transferred to the truck in the form of custom vinyl body wrap. Kenworth & Henderson worked closely with Mr. Wegner, turning his dream into reality.
Cost-effective, reliable sand and salt storage buildings from ClearSpan Fabric Structures

After a harsh winter last year, public works officials and small business contractors involved in deicing the roads here in the U.S. are stocking up on sand and salt in preparation for another cruel winter. Many newcomers to the industry often assume that storing road salt in any way is acceptable, but the contrary is true. In actuality, storing salt improperly can have a serious impact on the environmental health of the surrounding area. The biggest issue surrounding salt storage is stormwater runoff and the potential contamination of streams, aquifers and other major bodies of water, which can have damaging effects to animals, plants and people.

For bulk salt supplies, one popular option is to store the material in a maintenance-free, relocatable fabric structure. There are many advantages to storing salt and mixed sand/salt under cover. Sand/salt storage buildings minimize the possibility of contaminating ground and surface water.
water with salt runoff, eliminate the economic loss of salt that is dissolved and washed away by precipitation, and help make the mixed material easier to load and spread. Thankfully, covering stored road salt no longer needs to be extremely costly due to a number of technological advancements, and the benefits of properly covering stored road salt can be seen in both economic and environmental ways.

One company helping to cut the costs of sand and salt storage is ClearSpan Fabric Structures. ClearSpan offers customers a cost-effective, reliable sand and salt storage building that keeps material safe and dry. With the American-made, triple-galvanized steel frame of a ClearSpan fabric structure, there is no need to worry about the corrosive nature of salt, and each structure features no internal support posts, allowing for the maximum amount of storage space possible.

When faced with the dilemma of needing to replace their salt storage building, the Stephenson County, Ill., Highway Department elected to install two ClearSpan fabric structures to help improve their operation. These 45’ wide by 90’ long structures now provide proper storage conditions with a number of additional improvements as well. County Engineer Chris Isbell stated, “We now have one building large enough to hold a full year’s supply of salt and a second building that can hold half a year’s supply of our salt/aggregate mix.” Working with a leading fabric structure company has led to a number of benefits for the Stephenson County crew. “In addition to reducing salt lost due to runoff and waste, the new structures are also freeing up valuable budget dollars for road maintenance that would have previously been used for building maintenance,” stated Isbell.

Whether you have a structure that needs replacing or you’re looking for your first salt storage facility, ClearSpan Fabric Structures can design the ideal building for your needs. For more information, visit www.ClearSpan.com or contact a Truss Arch Specialist at 1-866-643-1010 today.
Products in the News

Tippmann Post Driving Equipment introduces side mount adapter for driving u-channel posts

**Tippmann Side Mount Adapter** fastens quickly to all u-channel posts ranging in size from 2 lb. per foot all the way up to a 4 lb. per foot post. Whether you are driving an 8 ft. post or a 14 ft. post, this adapter will allow you to drive from a height you are comfortable with and your feet on the ground. This adapter is equipped with 11 sturdy attachment pins, which fit all major manufacturer u-channel hole patterns. The side mount adapter is then held in place by a long retaining pin and clevis. Learn more about this adapter as well as view online video demonstrations by visiting propanehammer.com. Or call toll free for a free brochure: (866) 286-8046.

Reduce your slip and fall liability this winter with STAND-UP Freeze Resistant Liquid Deicer

New **STAND-UP** helps facilities mitigate their slip and fall liabilities by completely clearing away slippery ice and snow from their steps, walkways and ramps. STAND-UP is a great alternative to salt around facilities since it keeps working even after the sun goes down. STAND-UP will not track into buildings, and it will not damage expensive stamped concrete and brick pavers like salt can. For more information, watch a short video of STAND-UP in action at [www.rhomar.com](http://www.rhomar.com) or call (800) 688-6221.

