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On the cover: Public works professionals across Western Canada are hard at work every season of the year. Make sure to recognize them in May, during National Public Works Week!



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A Message from the Public Works Association of British Columbia

It has been another fantastic year as we continue to provide quality education along with building and maintaining professional relationships with organizations that support and assist the public works profession. Thank you to everyone for the commitment in moving our association forward and for dedicating their personal time in promoting our great profession.

I would like to personally thank the Sun Peak's team and all the volunteers for their dedication and hard work in making the 2016 PWABC Annual Technical Conference a success. It was great to engage and share experiences with many public works professionals in attendance. The MSA tradeshow was an outdoor experience that was highly successful and the emerging leaders event was a lot of fun as it took place on the go kart track. I look forward to another successful conference in 2017, which will be hosted in Penticton, BC. Details will be posted on our website when available.

The upcoming year will be a time of transition for the Public Works Association of BC. Jeannette Austin is leaving our team after eight years with PWABC as Executive Director. I want to take this opportunity to sincerely thank and recognize Jeannette for her dedication and commitment to the Public Works Association of BC. In eight short years Jeannette has transformed PWABC from what we were into one of the leading providers of public works education in our province. As an advocate for public works Jeannette has relentlessly sought the ears of politicians and CAO's to ensure that the profile of public works in our cities remained top of mind. As a result of Jeannette's hard work, she has built a solid

**Thank you to everyone
for the commitment in
moving our association
forward and for
dedicating their personal
time in promoting our
great profession.**

foundation which will benefit PWABC as we move forward in the future. On behalf of the PWABC board of directors, we wish Jeannette all the best and success in her future endeavors.

In January 2017, Ashifa Dhanani will take over the role of Executive Director. Ashifa comes to us from the BC Water & Wastewater Association and will continue to lead the Workforce Strategy currently underway. Ashifa was formerly the EOCP Executive Director and also has experience working for the Industry Training Authority. Her diverse background and education will lead PWABC into the future. Please join me in welcoming Ashifa to our proud team. I look forward to working with Ashifa to continue the great work that Jeannette has provided the association.

I wish you all good health and happiness in 2017 and thank you for your continued membership, support and dedication to the public works profession.

Deryk Lee

President

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A Message from the Alberta Public Works Association

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Happy New Year from the Alberta Public Works Association! I hope everyone was able to enjoy the holidays with family and friends. It has been a very exciting year our organization. I would like to thank all our members from across this great province for their continued support. I would also like to say a big thank you to the board of directors, all our committee members and volunteers, and to all the municipalities that allow these members to serve...thank you!

At the recent CPWA luncheon during PWX 2016, in Minneapolis, Minnesota, Canadian Public Works Association (CPWA) National Public Works Week volunteer, Steve Blayney, CPWA Director from Manitoba, had the honour of announcing the 2016 CPWA National Public Works Week award winners. The City of Cold Lake, Alberta, was the small centre award winning municipality! Congratulations! Also, I met the new CPWA President, Andrew Stevenson, and spent some time chatting with him. I'm looking forward to working with Andrew in the coming years. Congratulations Andrew, on your new role as President of CPWA.

Once again, The Excellence in Public Works Conference was a huge success. Thank you to the conference committee

and to our Executive Director, Jeannette Austin. Everyone put in a lot of hard work! I think this trade show had even more equipment and vendors than the previous year—a wow! I can't wait for the next one. We also had our 19th annual Equipment Rodeo in Red Deer, Alberta, where the brand new Equipment Rodeo logo and T-Shirts were unveiled. They are available for purchase and are a great gift idea. Congratulations to the top three teams at this event: 1st Place – the City of Edmonton; 2nd Place – the City of Fort Saskatchewan; and 3rd Place – the City of Red Deer.

Don't forget about the Idea Group meetings throughout the province. If you would like to host a meeting or have an Idea Group meeting topic in mind, contact your Idea Group Leader.

Next year will be the 20th annual APWA Equipment Rodeo. Watch for more details as the date gets closer. Don't forget to nominate your community for a Project of the Year award, for any recent projects you are proud of. Details can be found on the APWA Alberta Chapter website (www.publicworks.ca). Please like us on Facebook and Follow us on Twitter.

Peter McDowell

President
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As you can see, the SPWA is endeavouring to bring our members, and others in the public works profession, greater value in educational and networking opportunities.

I hope that you all had a joyous holiday season and that 2017 is offering you good health and prosperity. Winter has been in full swing for a while, with southern Saskatchewan especially receiving healthy doses of snow. We greatly appreciate our public works professionals for all the time they contribute keeping our roads safe, and our residents healthy.

Much has occurred since my last chance to address you. In August 2016, I was very honoured to be elected as the Canadian Public Works Association (CPWA) President at PWX in Minneapolis, Minnesota. I have had many opportunities since then to advocate for CPWA and attend regional events put on by our Chapters, such as:

- The APWA Chapter Conference in Red Deer, Alberta.
- The Mid-Canada Snow Conference in Winnipeg, Manitoba.
- The APWA Strategic Planning and Board of Directors Meeting in Kansas City, Missouri.
- Meetings with the Federation of Canadian Municipalities (FCM), Infrastructure Canada, and senior political staff in the Prime Minister's Office in Ottawa, Ontario.

The Saskatchewan Public Works Association (SPWA) hosted our Fall Landfill and Recycling Workshop in Moose Jaw on October 20, 2016, to a large crowd (see the pictures and list of presenters in What's New on page 25). All the presentation information is posted on our SPWA website.

On our Board, Stewart Schafer has accepted the position of Treasurer and is transitioning in from Dale Petrun, who becomes our President at the next conference.

Speaking of the conference, work is also already well underway on our 58th Annual Conference and PWville, titled "A Climate of Change," scheduled for February 28 to March 2, 2017 in Saskatoon. Your entity should have already received the mail out detailing the event. It will bring



DID YOU KNOW that the SPWA's website has a page dedicated to selling used equipment? If you're looking to buy, visit <http://saskatchewan.cpwa.net>, and if you're looking to sell, send your details to the Chapter Administrator, spwa@sasktel.net.

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together communities, suppliers, educators, consultants and others to share their knowledge and skills at our conference. We are planning education/technical sessions that cover the many disciplines of public works. Networking is also an important component built into the conference. All agenda, sponsorship and registration documents are available on our website. New in this year's conference is the day specifically targeting the needs of community administration staff. Topics planned include risk management, water(s) upset protocol, measuring the total value of your PW investment, and succession planning.

Planning is also taking place on our National Public Works Week Workshop (to be held the third week in May), the Equipment Expo & Golf Tournament (tentatively scheduled for July 14, 2017 in Regina), and the Fall Operator Workshop.

Watch your email for more information on these events. (**Remember that the discounted rate members receive at our combined yearly events pays for the annual cost of membership with SPWA.*)

Please visit our website and see the new page for "Public Works Used Equipment" as a means for you to be able to post your items for sale to others. The entire website is very user friendly, contains information on all our events, and is designed as a virtual one-stop shop for public works. You can also visit us on Twitter @SPWAchapter.

As you can see, the SPWA is endeavouring to bring our members, and others in the public works profession, greater value in educational and networking opportunities. We will also continue to promote professionalism in the public works field, advocate the essential role that public works plays in the quality of life, and promote it as a career choice for the working force of the future.

Visit our Chapter website at <http://saskatchewan.cpwa.net>, or contact our Chapter Administrator, for more information and details about our upcoming SPWA events or how to become an SPWA member.

Andrew Stevenson

President

Saskatchewan Public Works Association

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As my year as Chapter president ends, I will take this opportunity to highlight activities of the Manitoba Chapter of CPWA/APWA and introduce you to our new Chapter President, Neil Gobelle. I would also like to thank Ron Watson, Derek Teperto and Joel Martens for their service on the CPWA Manitoba Chapter Board. This is my final message as President of the Manitoba Chapter—thanks to all the Board members for their support and efforts, and to the members of our Chapter who I have met throughout the last year.

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A Message from the Canadian Public Works Association, Manitoba Chapter

New Chapter President

It is my great pleasure to introduce Neil Gobelle as the 2017 President of the Manitoba Chapter of CPWA/APWA. Neil brings many years of experience with the province of Manitoba Department of Infrastructure and currently is the Manager of the 511 Operations Center. He has been very involved with development and implementation of the MB 511 road information system and projects such as the Road Weather Information Systems (RWIS) and camera implementation across the province. Neil has additional involvement with the RCMP regarding highway closure protocols and represents the Department at the Provincial Emergency Operations Center at MB Emergency Measures Organization when required.

Neil was previously on the Manitoba Chapter Board as a Director and has been on the Organizing Committee for all our recent Snow Conferences. We look forward to working with him this year.

