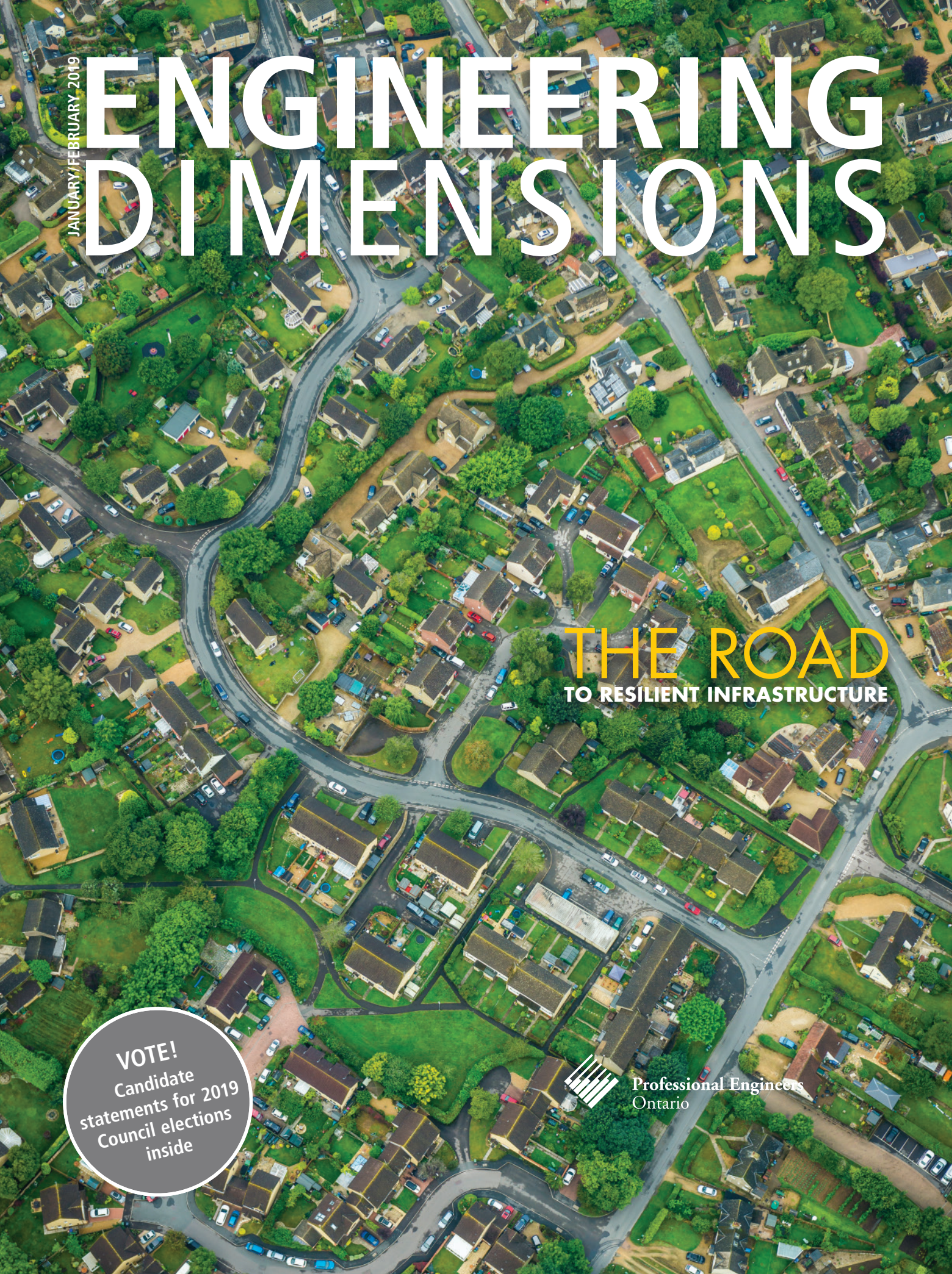
JANUARY/FEBRUARY 2019

ENGINEERING DIMENSIONS



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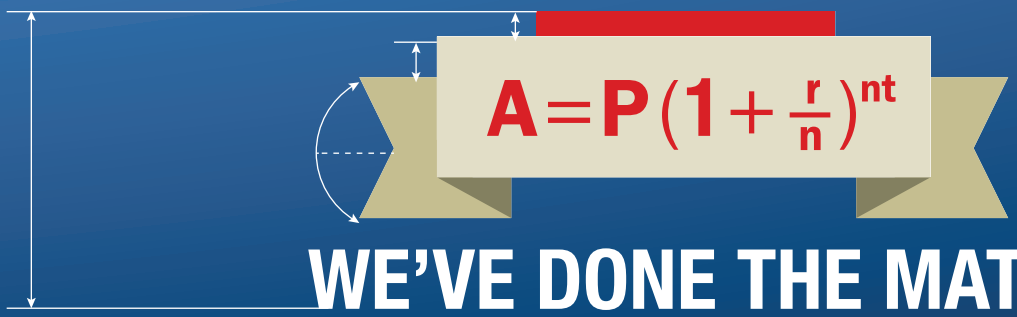