L-3 Snowfighter Training Services

Don’t wait until the first snowfall to train your snowfighting team. L-3 Driver delivers **basic and advanced safety skills training** for equipment operators year round. Significantly improve the knowledge, skills and attitude of your operators to be safe, efficient and prepared for winter road conditions. Our training solutions are proven to be **cost effective in reducing crashes and operational costs** due to wasted materials and equipment damage. Pre-screen and assess new hires and seasonal operators or offer refresher training for experienced operators. Topics focus on **situational awareness, safe plowing operations, distracted driving, fatigue management, and tandem operations** for snowplow trucks, tractors, dump trucks, light- and heavy-duty trucks, and tractor-trailers. Book the L-3 Mobile Training Center on a weekly basis with two driving simulators, experienced instructional trainers, and computer-based training courses. For more information, please contact Sean Brenke at (801) 303-5695 or visit [www.l-3training.com/snowfighter](http://www.l-3training.com/snowfighter).

VariTech Industries Blend Boss™ offers unique standalone blending for effective deicing

The **Blend Boss™ from VariTech Industries** is a standalone automated chemical blending station that allows up
to a three product in-line blend of nearly all liquid deicing chemicals. This groundbreaking unit can be installed with any new or existing tank farm. Mix the right product for your environment easily and accurately with the touch of a button. Features stainless steel enclosures, NEMA-rated control panel enclosure, on-the-fly adjustability, data logging, password protection, tank recirculation and closed loop control. For more information, visit www.varitech-industries.com/BlendBoss or call 1-888-208-0686.

PreCise® MRM offers newly engineered wireless road weather technology

Proudly voted
2016 Best New Product at APWA Public Works Expo!

Optimize your winter maintenance with our new wireless vehicle mounted sensor and dedicated color display. Accurately capture humidity, road and air temperatures and see live readings in-cab wirelessly—avoiding pinched or corroded cables. Option of a wired sensor is available at your preference. This winter, increase your snow and ice fighting efficiency and maximize your performance with road weather technology and fleet management solutions from PreCise MRM. For more information, visit www.precisemrm.com/pwx or call 1-888-449-0357.

Snow doesn't stand a chance with Ventrac

Ventrac sets the standard for sidewalk snow management.

Built for compact maneuverability in tight areas, sidewalks, small parking lots or housing developments, Ventrac’s complete snow package includes a two-stage heavy-duty snow blower with plenty of power to handle heavy snow. The broom attachment clears sidewalks quickly when time is of essence. The V-Blade and Power Angle Blade are designed for pushing snow efficiently from parking lots and driveways. Each attachment attaches quickly and easily using the Ventrac Mount System to provide users with everything they need for winter snow removal. For more information, please visit www.ventrac.com/snow.

D-Link expands line of 10GbE Smart Managed Switches

D-Link® has announced the availability of the 10-Port 10-Gigabit Ethernet Smart Managed Switch (DXS-1100-10TS), expanding its family of popular 10GbE Smart Managed switches. The powerful DXS-1100-10TS delivers 10-Gigabit Ethernet, ensuring that high bandwidth demand can be fulfilled easily and providing device flexibility across networks. With a groundbreaking price point, the DXS-1100-10TS provides a cost-effective and feature-rich solution for small- and medium-sized businesses (SMBs), government agencies, and educational facilities. For smart and flexible management, the DXS-1100-10TS offers powerful switch management functions, featuring an intuitive web-based graphical user interface that allows network managers to remotely control their network down to the port level. For more information, please visit us.dlink.com.

GS&P to work with GDOT on SR 136 widening

Gresham, Smith and Partners, a leading multi-disciplinary design and consulting firm for the built environment, has been chosen by the Georgia Department of Transportation (GDOT) to complete preliminary plans for a project on SR 136 in Pickens County, Ga. The project proposes multi-point improvements at various locations along SR 136, as well as plans to enlarge the shoulders throughout the corridor to accommodate bicyclists. The planned improvements include the replacement of a T-intersection with a roundabout at the SR 136 Connector; upgrades to the intersections of SR 136 with Antioch Church Road and Priest Circle; and a new roundabout intersection with SR 136 and Ellijay Road to improve the route’s horizontal geometry. For more information regarding GS&P, visit www.greshamsmith.com.
GVM’s EZ Brine Manufacturing System

Add efficiency, speed, and confidence to your winter operations with GVM’s EZ Brine Manufacturing System. The EZ Brine system produces brine faster, allows up to three micro-ingredients to be added, automatically monitors components and solutions, logs history, and even connects to an app, to start brine production remotely. GVM’s system touts fast startup and installation—users can go from delivery to producing brine in just a few hours. GVM’s EZ Brine System is powerful, yet simple enough for first-time users. A 12-inch programmable touchscreen computer guides the operator through the process. For more information about GVM, please visit www.gvminc.com.