Railway Crossing Seminar

We held a Railway Crossing Seminar on May 11, 2016, in Portage la Prairie, which brought over 50 participants together to learn more about the changes required to crossing information by Transport Canada. The initial reporting was to be submitted by municipalities in late 2016.

Once again, I would like to thank Bruce Kavanagh of Transport Canada, and Mark Reimer of MORR Transportation Consulting, for providing a wealth of information, and Steve Blayney for all his hard work in facilitating the first seminar. Due to the demand for information about this topic, CPWA Manitoba is planning a second session in the near future—watch your email or check the CPWA Manitoba website for more information.

Golf Tournament/Red River CET Bursary

This tournament will be held in late May 2017 (if weather permits). Weather caused us

to endure two postponements in 2016, but we finally had the event on June 30, 2016, and raised an additional \$1,000 for our Red River College bursary fund for CET students. We were able to award three bursaries to deserving Red River students in 2016.

Habitat for Humanity Build

The CPWA Manitoba work day was July 13, 2016, which was a rainy day, but the overcast skies made for comfortable working conditions. We may attempt this again in 2017. Many thanks to Garry Pekrul for organizing the build and to the folks who showed up!

MB Chapter Awards Program

We will be sending out information on our 2017 Chapter project awards program. I encourage public works agencies, small and large, as well as consultants, to take part in this program of recognition. We look forward to giving awards to some great projects!

Mid Canada Snow Conference & Trade Show in Winnipeg

The Manitoba Chapter of the Canadian Public Works Association (CPWA) hosted the 2016 Mid Canada Snow Conference and Trade Show at the Victoria Inn in Winnipeg from October 12-13, 2016. We had over 300 participants at this year's Snow Conference. This is the fourth Snow Conference hosted by the Manitoba Chapter since 2008. Thanks again to our trade show vendors and sponsors for their support!

In 2017, we anticipate a number of Lunch and Learn sessions, the Golf Tournament, a Spring Fling, and other events to be planned.

I hope you will have the opportunity to join us in 2017 at many of these exciting events!

Bill Grabowecky

Past President
Manitoba Chapter



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A Message from the Alberta Municipal Supervisors Association

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If you haven't already heard about this certificate opportunity, I encourage you to visit AMSA's website for more details.

As we kick off another new year, I'm happy to report on AMSA's initiatives over the 12 months. Most recently, our fall convention had a great lineup of presenters—an engaging, educational and memorable convention that members aren't going to forget anytime soon. It was our largest gathering to date with over 120 people in attendance.

Along with the great spring and fall convention and all of the ideas and best practices sharing that occurs, AMSA proudly offered an additional professional development opportunity for its members. In partnership with the University of Alberta, Executive Education, AMSA is hosting a Certificate in Municipal Management and Leadership, a six module program over the course of three years. If you haven't already heard about this certificate opportunity, I encourage you to visit AMSA's website for more details. Last spring, AMSA also hosted a very well attended procurement course in conjunction with convention.

December brought with it significant changes for municipalities, with the *Modernized Municipal Government Act* proclaimed in early December. AMSA executive members will, as I am sure all of you will as well, be reviewing the associated legislation

to determine the impacts on public works operations. We'll continue to endeavour to bring relevant legislative and legal presenters into the conventions to provide members with advice and timely information.

Coming to the spring 2017 convention, AMSA already has a great roster of speakers scheduled, including Todd Hirsch, ATB's chief economist and Doug Griffiths, presenting *13 Ways to Kill Your Community* keynote. Be sure to register online, and before the early bird deadline.

And I want to note that the convention is geared to serve you as members, so if you have any suggestions for topics, presenters or keynote speakers, please do let us know. Send your feedback to AMSA's executive director at cheggart@amsapw.ca.

I would also like to thank our many generous sponsors for a fantastic 2016. Without sponsors, AMSA wouldn't be able to offer two conventions annually to its membership at no additional cost.

I do hope you enjoy what lies ahead in 2017, and you are able to be productive, healthy and happy.

Bill Cade

President

Alberta Municipal Supervisors' Association



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Security for Infrastructure Works and Contract Performance

By Pam Jefcoat and Sonia Sahota, P. Eng.

Local governments (LGs) commonly require developers and other contract parties to post security for subdivision servicing works, to secure the provision of amenities and to secure the performance of other contractual obligations. In any context, careful consideration should be given to what form of security is appropriate, for example, a letter of credit (LOC), a surety bond, guarantee or other alternative.

Each of these instruments is used to achieve the same goal, namely to increase confidence and manage risk between parties. However, each instrument carries nuances that may impact upon its operation and utility, and therefore its appropriateness, in different circumstances.

Letters of Credit

An LOC is an instrument that creates an obligation on the financial institution to pay a designated person (i.e. the beneficiary) a specified sum of money once the beneficiary satisfies the financial institution of certain conditions. Once “demand” has been made, the beneficiary can cash (draw down on) the full value of the LOC, or portions of it, in accordance with the terms and conditions of the LOC.

Importantly, the financial institution is legally obliged to pay the beneficiary once the conditions in the LOC are satisfied, irrespective of any instructions or objections from the contract party. An LOC may, however, add to the overall cost of the transaction, since they normally carry fees and charges. Further, an LOC could be difficult to obtain if the contract party has a poor credit rating.

Surety Bonds

A surety bond is a three-party agreement, where the first party (the “surety”) guarantees the second party (the “principal”) will fulfill its obligations to a third party (the “beneficiary”). The bond is typically provided by the surety for up to a stated amount and is payable in the event the beneficiary incurs a loss because of the principal’s breach.

There are various types of surety bonds to secure payment and performance, including performance bonds, bid bonds, payment bonds and ancillary bonds. Unlike with an LOC, where a surety bond has been issued, the beneficiary must prove that the contract party has breached the contract and caused damage in order to cash the bond. In this scenario, the surety will typically support the principal in defending any claim of breach because they are incentivized to protect

their own financial interest upon receiving a claim.

Further, a bond will rarely guarantee the performance of all of the contract party’s obligations; rather it provides for recovery of financial loss up to the stated amount. If the beneficiary suffers greater damages than the face amount of the bond, the beneficiary’s recourse will be against the principal, not the surety.

Guarantees

A financial institution guarantee requires a financial institution to assume liability in the event that the contract party breaches an obligation under the project contract and is unable to rectify the default itself. As guarantor, the financial institution is technically required to subsume the performance of the contractor’s primary obligation (usually to make a payment). However, in practice, it is more common for the guarantee to be worded so that the beneficiary can rectify the default itself and claim the face value of the guarantee as damages from the financial institution. An alternative form of guarantee is a third party guarantee, for instance, from the parent company of the contracting party.

Third-party guarantees are often easier and less costly to obtain than financial institution guarantees. However, this method of ensuring

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payment is only as good as the contractual promise of the guarantor, the guarantor's creditworthiness and the guarantor's ability to be located when the principal has defaulted on the debt. This latter risk is particularly present when dealing with a complex company group structure where it can be unclear where the group's assets are held.

In the local government context, financial institutions (as opposed to private third parties) are typically used to secure the performance of a party's contractual obligations, since such institutions normally have the credit worthiness to satisfy the security in the event of default. LOCs are often favoured by LGs because of their ease of use and the fact that an LOC can be nearly as good as cash to the beneficiary for the amount on the face of the LOC. From an LG's perspective, a bond may be a less desirable security instrument because, unlike with an LOC, the beneficiary must prove that the contract party has breached the contract and caused damage in order to cash the bond. Bonds are rare in subdivision servicing, but are more commonly used for construction security. Where other forms of security are offered (e.g. a guarantee) local governments will need to review their bylaws to ensure that such alternate forms of security can be accepted. Note also that a contract party's offer of an alternate form of security may be a sign of its inability to secure conventional financing due to its creditworthiness and should be a 'red flag' to further consider.

In conclusion

Finally, regardless of the form of security accepted, LGs in British Columbia should be aware of their statutory obligations in section 19 the *Community Charter*, which governs an LG's use and return of security. In particular, LGs should be aware of s. 19(3) which provides that security may only be used for the purpose for which it was provided and any amount not required for that purpose must be returned to the person who provided it. ▀

Pam Jefcoat and Sonia Sabota are partners at Civic Legal LLP, a British Columbia law firm with expertise in municipal law, land development, construction, procurement and complicated contract matters. Visit www.civiclegal.ca for contact and additional information.

This article is intended for the general information of local governments in British Columbia. If your organization has specific issues or concerns relating to the matters discussed in this article, please consult a legal advisor.

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Upcoming Events

58th Annual SPWA Conference and PWville

A Climate of Change
February 28-March 2, 2017
Saskatoon, Saskatchewan

AMSA's Spring Convention

March 21-22, 2017
Edmonton, Alberta
Register by February 28 to be entered in the early bird draw for an Ipad Mini.