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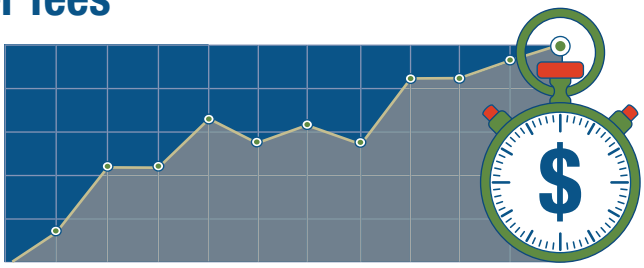

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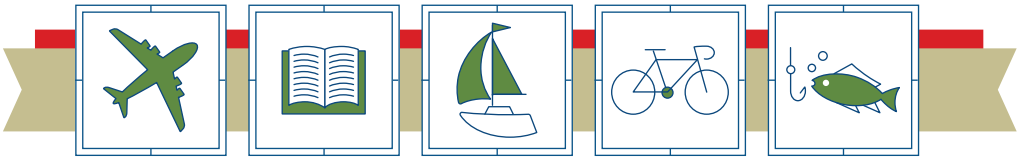

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DESIGNING FOR THE FUTURE

By Nicole Axworthy

ENGINEERING DIMENSIONS

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Everyone wants to be able to travel without delay and have the light turn on when you flip the switch, but Mother Nature's affect on our community's infrastructure can suddenly prevent these everyday actions from happening. The numerous storms that have hit our area of the world reveal much about the resilience of our infrastructure—especially aging systems in densely populated urban centres—and brings up the question of how we can adapt these systems to accommodate future needs.

In this issue, we delve into the topic of infrastructure from two different perspectives. In "Submerged" (p. 40), Associate Editor Marika Bigongiari explores how extreme weather events highlight the vulnerability of critical infrastructure in large cities such as Toronto. Stormwater systems, in particular, carry the burden of dealing with the overabundance of rainfall that comes with severe storms. As we struggle with the impact of unpredictable weather patterns, engineering experts agree that it's necessary to identify and plan for ways we can ensure our infrastructure is resilient, adaptive and flexible so we are prepared for the future. "As Ontario becomes more urbanized and development more extensive and intense, we need to rethink the strategies and safety factors used for stormwater design based on our changing climate," says David Lapp, P.Eng., FEC, manager of globalization and sustainable development at Engineers Canada.

At its core, a resilient community is one that is evolving rather than simply surviving. The city that thinks about tomorrow's risks and vulnerabilities and acts on that future in a collaborative fashion will ultimately be more resilient. (Of course, cities must also be able to find the funds necessary to implement the critical solutions to their infrastructure challenges, but let's save that for another discussion.) When future planning and collaboration does occur, communities reap the benefits of a stable and safe network. In "Hamilton: A community exemplifying Ontario's road safety" (p. 34), Associate Editor Adam Sidsworth provides an excellent example of engineering success: The continuous improvement to Ontario's road design and engineering have allowed the number of fatalities to drop significantly over the last few decades, despite the exponential growth in vehicular traffic and population. Hamilton, Ontario, is one city that has embraced its various road and traffic challenges—including accommodating gravel roads, one-way streets and highways within its amalgamated urban and rural communities—proving that Ontario has one of the safest road networks in North America.

Speaking of collaborative efforts, engineering communities are gearing up for this year's National Engineering Month, which includes numerous events across the province throughout the month of March. Don't miss the event highlights (p. 21) happening in a city near you.

On a final note, don't forget to check out who's running for available positions on PEO Council. Candidate statements can be found in this issue's insert. Voting opens on January 18, so don't delay getting yours in. Happy 2019! e

THIS ISSUE Despite a $100 billion infrastructure deficit, Ontario's municipalities face the burden of modernizing outdated infrastructure, most of which is over a century old. In this issue, we explore the challenges that Ontario's large cities face in developing new and innovative stormwater solutions in an era of extreme weather, and feature one municipality's approach to road safety and traffic-engineering solutions as a barometer of Ontario's roads—which is considered the second-safest road network in North America.