Earth Services & Abatement

A unique P3 design-build consortium called on Earth Services & Abatement Inc. for work on Colorado’s largest mass transit project to date: Denver’s FasTracks Commuter Rail to Denver International Airport. Its maiden voyage occurred in mid-April. Eagle P3 is the first major U.S. transportation project to use a public-private partnership (PPP) to finance, design, build, maintain and operate the system over 34 years. Denver Transit Partners (DTP) holds the project concession. ESA, with licenses and certifications in 35 states, is recognized as one of the top turnkey environmental remediation and demolition firms in the country. Contact Ted Sillstrop at (303) 991-1280 or ted@esasiteco.com.

ALTA Environmental

ALTA Environmental is a California-based consulting firm providing the highest level of service for environmental and engineering needs, with a collective track record of proven budget-minded solutions for industrial, commercial and government clients. ALTA provides strategic advice on air quality management, environmental health and safety, site assessment and remediation, hazardous materials and waste, sustainability and energy efficiency, water resource management, and occupational safety and industrial hygiene throughout the Western United States. For more information about ALTA Environmental, please e-mail info@altaenvrion.com or visit www.altaenvrion.com.

Traffic Engineering Data Solutions, Inc.

Traffic Engineering Data Solutions, Inc. (TEDS), a woman-owned transportation engineering business conveniently located in Central Florida, specializing in traffic engineering, transportation planning and civil engineering services, has announced the launch of its new website, www.teds-fl.com, that focuses on accessibility from virtually any device and website navigation, as well as traffic engineering and transportation planning services information for industry professionals throughout the state of Florida. TEDS website prioritizes information that is in high demand by transportation professionals, and makes it easier to find TEDS key services and qualifications. On the new website, visitors also stay informed on the latest news and events for TEDS. For more information about TEDS, visit www.teds-fl.com.
When it comes to TPMS, look no further than ACDelco

Did you know that Transportation Safety Association (NHTSA) required all automakers to begin offering Tire Pressure Monitoring System (TPMS) as standard equipment in their vehicles? Studies and data collected by the NHTSA results show that a functioning tire pressure monitoring system can reduce tire failure and save lives. For GM OE Tire Pressure Monitoring Systems, look no further than ACDelco. Here are some quick facts about the product: ACDelco GM OE Tire Pressure Monitoring Systems keep the vehicle operating to OE specifications—the way it was engineered from the factory; ACDelco GM OE three-volt lithium sensor batteries have a proven track record and are designed to last up to 10 years; and components include the sensor body, snap-in rubber valve or aluminum valve stem, plastic cap and electroless, nickel-plated valve core. For more information about ACDelco and TPMS, visit acdelco.com or www.youtube.com/acdelco.

Give it a “brake” with ACDelco GM OE brake pipe kits

Did you know that ACDelco hydraulic brake pipe kits are an efficient solution when replacing an entire brake pipe assembly?* When you’ve got corrosion or wear on your entire brake pipe assembly, look to ACDelco for replacement. These 66 part numbers meet GM OE specifications, are cost effective and simplify the service of 1999-2007 GM full-size pickup trucks and SUVs. The benefits: pre-formed and pre-flared to aid in installation; nylon coating for better corrosion protection. For more information about ACDelco and ACDelco GM OE brake pipe kits, visit acdelco.com. *Note: these kits do not include the rear axle crossover pipe and are not intended for the repair of a single damaged brake pipe.