2017 North American Snow Conference

April 23-26, 2017
Des Moines, Iowa

National Public Works Week

May 21-27, 2017

SPWA National Public Works Week Workshop

Third Week of May 2017
(Dates TBD)

Manitoba Chapter, Golf Tournament/Red River CET

Bursary
Late May 2017 – Weather Permitting

SPWA Equipment Expo & Golf Tournament

July 14, 2017
Regina, Saskatchewan

2017 PWX

August 27-30, 2017
Orlando, Florida

The PWABC Annual Technical Conference

September 17-20, 2017
Penticton, British Columbia

20th Annual APWA Equipment Rodeo

September 2017 (Dates TBD)



Attend the AMSA Spring Convention!

March 21-22, 2017
Edmonton, Alberta
Shaw Conference Centre

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Be sure to register by February 28, to be entered into AMSA's early bird draw for an Ipad Mini.

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Focus Areas

Module 1: Overcoming Challenges through Strategy and Leadership (November 2016)

Module 2: Leading Self & Others (March 19-20, 2017)*

Module 3: Strategic Thinking Skills and Guiding Innovation (November 13-14, 2017)

Module 4: Change Management (March 18-19, 2018)*

Module 5: Finance for Municipal Managers (November 18-19, 2018)*

Module 6: Building Engaging Workplaces, and Sustaining Your Leadership Development (March 17-18, 2019)*

**Please note these days are Sundays and Mondays, prior to AMSA conventions.*

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EDMONTON PROGRAM

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Don Howe.



Sheri Praski.

Attendees at the Fall Workshop.

The SPWA held another very successful annual Fall Workshop on October 20, 2016, in Moose Jaw, Saskatchewan. We would like to thank the nearly 60 participants who attended the Landfill & Recycling Workshop. The participants heard very timely and educational presentations from Don Howe (Saskatchewan Ministry of Environment), Joanne Fedyk (Saskatchewan Waste Reduction Council), Colleen Yates (Recycle Saskatchewan), Sheri Praski (Solid Waste Association of North America – Northern Lights Chapter), and Kim Looyenga (Town of Moosomin).

We appreciate the great comments on the variety and depth of the speakers.



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Courses Provided by PWABC

PWABC offers a variety of educational programs available through institutions and organizations in public works. Course topics include management, snow and ice training, risk management, construction inspection, emergency management, asset management, and more! Contact PWABC for more details, or go to www.pwabc.ca/events/education-programs for a full list of programs available.

Participate in an Idea Group

The APWA has four Idea Groups, which meet on a quarterly basis, usually in January, April, June and November, and then at each of the two Annual Conferences (March and October). If you are interested in participating, contact the appropriate director (found at www.publicworks.ca). There is an Idea Group for each of these regions: Northern Alberta, Peace Country, Central Alberta, and Southern Alberta.



Did You Know!

The Manitoba Chapter is the longest serving of the Canadian chapters and has been providing a forum for practitioners since 1955!

SASKATCHEWAN PUBLIC WORKS ASSOCIATION

'A Climate of Change'

SPWA 2017 Annual Conference & PWville
February 28 - March 2, 2017 at the Saskatoon Inn

Tuesday, February 28

8:00 am to 9:30 pm	Delegate registration - Mezzanine
9:30 am to 10:30 am	Infrastructure Asset Management - Ballroom A Joline McFarlane - Operations Programs Coordinator/Water Services/City of Airdrie
10:30 am to 10:45 am	Coffee Break - Mezzanine
10:45 am to 12:00 pm	Communications Strategies for Internal & External Customers - Ballroom A Michelle Pexa - Senior Consultant at Kaio HR Solutions
12:00 pm to 1:00 pm	Lunch - Ballroom A
12:00 pm to 3:00 pm	Supplier registration and booth set up - Ballrooms B & C
1:00 pm to 2:00 pm	Disaster Management Course - Ballroom A TBA
2:00 pm to 3:00 pm	Public Drinking Water Advisories, a Saskatoon Perspective - Ballroom A Terry Enns - City of Saskatoon
3:00 pm to 3:15 pm	Coffee Break - Mezzanine
3:15 pm to 4:15 pm	Automatic Meter Reading: Moving to Monthly Billing - Ballroom A Alex McGregor - Neptune Technology Group
5:00 pm to 9:00 pm	PWville (tradeshow) - Meet & Greet Night - GoPro Draw Drinks and appetizers available

Wednesday, March 1

7:30 am to 8:30 am	Breakfast - Ballroom A
8:30 am to 9:00 am	Opening Ceremony - Ballroom A
9:00 am to 9:30 am	Annual General Meeting - iPad Draw - Ballroom A
9:30 am to 5:00 pm	PWville (tradeshow) open
9:30 am to 10:00 am	Coffee Break - PWville
10:00 am to 11:00 am	Pump Maintenance, Troubleshooting, & Equipment - Ballroom A Rebecca Gatto - Xylem Smart Cities, Smart Lights, Smart Thinking - British Columbia (BC) Room Alfred Stauch - Smart Talk Security
11:00 am to 12:00 pm	UAVs (drones) in Public Works - Ballroom A Cansel Survey Equipment Risk Management - BC Room Blair Bleakney - City of Saskatoon
12:00 pm to 1:00 pm	Lunch - Erin Rodger - Sask 1st Call - Ballroom A
1:00 pm to 2:00 pm	Weather/Climate Change - Ballroom A Jeff O'Discoll - Associate Engineering Trench Shoring - BC Room Mountainview Systems
2:00 pm to 3:00 pm	Tree Management - Ballroom A Sawyer's Tree & Landscapes Recycling Pavement - BC Room Curtis Berthelot - PSI Technologies
3:00 pm to 3:30 pm	Coffee Break - PWville
3:30 pm to 4:30 pm	Municipal Employees' Pension Plan (MEPP) - Ballroom A TBA

Supper on Your Own

7:00 pm to 9:00 pm	Supplier Night and SPWA Awards - PWville (TV and supplier draws)
9:00 PM	Supplier booth take down

Thursday, March 2

7:30 am to 8:30 am	Breakfast - Lombardy
8:30 am to 11:30 am	Water Disinfection Workshop (0.6 CEU) - Ballroom A - ATAP Infrastructure Management Ltd.
8:30 am to 11:30 am	Click, Listen, & Learn - BC Room
10:15 am to 10:30 am	Coffee Break - Mezzanine
11:30 am to 1:15 pm	Lunch - Tiffany Lizée/Climate Change and Weather - Ballroom A
1:15 pm to 4:30 pm	Water Disinfection Workshop (0.6 CEU) continued - Ballroom A - ATAP Infrastructure Management Ltd.
	Road Management Round Table - Tentative
3:00 pm to 3:15 pm	Coffee Break - Mezzanine



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For information on each session topic, refer to the SPWA website: <http://saskatchewan.cpwa.net>



Spotlight on Women in Public Works & Technology

By Joy Chan, Esri Canada



PURSUING HER PASSION FOR CUSTOMER SERVICE

Kristy Brown, City of Prince George

As the asset manager for the City of Prince George in B.C., Kristy Brown is responsible for the city's long-term asset management strategy. She advises all divisions on their capital planning, operations and maintenance decisions related to the city assets they own. While a crystal ball that can foretell future asset conditions may sound useful in her role, Kristy turns to technology to help make decisions based on evidence.

In 2014, Prince George implemented Cityworks, a computerized maintenance management system (CMMS) that enables

the city to take an integrated approach to managing the city's core public infrastructure (water, sewer, drainage and roads). Traditionally, assets were replaced based only on their age. The CMMS uses geographic information system functionality to map the location of the assets, store and manage all information (e.g., purchase date, lifecycle, etc.) associated with each asset and analyze its connection to other assets, so that they can be optimized and asset maintenance and repairs can be prioritized and completed cost-effectively. With Cityworks, the city can now group assets by location, type, age and other key parameters to better plan maintenance activities, such as preventive maintenance, repairs, tests or inspections.

Kristy and her team have embarked on several projects to get the most out of the CMMS. They created and implemented mobile applications for Cityworks Service Requests, Work Orders and Inspections, which their field staff have been using since last summer. These apps run on tablets and smartphones, and enable real-time data updates into the CMMS. All these projects will lead to better customer service, which is what attracted Kristy to the public works field in the first place.

She initially began her career in forestry technology. After seven years, she decided to go back to school and take up civil engineering. "I chose public works because I wanted to be closer to the community and provide services to customers," noted Kristy.

In 2006, she received her diploma in engineering design technology and became a Certified Civil Engineering Technician (CTech). Kristy joined the City of Prince George's Utilities Division as an engineering assistant. There, she honed her skills in capital project management and water/wastewater network design.