ENGINEERING IS GROWING EXPONENTIALLY. CAN PEO KEEP UP?

By David Brown, P.Eng., BDS, C.E.T., IntPE, MCSCE

Several students at an Ontario university have hit upon the next big thing: an invention that promises to be hugely popular and has the potential to make them very rich. The project is now winding its way through the patents process, and the students are on the cusp of becoming successful entrepreneurs.

It's exciting engineering—except these folks aren't professional engineers and likely have no intention of getting licensed. Their work, which applies engineering principles, falls within PEO's regulatory bailiwick, but it's going on unregulated—as is perhaps untold amounts of engineering work being undertaken by unlicensed people in Ontario in 2018, particularly in emerging disciplines.

I use this fictional example to illustrate what I see as a looming problem at PEO: The *Professional Engineers Act*'s (PEA) primary objectives—protecting the public interest through licensure and setting and enforcing standards of knowledge/skill, practice and ethics—are broad enough to capture emerging engineering disciplines. However, our regulatory focus on licensure and enforcement is proving limited in its capacity to regulate the full gamut of engineering in Ontario, especially in an age when technology is advancing exponentially and growing beyond our means to regulate it all.

ENGINEERING vs PEO's CAPACITY TO REGULATE

The graph on page 7 depicts my thinking on the issue. The vertical axis represents the size of PEO's "regulatory fence"—the engineering work across all disciplines (including emerging ones) that PEO is mandated to regulate within the province. The horizontal axis represents PEO's capacity as a function of time—in licensing and registration, enforcement and discipline and practice guidance—to regulate, across several technological revolutions. The blue line represents PEO's capacity to regulate, beginning at its inception in 1922, while the purple line represents the regulation required to adequately oversee all the engineering practice being undertaken from 1922 to now (and beyond).

As you can see, the two lines align for most of PEO's history, showing how we have, for the most part, kept pace regulating engineering practice over the past century. For most of that time, engineering practice was well defined, encompassing only five or six disciplines, so regulation was straightforward.

As technology—notably electronic and computer technology—has advanced over the past few decades, that line begins to diverge, with PEO's regulatory capacity flatlining or even descending, while technology and engineering move forward. At that point, I would argue, the boundaries (or regulatory fence) of engineering practice have moved beyond PEO's capacity to regulate it all.

The space between the expanding fence and PEO's regulatory capacity represent all those unlicensed people (like the four university entrepreneurs mentioned above) who may be practising engineering and creating new technologies without the benefit of a licence or any kind of oversight.

PEO LOSING GROUND

So why is PEO falling behind? I think it's for a couple of reasons. First, as mentioned earlier, although our act is sound, we lack the regulatory compliance resources to enforce licensure and exclusive rights to practice—we're playing whack-a-mole trying to ferret out and act against non-licensed individuals and practice. And second, many new engineering graduates don't seem to see the value in getting licensed; and this thinking was borne out in recent focus groups conducted by PEO's Public Information Campaign Task Force. "There was no drive from the organization [to get licensed], and progress in career happened anyway," one participant said. "Why put myself through the extra work and emotional distress associated with the process, for no added value?"

This thinking is likely even more prevalent among graduates working in emerging disciplines, and a case in point is software engineering. Back in 2001, attempts were made to bring this area of practice into PEO's regulatory fold, but as former PEO president George Comrie, P.Eng., FEC, noted in his September/October 2016 *Engineering Dimensions* column (p. 3): "The net result of our tardiness in embracing software engineering as a regulated engineering discipline allowed non-engineers to dominate the field, and to this day, it remains essentially unregulated. I believe it can be argued that the public has suffered from the consequences of lack of discipline and accountability in the development and management of software systems."

POTENTIAL SOLUTIONS: PUBLIC DEMAND AND ENTITY REGULATION

If the public knew the full scope of unlicensed practice going on within these new technologies created by emerging disciplines, I think we would see a backlash. Just as the public presumably would not go to an unlicensed individual or firm to design a building, why would they feel any different about, say, a communications infrastructure project? The value proposition in hiring a licensed engineer is the same: They are well educated and experienced, abide by a code of ethics responsible for safeguarding life, health and public welfare and are accountable to a regulator.