LCPtracker: certified payroll and workforce reporting software

LCPtracker is a powerful cloud-based, prevailing wage and workforce compliance/management solution. It is ideal for agencies and prime contractors working on construction projects who need to generate Certified Payroll Reports and may need to track and enforce detailed worker information for compliance and workforce reporting. The software is comprehensive, easy to deploy, configurable, user-friendly, highly scalable, and time-tested in thousands of construction projects throughout the nation. The core LCPtracker validation system checks payrolls for local, state, and federal Davis-Bacon wage and labor compliance by flagging any error or omission discrepancies the contractor may have on a report. For more information, please visit www.lcptracker.com.

New AmpliVox ADA-compliant lectern accommodates all presenters

AmpliVox Sound Systems, a leader in height-adjustable presentation lecterns, is proud to introduce its new ADA-compliant lectern. This innovative furniture piece can be used comfortably by anyone, thanks to an electric lift that provides customized height adjustment for seated or standing presenters. The lectern meets ADA Standards for Accessible Design, with an extra-wide rear entry to accommodate wheelchairs. Its classic design fits well in education, business, religious, hospitality, and convention settings. For more information, please visit www.ampli.com.
Problem-based and practical introduction to the sciences required to treat wastewater

DEStech Publications, Inc. has announced the publication of The Science of Wastewater, by Frank R. Spellman, Ph.D. The scientific properties of different types of wastewater and the unit processes used to transform it into effluent of sufficient quality to be returned to the environment are explained in this comprehensive text. The book presents detailed descriptions of, and mathematical formulas for, wastewater treatment processes—from “dirty” influent to drinking-water-quality discharge. Operations include: filtering and activated sludge; detention basins; ponds and lagoons; and the stabilization and composting of biosolids. For more information, please contact Michael Hauck at mhauck@destechpub.com.

Winter Maintenance Documentation: Revolutionized!

We often see “new and revolutionary” winter fighting equipment, designed to make winter operations a bit more manageable. However, almost no ground-breaking tools have been made for the public works officials tasked with documenting the entire winter maintenance policies documents. They still have to write the document manually—until now! The Winter Web App is designed by public works staff, for public works staff. Simply answer questions, and download your fully-customized, professionally written document in less than three days. Already having won awards in Canada, the service is now available across the United States. Visit www.OGRAapps.com for more details.

Magnum M9-OPUS-MLDE

Magnum Energy Solutions’ M9-OPUS-MLDE intelligent lighting node was specifically designed for easy installation in the Philips SR LED EvoKit. This LED troffer installs in minutes and provides smooth, consistent, quality LED light; ideal for commercial interiors, hospitals, schools, and more. The M9-OPUS-MLDE provides standalone occupancy-based ON/OFF, daylight harvesting and control with a wireless, battery-free switch. When integrated with software or to BACnet building automation using the M9-EBOX, the M9-OPUS-MLDE provides data points associated with light status, occupancy, light values and real-time energy consumption of each fixture. For more information, visit www.magnumenergysolutions.com or call (330) 656-9365.

Knowledge Transfer and Talent Risk Management

For more than two decades, The Steve Trautman Co. has provided executives at blue-chip companies with the quickest, simplest, and most relevant solutions for knowledge transfer and talent risk management. Their practical framework is now the nationally-recognized gold standard in corporate America, and is used by companies ranging from Boeing to Nike, Johnson & Johnson to Goodyear. Founder Steve Trautman has written two books, Teach What You Know: A Practical Leader’s Guide to Knowledge Transfer through Peer Mentoring (Prentice Hall) and The Executive Guide to High Impact Talent Management (McGraw-Hill). For more information, please call (206) 547-1775 or e-mail sonja@stevetrautman.com.
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For more information, contact David Dancy at (800) 848-APWA or send e-mail to ddancy@apwa.net.

OCTOBER 2016
4-5 Midwest Energy Policy Conference, St. Louis, MO, (573) 341-6222, www.lauferenergy.mst.edu

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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
2017 April 23-26 Des Moines, IA
For more information, contact Brenda Shaver at (800) 848-APWA or send e-mail to bshaver@apwa.net.

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