Kristy was promoted to supervisor in 2011 and managed what she considers one of her greatest achievements: the city's biomass-based district energy system. From concept to completion, she was involved throughout the process and worked closely with the consulting firm hired to construct the \$15-million project. The system, which uses wood fibre burned at a local sawmill to provide clean, renewable energy to buildings in downtown Prince George, is not very common in B.C. She also supervised and mentored 35 staff members who were involved in the day-to-day operations and maintenance of the city's water and sewer networks.

On building a successful career in public works and technology, Kristy says she brings a unique perspective to the male-dominated industry: "Women tend to be good at showing empathy, which is valuable when you're leading a team in implementing several projects. We also feel comfortable asking for advice on things, such as which mobile technologies and apps work best for managing work orders and inspections. This makes collaborating with others easier so that we can come up with the best solution for the city's needs."



BUILDING SMARTER COMMUNITIES

Karen Stewart, Esri Canada

For more than 30 years, Karen Stewart has helped municipalities across Canada operate more efficiently through the use of geographic information systems or GIS. She has seen the system evolve with each advance in computer and telecommunications technology—from plotters to mainframes to desktop computers

to tablets and smartphones—and enable rapid enterprise mapping and analysis that bring valuable spatial intelligence to public works.

Karen initially did not set out to build a career in GIS. She took up marketing and graphics design in university and used her knowledge of computer-aided design (CAD), as well as her working experience at a surveying company, to land a mapping technician position at Hydro Gas (now FortisBC) in the early '80s. She converted legal survey plans to a digital mapping system by manually drafting the utility's cadastral base in connected strips on plotter paper and then digitizing them into the system.

One of the things her team mapped were vehicular accidents that occurred close to utility poles and other assets, which may cause damage to the network. It was after she got into a serious motorcycle accident that Karen realized they could have analyzed the accidents to identify areas in the province that had a high risk of collisions, with the goal of reducing those types of accidents.

The experience motivated Karen to return to school and specialize in geomatics.

Her hard work, focus and determination paid off as she enjoyed a successful career in the public sector for nearly three decades.

After working her way up to shift supervisor at Hydro Gas, Karen moved to the City of Surrey. She was involved in entering cadastral data into the city's digital mapping system and creating the pioneering City of Surrey Mapping Online System (COSMOS), which allowed staff across departments to easily track public works projects, conduct analyses and access base-maps on which to plot their data.

Another notable achievement is the development of the Digital Plan Submissions system, which increased the speed of entering CAD-based legal survey plans into the city's GIS by 60 per cent in 2002. The survey plans are used to support capital planning for engineering; parks, recreation and culture; and civic facilities.

To share her knowledge with other municipalities, Karen has published several papers and delivered numerous presentations on moving CAD drawings to GIS, which have helped

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many to effectively bridge the gap between engineering and GIS. In 1997, she became the first woman to hold the GIS Manager position in the city and in Lower Mainland B.C.

When asked what women bring to the public works and technology industries, Karen replied: "Women are usually compassionate and understanding of the needs of others; these are traits I draw upon when designing a technology solution for my customers. Women also look at things from a broader perspective. Instead of applying GIS in a single department, I look at the big picture and see how the technology can be used across the municipality so that everyone can benefit from it."

After 20 years with the City of Surrey, Karen brought her expertise to the Township of Langley, where she formed the Geomatics Department. She led the development of GeoSource, a web-based GIS mapping system that provides staff and the public with efficient access to the Township's maps, land data and aerial photography. As the Township expects its population to double over the next 30 years, GeoSource provides

effective decision support for designing a sustainable community.

Inspired to help even more municipalities benefit from GIS, Karen joined Esri Canada, the country's largest GIS solutions provider, in 2007 as public works industry manager. Having used Esri technology throughout her career in the public sector, Karen attests to the advantages of using GIS to organize municipalities' location-based data into a centralized system so that all stakeholders can access a single source of consistent and accurate information.

The implementation of PS3150 regulations on Tangible Capital Asset Reporting by the Public Sector Accounting Board in 2009 further highlighted the power of the system in tracking municipal assets and managing all information related to each asset. Since GIS easily integrates with other business systems including financial, customer relationship management and enterprise resource planning systems, it provides decision-makers with a holistic view of assets and a more informed basis for capital planning.

In 2013, Karen became Esri Canada's Municipal Solutions Industry Manager. With the introduction of cloud and mobile technologies, she focuses on helping municipalities leverage these platforms to operate smarter and increase productivity through better coordination of work between office and field staff. As well, she encourages municipalities to adopt cloud GIS, which features many applications that can inform and engage citizens in government projects and increase transparency.

Karen continues to share her expertise with the public works industry as the Secretary and Treasurer of the PWABC Board of Directors. She also serves as chapter liaison for the Urban and Regional Information Systems Association (URISA) in B.C. On her enduring success, Karen credits her ability to predict technologies and trends that will make a significant difference in the future—a talent she has proven when she chose a career in GIS. ▀

Joy Chan is Public Relations Specialist for Esri Canada.

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The North 43 Lagoon Commission: Challenges and Successes

By Joe Duplessie, Lac Ste. Anne County

For many years, Lac Ste. Anne County, located northwest of Edmonton, has recognized the need to move toward the consolidation and regionalization of individual wastewater systems along its abundant lakes into larger regional networks. Regional systems assist with environmental concerns, and help participating municipalities mitigate growing concerns about the financial viability of a wastewater system.

Comprised of the County and three Summer Villages bordering Lac Ste. Anne, the North 43 Lagoon Commission recognized the growing need for a wastewater lagoon in the immediate area 16 years ago. Because of this need, a lagoon was constructed in the fall of 2003. Very shortly thereafter, Commission members also began to see the impact of many of the individual sewer systems along the lake. With numerous systems outdated and in poor repair, a regional system required consideration.

The design challenges of this project were enormous. First, the Commission needed to plan for a system with sufficient capacity to service the ultimate population growth of the development area identified, including county residents, three summer villages, one condominium association, several subdivisions, one hamlet and a 300-stall campground. Additionally, the plan needed to consider the "best" route along the populated corridor, cross the Sturgeon River, cross a major

highway and rail line, and service a summer village that had only a causeway into the island for service. The identified area covered approximately 1,247 acres with 511 developed acres and 736 acres undeveloped.

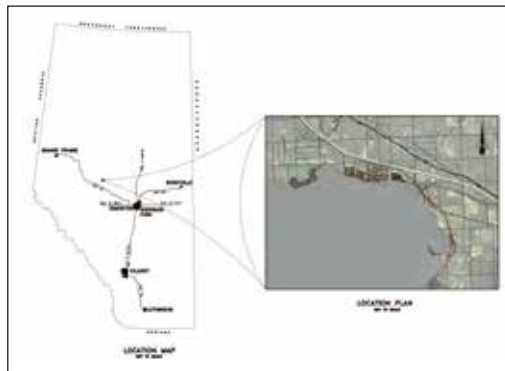
Taking these variables into consideration, the Commission decided to proceed with a low pressure septic tank effluent pump system to reduce construction costs, eliminate infiltration and leaks, and protect ground water from contamination by keeping sewage in the pipe.

After submission for the project through the *Water for Life* program, funding was approved in mid-2011 for \$4.4 million dollars. The overarching project objective was to ensure sewage was safely collected from the inhabited area and conveyed to the lagoon to mitigate water pollution, and to protect public health and aquatic life. The Commission began to strategize what the highest amount of percentage costs would be covered by the grant, which would in turn result in the lowest amount of cost to the consumer. The first step in the process was a requirement to identify what systems were currently in place.

In the summer of 2012, 750 private sewage systems were inspected. These inspections encompassed three categories: existing two-compartment holding tanks; existing one-compartment holding tanks; and unsatisfactory tanks/systems. At that time, 25

per cent of the systems failed, and many others required upgrading to tie in to the forcemain once it was constructed. By early 2013, all private systems had been inspected, the campground requirements were converted into equivalent dwelling units, and the project was divided into four components: the pump station; the transmission line; lateral lines; and services to property line.

In December 2013, the project was taken to the respective Municipal Councils for review. In May of 2014, an information package was prepared for the public outlining the preliminary design report, which included the criteria and pipeline capacity, conceptual plans, system modeling and cost estimating. Public meetings began in June of 2014. Following these meetings, a petition was received from one summer village indicating that they were reconsidering participation in the project (by October, the Commission received an official withdrawal). During this time, the Commission also investigated corporate ownership and governance structure per statutes and







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regulations, and how this structure would apply to the services provided by—and derived through—the Commission-owned and operated facilities and the application to each municipal member receiving the waste water services from the Commission.