Perhaps public demand is the regulatory driver we need to reign these people in and close our regulatory gap. If the public doesn't see a PEO logo on the bottom of a com-

pany's website and a list of P.Engs on their team, they may look elsewhere to those who do—secure in the knowledge that the people they're dealing with will do the job right, providing product or work with honesty and integrity and are ultimately answerable to PEO.

I think that kind of bottom-line impetus would spark more than a few firms to get their people licensed.

To capitalize on this public demand, PEO needs to focus more on regulating the entity that provides engineering services as opposed to regulating the individual engineer. By doing so, we would require that the entity be accountable under the PEA, as opposed to our current approach of trying to regulate individual practitioners. We already do this through our certificates of authorization, but it needs to be strengthened and aligned for this purpose.

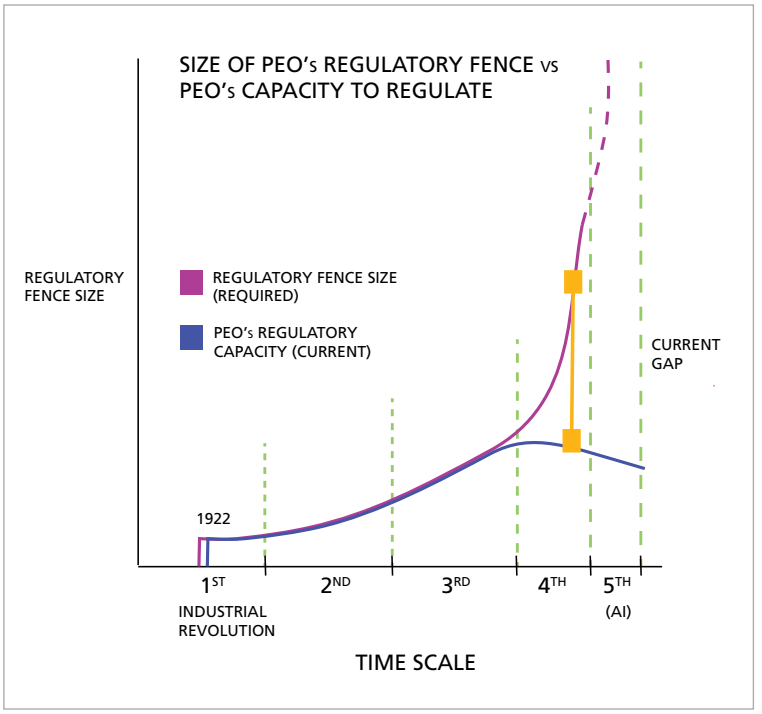
The concept—entity regulation—is already attracting much attention among Canadian legal regulators and is currently being rolled out as the new regulatory framework of the Nova Scotia Barristers' Society (NSBS).

The model moves the regulatory focus from the individual practitioner to a group of practitioners who work together, whether that's a consulting firm, an in-house department or government department. If someone is a sole practitioner, the entity is the sole practitioner.

Entity regulation is also compliance based, with fewer rules and requirements and is something our current government is moving towards. Instead, the model holds entities accountable to uphold public interest–based principles or regulatory objectives—how the entity meets them is up to its discretion. For example, the NSBS' new framework has 10 Management System for Ethical Legal Practice objectives, including developing competent practices, ensuring confidentiality, maintaining appropriate file and records management systems and avoiding conflicts of interest, among others.

Some regulators investigating entity regulation are exploring the idea of entities appointing a compliance manager who would both report compliance to the regulator and address issues within the entity if the regulator finds problems.

According to the Canadian Bar Association's 2014 report *Futures: Transforming the Delivery of Legal Services in Canada*, when Australia adopted a similar approach, it resulted in a two-thirds drop in complaints against legal services providers in New South Wales.



Although an entity-based regulator is still in charge of licensing and registration, complaints and discipline and practice guidance, it offloads oversight of individual practitioners to their employers. And if we're struggling to maintain our regulatory "fence" around an exponentially expanding engineering profession, limiting our regulatory purview to thousands of entities versus tens of thousands of individual practitioners will at least give us a fighting chance at keeping up.

If you couple this with a well-informed public that demands licensure from providers of any and all engineering products and services, I think you have a recipe for success. If practitioners and firms are operating in a business environment where public expectations around quality, ethics and accountability dictates the need for engineering licences, they have no options. They get licensed or they go bust.

My point is that the world is not going to stop and wait for us to catch up. There is a lot of engineering going on in this province, and we're not regulating all of it. Nor can we, I would argue, under our current regulatory framework.