In 2015, the Commission continued progression of the project with land acquisition agreements; surveys; highway, utility and rail crossing agreements; technical meetings; public information meetings; and pre-qualification requirements for construction contract bidders. When the construction contract was finalized in early 2016, 10 contractors pre-qualified and ultimately seven bids were received. Also during this time, Lakeview Manor (a 33-unit facility under the umbrella of the Alberta Social Housing Corporation located in the service area) requested participation in the wastewater line project.

In April 2016, the construction tender was awarded with construction beginning that spring. At the time of writing (November 2016), construction continues with an anticipated operational system to be in place in the spring of 2017.

This project has certainly not been without challenges, and has taken many years of careful planning. Regional systems are never a one-size-fits-all approach, and many road blocks have impeded progress in bringing this project to fruition. Smaller communities often have difficulty funding infrastructure of this scale given the large distances the infrastructure must cover, combined with low population densities. Additionally, smaller municipalities are often concerned with a loss of autonomy and control, and as such are not readily convinced that regional systems are any more efficient than standalone systems.

There is a clear need for increased infrastructure funding for these types of regional systems. Perhaps more importantly, the need also exists to educate the public on wastewater (and water) issues. Increased public awareness would certainly assist municipalities implement scalable, sustainable water manageable solutions that invariably result in unpopular changes in utility cost. ▀

Joe Duplessie is the General Manager of Infrastructure & Planning, North 43 Lagoon Commission Manager, for Lac Ste. Anne County, Alberta.

The advertisement for RPM TECH features a large background image of a yellow snow blower clearing a path through deep snow. In the foreground, a blue snow blower is also shown clearing snow. The text is overlaid on the right side of the image. At the top, the RPM TECH logo is displayed in black and red, followed by the slogan 'We have the equipment you need to get the job done!' in red. Below this, four bullet points list the company's offerings: 'Selection of snow blower models for loaders and backhoes', 'Snow removal capacities from 1300 to 5000 tons per hour', 'Heavy-duty construction', and 'Fast delivery'. At the bottom, there is a section titled 'Contact Your Local Dealer' with contact information for BC, AB, SK and MB, including logos for Industrial Machine Inc. and Hitrac, and their respective phone numbers. The website 'www.rpmtechgroup.com' and the toll-free number '1.800.631.9297' are prominently displayed at the very bottom.

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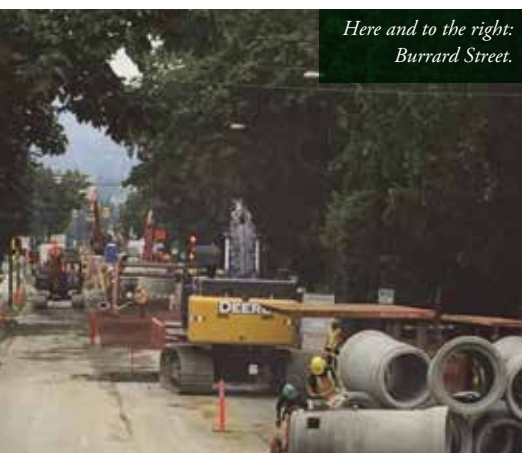
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The City of Vancouver's Engineering Department Completes Two Major Public Works Projects in 2016



*Here and to the right:
Burrard Street.*



*Here and to the right:
South West Marine Drive.*



By Jasvinder Hothi, City of Vancouver

The City of Vancouver's Engineering Department is one of the most unique construction public sector organizations in North America, completing several large infrastructure projects annually. With expertise from an internal design/build team that facilitates all design and project management relating to city infrastructure, the City of Vancouver mimics some of the largest design/build construction firms in western North America.

In 2016, the Engineering Department completed two large scale integrated projects; Burrard Street South Improvements and South West Marine Drive Upgrades. All project planning, design and construction was conducted by City staff utilizing internal resources.

Burrard Street South Improvements

The Burrard Street South Improvements Project was an integrated multi-branch project involving Sewers Design & Operations, Water Design & Operations, Transportation, and Streets, Traffic & Electrical.

The project brought city assets up to current standards and helped to mitigate any associated risks on the corridor. In the long-run, sewer separation will minimize treatment costs and better protect the environment and public health. Repaving the road improved riding quality, eliminated

the potential for skidding and improved safety for vehicles, pedestrians and cyclists. The increased capacity of this infrastructure will also accommodate future developments in the Burrard Street corridor.

New sewer main construction was completed between 5th Avenue and 16th Avenue along Burrard Street. City crews replaced a combined sewer system dating back to 1910/1912. The new separated system consists of storm mains ranging from 900 mm to 1,500 mm, and sanitary mains ranging from 200 mm to 575 mm. Along with large pipe diameters, depths of excavation ranged from 12' to 18' feet to invert.

There were several highlights to the project, including the installation of a 10' foot diameter prefabricated manhole chamber. The newly separated sewer system will reduce flooding, increase system capacity and add to one per cent of the City of Vancouver's sewer separation target, as mandated by the Integrated Liquid Waste Resource Management Plan (ILWMP). A portion of the project crossing West Broadway was completed by trenchless construction. See the Tech Talk article on page 44.

Water main construction was a key component of this project. Construction took place from 1st Avenue to West Broadway. The water main dated back to 1932 and was at the end of its life cycle. The scope of work included the installation of approximately

900 m of new 200 mm restrained joint ductile iron cement-lined water main, six hydrants and several gate valves. As with the sewer main upgrades, the new 200 mm water main improved the life of the asset and increased the capacity in water infrastructure for this corridor.

Street improvements and restoration work was also a major component of the work on Burrard Street. Due to poor pavement conditions along Burrard Street, the scope of work for Street Operations was significant. Work consisted of 2" grind and overlay of Burrard Street from Cornwall to 17th Avenue, and deeper grind in spot locations. This was 25,000 m² of asphalt paving with all asphalt supplied by the City of Vancouver's aggregate facility.

Project scope included modification, replacement and upgrading of curbs and ramps along Burrard Street (1,00 LM); replacement of sidewalk panels (3,000 m²); and reapplication of line markings and paint along Cornwall to 17th Avenue. There were also several transportation upgrades, including traffic calming diverters, geometric upgrades and improvements, traffic signal modifications, street lighting upgrades and communication upgrades (fiber) along the corridor.

South West Marine Drive Upgrades

The South West Marine Drive (SWMD) upgrades were a major infrastructure

improvement project for the City of Vancouver in 2016. SWMD forms part of Vancouver's major road network, which consists of roads across the Lower Mainland that facilitate the efficient movement of goods and people, and connect the provincial highway system with local streets.

To execute the project, city resources were required to close down SWMD from Granville Street to Crown Street, a stretch of 5.7 km. From Granville Street to W49th Avenue, construction consisted of significant road improvements, and from W49th Avenue to Crown Street, work consisted of major sewers infrastructure upgrades and separation.

Sewers Design identified the section between W49th Avenue and Crown Street as a candidate for separation into a storm and sanitary system, in support of the City of Vancouver's goal of a separated system by 2050 as set forth in the ILWMP. The previous sewer main infrastructure in this portion consisted of a single main that was between 70 to 100 years old.

Sewer Operations constructed and installed storm mains between 900 mm to 1,500 mm and sanitary mains ranging from 200 mm to 375 mm. Crews worked safely and diligently while excavating at depths between 14' to 18' feet. The project presented challenging ground conditions that required the use of several types of shoring, such as slide rail systems, timber shoring and metal trench shields with large steel plates. Along with sewer main construction, approximately 50 catch basin locations were identified for relocation and/or installation.

Streets, Traffic & Electrical Operations (STEOB) worked from Granville Street to Macdonald Street along SWMD. Construction included substantial upgrades to widen the road on both the north and south side to accommodate two dedicated bike lanes, improving safety for cyclists and road conditions. The scope of work covered 10,000 m² of roadway and included a 2" grind and overlay of the entire roadway (40,000 m²); concrete work to replace and upgrade sidewalks, curbs and gutters; geometric upgrades; and new line paint and

signage. Again, all aggregate and asphalt was supplied by the City of Vancouver's aggregate facility.

Summary

As the City of Vancouver moves forward with infrastructure upgrades, the city's design/build team will continue to work within the project management framework to limit construction impacts to the public and all stakeholders, and to

ensure cost efficiencies. Having completed all work in-house, the city has demonstrated remarkable strength in teamwork, highlighting the dedicated staff involved in delivering large-scale construction projects. ▮

Jasvinder Singh Hothi is Superintendent I – Construction, Sewer Operations, City of Vancouver. Get in touch at jasvinder.hothi@vancouver.ca.