If we're going to close our regulatory gaps—gaps that are widening every year—we need to change the way we look at licensure. **e**

PEO UNDERGOES EXTERNAL REGULATORY REVIEW

By Adam Sidsworth

In a move to increase transparency, PEO has contracted an international advisor to the United Kingdom–based Professional Standards Authority (PSA) to conduct a comprehensive review of PEO's performance as a regulator. The review comes as regulators across Ontario and Canada have had their regulatory performance questioned or curtailed by provincial governments.

"We need to look at our performance against the *Professional Engineers Act* and our processes, in respect of our three mandates: licensing, practice and regulatory compliance," PEO President David Brown, P.Eng., BDS, C.E.T., told *Engineering Dimensions*. "There was a suggestion on Council that we could do this ourselves, and I felt that would be impossible for us to accomplish internally. One, there isn't the expertise [at PEO] for something like this, and there are the biases [within PEO]. You need to use an external body that is a subject-matter expert in regulatory performance. PSA is the gold standard globally; they have a niche in this area of expertise. Nobody else offers this service in the manner that PSA can, as they were set up in the UK to audit health services for just this purpose."

PSA, an independent body accountable to the UK parliament, was enacted in 2002 to oversee the work of nine regulatory bodies that regulate health professionals in the UK and social workers in England. PSA states that "we review the regulators' performance and audit and scrutinize their decisions about whether people on their registers are fit to practice." They have since become recognized for setting the standards for regulatory review and have been contracted by numerous regulators across Ontario, British Columbia and Australia.

"We hold up a mirror against the regulators and measure them against the performance of other regulators, and then it's up to them to improve by looking at their strengths and weaknesses," says PSA international advisor Harry Cayton, who was chief executive of PSA from 2007 until October 2018 and who is part of the three-member team undertaking the review of PEO. "In recent years, we have branched out in a significant way. We've advised regulators that aren't health related in the UK: We've worked with the Royal Institution of Chartered Surveyors, with the College of Policing and we've helped set up our new press regulation."

REVIEW TIMELINE

Cayton is familiar with regulatory matters in Ontario, having led a regulatory review of the province's Royal College of Dental Surgeons in 2014 and a gap analysis for the Ministry of Health and Long-term Care in 2016. He also provided training for Ontario's doctors and spoke at the Ontario teachers' conference. Included in Cayton's team is Deanna Williams, who has held senior policy positions with Ontario's Ministry of Health and Long-term Care as well as having served as supervisor to the College of Denturists of Ontario and as registrar of the Ontario College of Pharmacists.

"We're going to be measuring you against the standards, against the benchmarking, but then we will make comparisons to other regulators in a similar context," Cayton says. "Are there other things you can learn from them, or are there things you're doing particularly well? We'll make recommendations about improvements." Cayton adds that they will assess PEO's performance within a right-touch regulation (RTR) approach, which he defines as "achieving regulatory effects with minimum force, so we don't overregulate, and we don't underregulate either. Right-touch regulation is about finding the balance between regulatory pressure and the autonomy of professionals." Above all, Cayton will form his conclusions and recommendations based only on evidence and facts he gathers during the review.

Cayton states that PEO's review began with preliminary research in December, with the advisors spending approximately two months learning the *Professional Engineers Act* and other pertinent information. The team will:

- Come to PEO headquarters in early February 2019 to conduct interviews with staff, Council, and committees and observe regulatory committees;
- Draft a preliminary report for April 2019, with PEO given the opportunity to fact check; and
- Submit a final report, which will likely be presented to Council in June 2019.

OTHER REGULATORS UNDER REVIEW

The PEO review comes as regulators in Ontario and across Canada are under increased scrutiny. In October 2018, the provincial government tabled legislation that, if passed, will scrap the Ontario College of Trades; and the Ontario College of Pharmacists is being called out for their handling of pharmacists who allegedly diverted opioids onto Ontario's streets. In Quebec, the provincial government placed l'Ordre des ingénieurs du Québec under the trusteeship of the province, which cited concerns over the financial viability of the regulator. And in British Columbia, the provincial government introduced the *Professional Governance Act*, which, if passed, will enact key recommendations from its recent review of the professional reliance model (see "Professional reliance review targets BC natural resource regulators," *Engineering Dimensions,* September/October 2018, p. 10). The legislation will impact how engineering and geoscience are regulated in BC and will restructure Engineers and Geoscientists British Columbia (EGBC) and four other natural resource–based regulators under a new Office of the Superintendent of Professional Governance.

EGBC has already worked with PSA to complete a review of their legislation and governance functions. Their review was initiated as part of EGBC's commitment to continuous improvement in delivering on its mandate of protecting the public interest; notably, it began prior to the BC government's announcement of its professional reliance review. "Our association

had made a lot of strides in good governance with our implementation of strong and aligned strategic plans and strategic budgeting processes, and we have started to implement stronger risk management tools," says EGBC Chief Executive Officer and Registrar Ann English, P.Eng. "But legislatively, we were lacking some important tools that we felt would make us a stronger, more effective regulator. Our act was almost a hundred years old; it was outdated and needed to be modernized. We acknowledged that there were likely additional things we could learn from a third-party audit that could help us make some advances in this area." English notes that during the review, the PSA team:

- Reviewed BC's *Engineers and Geoscientists Act*, to which EGBC is held accountable;
- Worked with EGBC to set up a secure wiki site to allow PSA to have access to EGBC documents;
- Interviewed 30 per cent of EGBC's council, as well as senior staff and government officials, including ministerial officials who were familiar with EGBC;
- Over a period of a week, attended a council meeting and statutory meetings (privacy of members' information was assured throughout the whole process); and
- Wrote a final report, which EGBC was able to review for factual errors prior to publication.

English states that the PSA audit became very valuable when, a few months later, the provincial government announced its professional reliance review. "We were able to provide the PSA report to government," English says. "Our government is quite familiar with PSA; they hold them in high regard." English notes that PSA performed regulatory reviews of BC's nurses and that Cayton was commissioned by the BC government to review the province's College of Dental Surgeons and *Health Professions Act*.

Although the *Engineers and Geoscientists Act* will eventually be repealed over the next two years as it is merged into the *Professional Governance Act*, English notes that many of PSA's recommendations for a stronger regulatory framework are mirrored in the new legislation, such as the ability to regulate engineering organizations, the equivalent of PEO's certificate of authorization.

English praises EGBC's council for welcoming the PSA review and subsequent publication of its report. "Our council said, 'We don't mind exposing our weaknesses if it eventually helps us be a better and more effective regulator in the public interest,'" she says. English reiterates that the PSA review was strictly a review of the performance of EGBC as a regulator as a whole and not of any individual council or staff member. "It's a learning opportunity," she points out. "It was not a witch hunt in any way, shape or form. They may tell you things along the way you don't necessarily want to hear. But for the most part, we can't argue with their observations and conclusions. If you're not willing to listen to feedback, why are you doing it? I have no hesitancy in recommending them."

Cayton echoes English's remarks: "We're not making any judgments about individuals, and that's not what we're here to do at all," he says. "We're looking at processes and measurements and consistency of approach. I've done a lot of these reviews, and I know people get anxious, but as we meet with staff, we explain that they shouldn't be worried."

President Brown also reiterates that the PSA review is about improving PEO's organizational performance. Brown notes that PEO is answerable to a new government that favours fewer procedures and restrictions; PEO must also find its niche in a world in which engineering is expanding into undefined—and often unregulated—areas. Brown has met with Attorney General Caroline Mulroney and informed her of the PSA review.

"It's more the glass is half-empty approach," Brown states. "Regulation is much different than it was a hundred years ago; it's going to change even more. In 1922 [when PEO was founded], it was very easy to build a fence around the limited disciplines present at that time. Now it's expanding at such a rate on the entrepreneurial and technological level that our ability to regulate all engineering as it is defined under our act is currently beyond our capacity."

MEMBERS MINGLE WITH MPPs AT PEO QUEEN'S PARK RECEPTION

By Adam Sidsworth

PEO's 12th annual Queen's Park reception on October 24, 2018, was the first opportunity for many PEO representatives to meet MPPs and cabinet ministers from the last provincial election, which was held on June 7. The event—which is organized annually to celebrate the growing relationship between the government and the Ontario engineering regulator through its Government Liaison Program (GLP)—attracted over 30 MPPs, including several cabinet ministers, many of whom are serving their first terms at Queen's Park.