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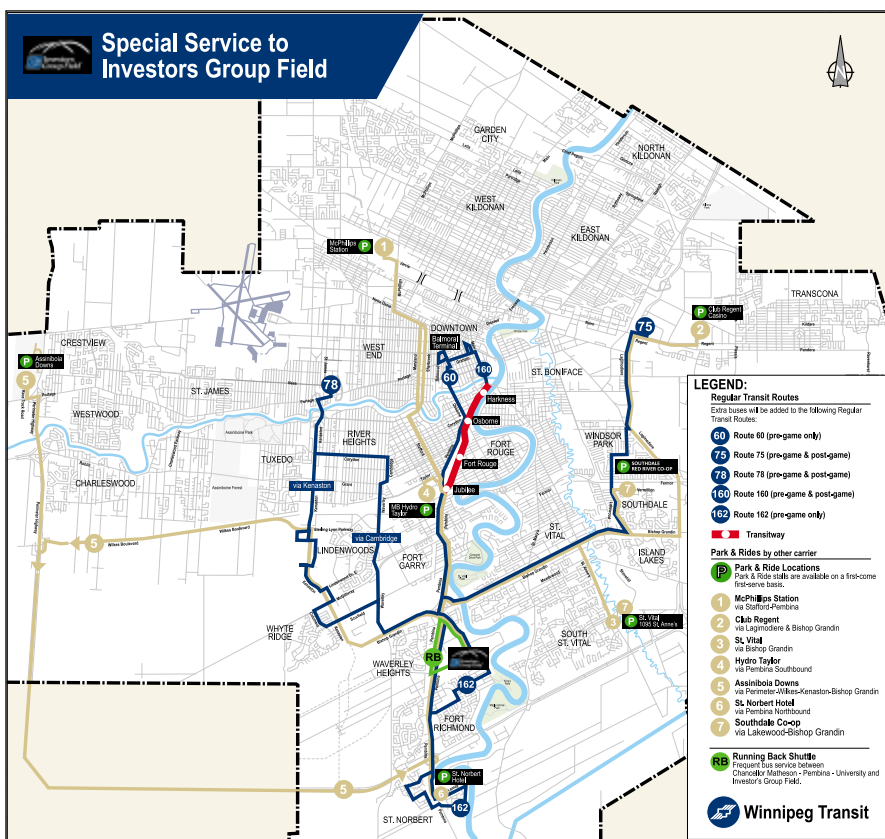
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The Tim Hortons Heritage Classic Warmed up Winnipeg in 2016



Much more than simply dragging a garden hose to the back and flooding the yard, constructing an NHL-calibre ice rink in a football stadium can be an extremely arduous undertaking. In order to make 2016 Tim Hortons NHL Heritage Classic happen for the roughly 30,000 fans in Winnipeg making their way to the Blue Bomber's Investors Group Field, the NHL uses extremely specialized equipment and technologies to create an outdoor hockey rink that was fit for the very best players in the world.

The NHL utilizes a one-of-a-kind 16-metre, 275-tonne capacity mobile refrigeration unit and rink system that was developed in-house to remove the heat from an ice surface and stabilize the temperature at an ideal -5.5 degrees Celsius. To accomplish this, the refrigeration unit pumped more

A pre-Heritage Classic bus lane was established 90 minutes before each game to ensure unhindered access for Transit.

A Winning Partnership

All special events held at IGF, which expect 15,000 plus in attendance, trigger the implementation of the transit and traffic mitigation strategies outlined in the Integrated Transportation Plan (ITP). This plan calls for a 30 per cent transit modal split on event days.

The ITP outlines that an Event Day Management Plan be developed by IGF management, and that Winnipeg Transit be responsible for developing the specialized transit service component and providing support toward implementation of each Event Day Management Plan.

In addition, bus services provided under the ITP to Investors Group Stadium by Winnipeg Transit are done so on a cost recovery basis from each special event.

than 11,000 litres of glycol coolant directly into custom-made aluminum trays configured to the specifics of Investors Group Field (IGF).

Water was then sprayed as a fine mist hundreds and hundreds of times over the rink, providing an even freeze and a high-quality playing surface for the game. As a finishing touch, the ice surface was whitened with over 1,300 litres of water-soluble paint before the lines and team logos were applied and covered with yet another layer of clear ice.

Monitoring the completed ice surface is 24-hour job, managed by the NHL's high-tech 'Eye on the Ice' system that measures ice conditions, signaling an alert to automatically pump additional glycol or engage an in-line heating system in case of the weather getting too cold; which turned out to not be an issue for the unseasonably warm temperatures of Winnipeg last October.

"We deal with the different elements—from sun, to snow, to rain and sleet—and we've learned to cope with all of them over the last several years," says Mike Craig, NHL Senior Manager of Facilities Operations. "But we had some awesome fall weather in Winnipeg, which made it nice for the build-out, the ice making, and for the fans. I think that everyone that came to the stadium really enjoyed the game and their experience."

Winnipeg is quickly becoming a destination of choice for future large-scale events—such as the upcoming 2017 Canada Summer Games—and an occasion such as the Heritage Classic is able to offer valuable lessons for Winnipeg Transit; now and into the future.

Continued on next page.

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Winnipeg Transit invested a significant amount of resources into creating its Game Day Event Management plan, which assumed a 30 per cent mode split for Transit and specified a level of service to meet that demand. During the two-day Heritage Classic, ridership levels met and even exceeded this 30 per cent mode split, with nearly 10,000 people going to and from IGF on each day of the event.

"We basically ensured that there were roughly 70 Transit buses and Bus Operators, up to 100 school buses and drivers available for game day, special "Park & Ride Super Express" service, and 20 Winnipeg Transit inspectors to provide game day, on-site supervision of the special bus service system," says Alex Regiec, Operations Planner for Winnipeg Transit.

Two additional buses were also designated to run on what is referred to by Winnipeg Transit during the football season as a "Running Back Shuttle"; a clock-wise circular route that runs around the Investors Group Field neighbourhood to shuttle passengers from nearby parking lots to the stadium gates.

As is done for regular Winnipeg Blue Bomber game days, a pre-Heritage Classic bus lane was established 90 minutes before each game to ensure unhindered access by the close-to 200 Transit and school buses providing the special event service. In addition, a "Use of Street" permit was taken out by IGF stadium management to create what was called a "transit terminal" where the transit vehicles could be lined up by route for departure.

Pedestrian safety at the Heritage Classic was a coordinated effort between the Winnipeg Police Service, Transit Inspectors, and the IGF stadium volunteer corps who worked together on-site to make sure that the crowd exiting the stadium were safely managed and could safely access buses or parking lots.

"Maintaining an open line of communication with key contacts among all our stakeholders—both in the planning stage and during the actual event—was critical for expedient problem solving and our service delivery effectiveness," says Regiec.

Rebuilding Infrastructure: Investing in Moose Jaw's Future

By Carol Reynolds-Wittman, Pro. Dir., City of Moose Jaw

As Saskatchewan's fourth largest city, with a population of approximately 36,000, Moose Jaw's potable water distribution system contains 80 km of cast iron water mains, some of which are up to 110 years old. The cast iron water mains account for one-third of the city's water system.

Up until the 1960s, cast iron was the infrastructure material of choice for delivery of water municipally. Over time and without appropriate action, the problem of cast iron water main pipe corrosion and deterioration has increased, and now threatens the safety and security of Moose Jaw's water delivery system. In 2014, the city spent more than \$2 million dollars on unplanned cast iron water main repairs.

2016 was the first year of a 20-year water infrastructure upgrading program that is addressing this backlog of failing pipes, to create a sustainable water distribution system. The City's Cast Iron Water Main Replacement Project involves work on two established systems: the feeder lines that deliver the main water flow; and the second, for distribution and connection lines, which assists individual properties. Both property owners and the City of Moose Jaw have benefitted from these improvements in Phase 1 of the program, which was completed in November 2016. Advantages of the project include improved service quality for properties, and fewer water main breaks and utility and traffic disruptions, resulting in a cost savings to taxpayers.

In Phase 1 of the program, Moose Jaw City Council approved rehabilitation of adjacent roadways, sidewalks, storm sewers, intersections and hydrants as part of the funding model chosen for the program. Phase 2 is scheduled to proceed in the spring of 2017 and Council will decide on a revised funding model for this and subsequent phases. While there has been some community disagreement on the funding model used for this important program, no-one disputes that the water mains need to be replaced for safety and security purposes.

Through this program, the city is not only looking at the water main replacement from an infrastructure point of view, but also as

improved water quality. Iron pipes can add colour, taste and odour to the water.

Regulations on lead are also being reviewed in North America and it is expected that more stringent policies will soon follow suit. As such, Moose Jaw is planning a stronger educational program for subsequent phases of the replacement program, which will strongly advise residents to replace their lead lines and to have their water tested. Water quality and health issues can arise when water comes in contact with service connections containing lead. In addition, lead in the household plumbing systems or in solder joints (lead solder in plumbing or brass faucet fittings) can also lead to elevated lead tests, even despite having service connections replaced.

The city is working closely with local regulators, including the Water Security Agency and Five Hills Regional Health



Authority, to provide important health and safety information to residents.

Through this 20-year plan, the City of Moose Jaw is addressing replacement of this vital infrastructure and is improving the safety, security, and water quality of its potable water distribution system for residents. ▀

Carol Reynolds-Wittman, Pro. Dir., is the Communications Manager for the City of Moose Jaw.

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Town of Rosthern, Infrastructure and Investment

By Nicole Lerat, Town of Rosthern

Rosthern, Saskatchewan, is strategically located halfway between the major cities of Saskatoon and Prince Albert. It is a progressive, welcoming Town with rich cultural diversity and many recreational activities. The town is a dynamic and vibrant community interested in economic growth and investment opportunities.

Asset Management has become a huge focus for the town. In the last 12 years, a number of town owned buildings have been replaced. These include the outdoor swimming pool, a four-bay fire hall with training room, the town office, a dog pound, and most recently, a 16,000 square foot public works building.

Both council and staff are extremely pleased with the new public works building. In floor heat, a proper exhaust system, a welding fume hood, storage in the mezzanine for water meters and parts, pipe racking, work benches, personal lockers, a huge office space, coffee/meeting room, eye wash station, and a wash-room with a shower, are just some of the features of this building. The parks' equipment, the transit bus and bylaw enforcement truck are also housed here. The shop has ultimately become a central focus for all employees, and a venue for staff get-togethers, including the odd fish fry. It has created positive attitudes and an enjoyable workplace for staff.

Buildings are just the tip of the iceberg for replacing assets. Current capital projects include replacement of the ice plant for the arena and curling rink, and a huge project adding a new sewage lift station and sewer force main to the lagoon. A recent water audit showed how little water storage we have, so the next big project that the town will have to plan for will be upgrades or a replacement at the water treatment plant. And we haven't even touched on our roads yet!

Like many other municipalities, upgrades or replacement of capital assets were not always considered, and now replacement



of these assets is critical and needing to be addressed all at once. The town is gathering information on its water aquifer and is creating a development standards document in order to plan better for the future.

Another asset that council realizes they have is their employees. There has been a higher turnover of staff members, whether they are retiring or moving on to other opportunities. This makes one realize how important it is to have good staff in the workplace and, like the other assets, you need to invest in them. The town has become very competitive with wages and ensures training is available when needed.

The changeover in employees, in particular management, also makes one realize the importance of having written policies and procedures, updated inventory of assets, current maps, and other things like checklists for day-to-day operations. This saves much time and money, and is invaluable.

Parks, green space and walking trails are another area that the Town of Rosthern prides itself on. Some people may think this is a waste of resources but it has proven to be an investment in our town. So many people who have relocated here say that one of the reasons they picked Rosthern is because it is a clean, pretty town, and you can tell the people here take pride in it.

There are over 100 businesses in Rosthern, including storefront and

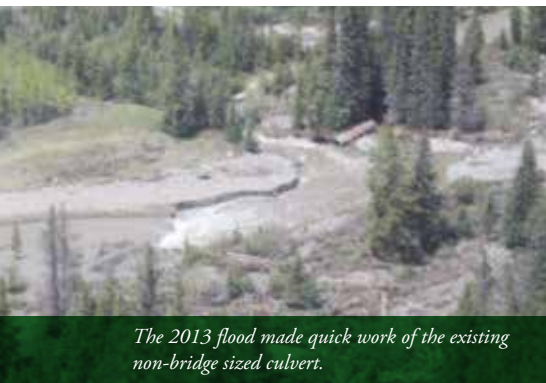
home-based businesses. The town is a part of the Saskatoon Regional Economic Development Authority and is always looking for industry or businesses that would be a good fit for the community.

The town is also one of nine municipalities that form the Twin Rivers District. This group has adopted a regional land use plan and shares a number of services, such as by-law enforcement, vehicle extrication services and a household hazardous waste pick-up. Phase one of a waste management study has been completed, with the ultimate goal of a regional waste site. Currently, the Twin Rivers District is working diligently on a new hospital for the area.

The Town of Rosthern is a beautiful, diverse and progressive community, which offers a wide array of services to the community and the region. Not unlike most municipalities, Rosthern is experiencing difficulties balancing the high costs of operations while offering citizens a high level of service throughout its municipal recreational facilities, roadways, utilities and safety services. The town recognizes that improvement is necessary in certain areas, and it will take continuous strategic planning, and proper asset management to meet the needs the town is presented with. ▀

Nicole Lerat is the Chief Administrative Officer for the Town of Rosthern.

Open Sesame: Are We Ignoring a Great Alternative to Bridges?



The 2013 flood made quick work of the existing non-bridge sized culvert.



The structural ribs were installed above the corrugated aluminum structure, allowing for a greater span.



The finished product is economical and very aesthetically pleasing.

By Bernie Roseke, P.Eng, PMP, Roseke Engineering Ltd.

Watercourse crossings are often seen by municipalities and their engineers as “bridge vs. culvert.” Because of this, several less traditional types of structures are often overlooked that could provide a cheaper way to move traffic over a watercourse. Take open bottom culverts, for example. Although seen as a niche product that is only viable when fish habitat requires it, perhaps there is an opportunity for greater utilization of the limited resources in County bridge replacement budgets. A case in point: The Etherington Creek Campground access road in the Kananaskis Country, Alberta.

During the 2013 floods, the existing 1,200 mm diameter corrugated steel pipe (CSP) was washed out and ended up in the downstream trees. This was not the only time it had been

washed out, and it was clear to Alberta Parks that a replacement bridge or bridge-sized culvert was necessary at the site. The existing culvert was re-installed as a temporary solution. The replacement, a 7,301 mm x 1,743 mm corrugated aluminum structural plate culvert was manufactured by Canada Culvert and Roseke Engineering was the project engineer.

Structurally, the dimensions of the open bottom culvert were beyond the limits of stability, that is, the structure was too wide and too flat to handle standard highway loading. However, the manufacturer designed steel “ribs” that spanned each corrugation and effectively converted the structure from flexible to rigid. Because of this, it is safe to say that these “aluminum box” structures can be designed to any size and shape, and can be a viable alternative virtually anywhere that a bridge is being considered.

Due to the high bedrock a bridge-sized CSP was not advisable. The significant fish presence also necessitated a structure that didn’t have an invert. The height of the road above the streambed was low, thus the only feasible option using traditional engineering considerations was a bridge. However, the installation of an open bottom culvert was investigated, and since the costs were similar to a bridge it was eventually chosen as the preferred alternative by Alberta Parks.

Environmental Issues

In the Kananaskis country, every construction site is under a tremendous amount of scrutiny when it comes to the environment. In fact, on numerous occasions members of the public would arrive, look around within the construction site, and ask questions about how the environment was being



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handled (trees, fish, etc.). Thus, it was clear that even the smallest environmental oversights could turn political very quickly. Since the minister of Environment & Parks is mandated to respond to every inquiry the public makes about the environment, some weeks this consumed most of the project sponsor's time.

The initial fish habitat assessment observed approximately 50 fish over a two hour period (without electrofishing), including bull trout, a provincially threatened species. Therefore, full time turbidity monitoring was necessary during construction. A fish was even observed within the isolation berms during construction in an area that had never had any connectivity with the stream.

The site isolation system had to be changed twice, each time resulting in a spike in turbidity. Although this is normal at any bridge or culvert construction site, in this case the work was forced to stop, and the fish biologist had to submit a report to Alberta Environment & Parks (the regulatory division). However, each time the work was able

to continue the following morning as the turbidity had subsided to acceptable levels.

In addition, the cast in place concrete foundations had to be sealed to contain the materials within the concrete, which are toxic to fish and leach through the soil and into the stream channel.

An Alternative to Bridges

Although fish-related considerations were high at Etherington Creek, in hindsight we cannot help but notice that this structure would have been a viable alternative to a bridge even if the fish presence was minimal.

The tendered price of the aluminum box structure was roughly about 25 per cent lower than an equivalent bridge. If the structural ribs weren't necessary it would have been even cheaper. But because of the ability to place I-shaped ribs on the structure's corrugations, effectively converting the structure from flexible to rigid, the aluminum open bottom box culvert is an option at almost any site where a bridge is being considered.

The aluminum structure is significantly more corrosion resistant than steel, and a 75 year life span can be assumed, equivalent to a bridge.

The cast in place concrete footings are covered with clay and riprap, ensuring that undermining would only occur in a flood of a magnitude that would inflict significant damage to a bridge as well.