PEO President David Brown, P.Eng., BDS, C.E.T., was among the first dignitaries to speak to the gathering in the crowded room. "[This event] gives us a chance to interact [with you]," Brown told MPPs, stating that the reception "recognizes our mandate to regulate…and [helps you] understand our mandate." Brown took the opportunity to remind MPPs that although PEO holds itself to high standards, particularly when prosecuting those who practise engineering without a licence, under his leadership, PEO is seeking regulatory changes to help it become more transparent. "To this end, we are undertaking a regulatory

continued on p. 12

QUEEN'S PARK RECEPTION 2018

Bonnie North (centre) and Becky Smit (right) of Ontario's Green Party with Karin Pratte of PEO's North Bay Chapter

Parliamentary Assistant to the Attorney General Lindsey Park, MPP (Durham), speaks to reception delegates.

From left to right: PEO Eastern Region Councillor Ishwar Bhatia, P.Eng., with Nina Tangri, MPP (Mississauga-Streetsville), and Karanjeet Singh, P.Eng., of PEO's Mississauga Chapter

PEO Vice President Marisa Sterling, P.Eng., FEC, with Steve Favell, P.Eng.

Former Ontario premier Kathleen Wynn, MPP (Don Valley West), poses for a photo with Mike Bell, P.Eng., of PEO's Hamilton-Burlington Chapter (left) and PEO Councillor Lorne Cutler, P.Eng. (right).

NDP Deputy Leader Sara Singh, MPP (Brampton Centre), speaks to the audience about the role of engineers and PEO in public safety.

From left to right: Randy Pettapiece, MPP (Perth-Wellington), Raul Moraes, P.Eng., and Rudy Cuzzetto, MPP (Mississauga-Lakeshore)

Warren Turnbull, P.Eng. (left), with Joey Taylor and Emily Rowan of Engineers Canada

Winners of the evening's bridge-building challenge: (from left to right) Pramod Kumar, P.Eng., MPP Chris Glover (Spadina-Fort York) and Ryerson engineering student Jeffrey Lee

President David Brown, P.Eng., BDS, C.E.T., with former Ontario premier Kathleen Wynne, MPP (Don Valley West)

continued from p. 9
review to see if we are effectively upholding our mandate at our government's pleasure. We look forward to dialogue with the government."

Parliamentary Assistant to the Attorney General Lindsey Park, MPP (Durham), represented Attorney General Caroline Mulroney at the reception. "PEO does important work, representing 85,000 licence holders who contribute to the prosperity and safety of the province," Park said. "[They] are natural providers of our society. On behalf of the attorney general, I would like to recognize the role of PEO in excellence… In fact, I think we need more engineers as legislators."

New Democratic Party Deputy Leader Sara Singh, MPP (Brampton Centre) and critic for the attorney general, spoke of the role of engineers and PEO in public safety. "I want to commend PEO for their 96 years of service," Singh said. "The NDP has a history of standing with engineers to make sure we embrace the high standards of safety. We are all committed to making sure we have a safe environment."

Liberal Interim Leader John Fraser, MPP (Ottawa South), thanked engineers for their work: "Everything you see around us is engineered. Thank you for all the work you do. I appreciate you seeing us in our natural habitat."

Green Party Leader Mike Schreiner, MPP (Guelph), recognized the contributions that engineers can make to help combat climate change: "You're leaders; you're innovators. The work you do is so critically important."

PEO President Brown, Manager of Government Liaison Programs Jeanette Chau, P.Eng., and GLP member Arjan Arenja, P.Eng., took the opportunity to honour both MPPs and PEO chapters that have helped to foster stronger relationships between PEO and government over the past year. Four chapters received GLP Awards for their efforts to build relationships with their local MPPs and raise awareness of PEO's mandate: Algonquin Chapter won for chapters with one MPP; Georgian Bay Chapter won for chapters with two MPPs; Oakville Chapter won for chapters with three to five MPPs; and London Chapter won for chapters with six to nine MPPs.

PEO also honoured MPPs who actively took an interest in PEO and the wider engineering community:

- Lisa Thompson, minister of education and Progressive Conservative MPP (Huron-Bruce), for, among other things, her participation in Take Your MPP to Work Day, the GLP Academy and her acknowledgement of engineers as innovators;
- Percy Hatfield, NDP MPP (Windsor-Tecumseh), for his efforts to repeal the industrial exception and his attendance at local chapter meetings; and
- Mitzie Hunter, Liberal MPP (Scarborough-Guildwood), was also honoured for her support of chapter events and her attendance at licence presentation ceremonies.