Municipalities would be well served to investigate aluminum box culvert at most sites where bridges are normally built. We hope the lessons of Etherington Creek will result in an expansion of the knowledge of bridge replacement options and an overall increase in the effective use of limited funds for bridge replacement by municipalities. ▀

Bernie Roseke, P.Eng, PMP, is the founder and president of Roseke Engineering Ltd., based in Lethbridge, Alberta. He specializes in rural bridges, culverts, and drainage structures. He has designed every type of rural bridge structure, including CSP, structural plate CSP, open bottom culverts, horizontally ellipsed CSP, concrete pipe, concrete boxes, and single and multiple span bridges.

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Innovative Applications of Automated Video Analysis and UAVs Improve Road Safety Investigation

VCA using UAV video footage



A motion prediction algorithm and time to collision.



A UAV pilot and drone in background.



By Mark Hearson, Fireseeds North Infrastructure

Road safety analysis has traditionally relied upon historical collision data, however the use of this data often presents many challenges. Fatalities and injuries from collisions are a direct outcome measure of road safety, and for that reason, one of the best indicators to use in monitoring and evaluating safety performance. However, depending on the type of analysis and the road facilities being analyzed, there may be too few collisions to draw safety conclusions from and/or the data may be statistically insignificant.

Data reliability and underreporting of collisions, both common challenges for most Canadian jurisdictions, further constrain the ability to make safety conclusions and implement treatments. Additionally, observed collisions are a reactive road safety measure, meaning that road safety interventions and

decisions can only be made after collisions occur. Performing road safety analysis on new road facilities is particularly challenging in the absence of historical collision data. Organizational reliance on historical collision data may cause timely delays when road users may be at heightened risk.

Both audits and reviews enable a jurisdiction to assess new facilities in light of safety concerns, such as those expressed by the general public. Preliminary design, functional design, detailed design and post-construction/pre-opening road safety audits reduce the risk of safety issues present at a new road facility; following Transportation Association of Canada (TAC) guidance on these audits is considered best practice in Canada. TAC also provides guidance on the methodology for performing in-service road safety reviews, which seek to identify safety issues and corresponding treatments on existing in-service

road facilities. However, the lack of collision data may still play a major role in limiting the audit/review team's analysis.

Serious conflicts (or near misses) complement or offer an alternative to collisions when evaluating safety performance. Considered safety surrogates, conflicts occur more frequently than collisions and therefore conflict data is less likely to be statistically insignificant. However, conflicts are not reported, observed, or analyzed to the same degree as collisions. Similarly, there is inherent subjectivity when analyzing safety surrogates (e.g. near misses, deceleration rates, and speed differentials) with data collected through on-site observation or manual review of video, particularly when assessing the severity of a conflict. Manual observation can also be consuming and tedious.

The use of artificial intelligence (AI) and machine learning enables automated conflict

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analysis, saving time and increasing accuracy. Computer-aided video conflict analysis broadens the scope of possible conflict types to be considered; analyzing video data of road facilities for conflicts presents an unprecedented opportunity to harness more data that will provide insight into possible conflict situations and make it easier to suggest effective treatment strategies. For new road facilities with potential safety issues, video conflict analysis may help identify safety issues at the site, leading to effective treatment selection and reduced probabilities of fatal and injury collisions. If specific conflict scenarios are over-represented at a site or when compared to the network average, treatments may be tailored to reduce the over-represented conflict.

Some conflict scenarios to consider include rear end, right angle, side swipe, and pedestrian-related conflicts. The severity of these conflicts are measured using safety indicators, such as collision course angle, velocity angle, distance/proximity, speed differential, collision probability, time to

collision (TTC), and gap time (also referred to as post encroachment time or PET). A number of time-based indicators such as TTC are obtained by predicting the future position of road users from their initial positions, given their speed and orientation. These projections are based on motion prediction algorithms such as constant velocity, normal adaptation, and motion pattern learning. The precision of the calculated indicators is largely affected by the selection of the motion prediction algorithm.

Fireseeds North Infrastructure continues to develop in-house video conflict analysis software, which enables road agencies to assess and quantify near misses at facilities on their road network. The use of this analysis also unlocks other opportunities in road safety, including rapid before and after studies, treatment evaluations, the development of conflict-based safety performance functions, conflict-based network screening and blackspot analysis, and improved diagnostics for in-service road safety reviews.

To support the development of in-house video conflict analysis software, Fireseeds North Infrastructure has tested the use of unmanned aerial vehicles (UAVs) for retrieving high quality aerial video footage. The flexibility afforded by UAVs enables improved road safety analysis, particularly at dynamic facilities such as work zones during construction staging.

The use of UAVs in transportation engineering is expanding rapidly; new applications of these UAVs are being tested within cities and provinces across Canada that can augment traditional road safety analysis. New applications include a) driver behaviour and compliance monitoring, b) inspections as part of an asset management program, c) wildlife monitoring, and d) analysis of UAV video footage that supports traffic simulation. ▀

Mark Hearson is a transport infrastructure specialist with Fireseeds North Infrastructure. Any questions or comments regarding this article can be directed to Mark Hearson at mark.hearson@fireseedsnorth.ca.

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Trying Trenchless Crossing to Reduce the Impact on Traffic, Pedestrians and Businesses

By Jasvinder Singh Hothi, City of Vancouver



In March 2016, City of Vancouver Sewer Operations embarked on a major trenchless crossing at the intersection of Burrard Street and Broadway in Vancouver, British Columbia. The trenchless crossing was a part of the Burrard South improvement project, which consisted of major infrastructure improvements from the foot of the Burrard Street bridge to W17th Avenue. Improvements included the twinning of the existing combined storm main, road improvements, street repaving and the installation of a new water main.

The majority of the city sewers infrastructure work has traditionally been completed using open-cut construction methods. While the city's construction crews are proficient in these methods, the demand for a less disruptive and more efficient solution was explored in this situation. Burrard Street is a very busy north/south arterial road within the City of Vancouver. West Broadway is a dedicated truck, transit and major traffic route connecting the city traffic from east to west.

After taking the traffic impacts, pedestrian impacts and disruption to local business into consideration, sewers operations and design

made the decision to complete this portion of the project trenchless. The crossing was over 90 m in length and was completed in very challenging conditions. In May of 2015, trenchless technology was introduced into operations and successfully utilized in four major in-house trenchless construction projects; after the success of these four projects, sewer operations had the confidence to complete this project in-house.

The scope of the work included installing a separated storm and sanitary wastewater system. The decision was made to install the work crossing Broadway by trenchless

constructability methods. This work consisted of using the Ackermann 4800 Guided boring machine, with 36" and 24" cutting heads, to install a 92 m length of sanitary and 92 m storm main.

The invert elevation of the install was 18' deep. Shoring and excavation of the launch pit was not easy. With parallel underground utilities running on one side of the launch pit and the existing combined sewer main on the other, excavating and shoring the 40'L by 16'W by 18'D launch pit took considerable attention to safety. To make the excavation even more of a challenge, the bottom 10' of the excavation material was contaminated. It contained high volumes of hydrocarbons that were above the allowable limits for the soils that were being excavated. This contamination was caused by the gas station that was located adjacent to the excavation of the launch pit. This excavation material had to be handled with due care, and was transported and disposed of at an approved disposal facility by approved haulers.

After excavation of the launch pit the crew started the process of pushing the pilot tubes,

and the laser was set for the desired grades of 2.27 per cent. Even though the ground conditions were contaminated with hydrocarbons, the soil along the alignment of the crossing was favourable for the pilot tube methodology. This was confirmed with bore holes and a sweep with ground penetrating radar. The pilot tubes were pushed in at a substantial rate. The crew completed the crossing of the pilot tubes, 92 m in just 16 hours.

After the auguring was completed, crews started the set up for the 36" Ackerman power cutting head and the direct jack of the Hobbas pipe. Direct jacking was another first for the trenchless crew. After some very minor setbacks the pipe was installed, and the crossing completed to the desired grade and invert.

After the storm main crossing was complete crews started the set up for the 24" sanitary. Again, the pilot tubes were pushed across at the same rate as before. For the sanitary, the augers were downsized to 11.5", which would fit the 24" power cutting head. The smaller augers allowed for efficiencies for the auger process and reduced time to get across. As with the

storm main, the sanitary was direct jacked at a grade of 2.27 per cent.

The crew persevered and overcame many challenges while completing this project, such as equipment failures, contaminated soil and minor scheduling delays to successfully complete the crossings.

This trenchless crossing was a very large undertaking from inception to completion. City staff did a great job completing the project with less than one year of experience in trenchless construction, and the first time direct jacking Hobbas pipe. This further demonstrated the great team work between the internal design and build team at the City of Vancouver. With continued success in trenchless construction sewer operations will continue looking for construction projects where trenchless work can be integrated to be cost effective and provide efficiencies for pipe installations. ▀

Jasvinder Singh Hothi is Superintendent I – Construction, Sewer Operations, City of Vancouver. Get in touch at jasvinder.hothi@vancouver.ca.



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