OTHER DIGNITARIES ATTEND 2018 RECEPTION

Ministers
Municipal Affairs and Housing Minister Steve Clark, PC MPP (Leeds-Grenville-Thousand Islands and Rideau Lakes); Agriculture, Food and Rural Affairs Minister Ernie Hardeman, PC MPP (Oxford); Labour Minister Laurie Scott, PC MPP (Haliburton-Kawartha Lakes-Brock); Government and Consumers Affairs and Government House Leader Todd Smith, PC MPP (Bay of Quinte); and then-Transportation Minister John Yakabuski, PC MPP (Renfrew-Nipissing-Pembrooke)

MPPs
Deepak Anand, PC MPP (Mississauga-Malton); Aris Babikian, PC MPP (Scarborough-Agincourt); Gilles Bisson, NDP MPP (Timmins); Paul Calandra, PC MPP (Markham-Stouffville) and assistant to the minister of energy, northern development and mines; Stephen Crawford, PC MPP (Oakville); Rudy Cuzzetto, PC MPP (Mississauga-Lakeshore); Stan Cho, PC MPP (Willowdale); Michael Coteau, Liberal MPP (Don Valley East); Doug Downey, PC MPP (Barrie-Springwater-Oro-Medonte); Catherine Fife, NDP MPP (Waterloo); Goldie Ghamari, PC MPP (Carleton); Chris Glover, NDP MPP (Spadina-Fort York); Mike Harris, PC MPP (Kitchener-Conestoga); Terence Kernaghan, NDP MPP (London North Centre); Daryl Kramp, PC MPP (Hastings-Lennox and Addington); Natalia Kusendova, PC MPP (Mississauga Centre); Marie-France Lalonde, Liberal MPP (Orleans); Laura Mae Lindo, NDP MPP (Kitchener Centre); Jim McDonell, P.Eng., PC MPP (Stormont-Dundas-South Glengarry); Billy Pang, PC MPP (Markham-Unionville); Randy Pettapiece, PC MPP (Perth-Wellington); Sheref Sabawy, PC MPP (Mississauga-Erin Mills); Dave Smith, PC MPP (Peterobrough-Kawartha); Nina Tangri, PC MPP (Mississauga-Streetsville); Monique Taylor, NDP MPP (Hamilton); Vijay Thanigasala, PC MPP (Scarborough-Rouge Park); John Vanthof, NDP MPP (Timiskaming-Cochrane); and Kathleen Wynne, Liberal MPP (Don Valley West) and former premier

Engineering leaders
Allan Changoor, P.Eng., director, Professional Engineers Government of Ontario; Christine Hill, P.Eng., vice chair, Queen's Park reception, and chair, Consulting Engineers of Ontario; Nancy Hill, P.Eng., LLB, FEC, president-elect, PEO; Marissa Sterling, P.Eng., FEC, vice president (elected), PEO; Tibor Turi, P.Eng., vice chair, Queen's Park reception, Ontario Society of Professional Engineers; Johnny Zuccon, P.Eng., FEC, interim registrar, PEO; and Ivan Zvonkov, president, Engineering Student Societies' Council of Ontario

PEO-OSPE GOVERNMENT RELATIONS CONFERENCE FOCUSES ON NETWORKING WITH NEW MPPs

By Adam Sidsworth

On October 24, 2018, PEO and the Ontario Society of Professional Engineers (OSPE) jointly hosted members of PEO's Government Liaison Program (GLP) and OSPE's Political Action Network (PAN) at the second annual Government Relations Conference at the University of Toronto's Hart House. The conference, whose theme was "Engineers working together for a better future," was designed to help GLP and PAN members foster strong networking relationships with the new MPPs who were elected to Queen's Park in the June 2018 election, 74 of them for the first time.

Attendees at the day-long event witnessed expert panels of politicians, public relations officials, journalists and PEO and OSPE staff, who offered their insights on how to effectively communicate PEO's regulatory mandate and OSPE's advocacy mandate to MPPs, cabinet ministers and political staff.

PEO President David Brown, P.Eng., BDS, C.E.T., who was first to speak, stated: "Today, we're going to learn how to work together to become effective partners. With so many new MPPs, this panel will advise us how to interact [with them]."

During the morning's first session, York University and Seneca College professor Hershell Ezrin, who served under Prime Minister Pierre Trudeau and former Ontario premier David Peterson, advised how to navigate a transitioning government, noting that as a new government enters power, it realizes that it doesn't have the money to deliver its campaign promises. Premier Doug Ford, Ezrin stated, will use it to his advantage. "This government has proven itself to be incredibly focused on its message and decision making," he said, noting that it has already backtracked on some key issues, notably safe injection sites and the basic income project. He advised the need to recognize the new government's key message, which centres around affordability, balance and opportunity. "There's a new cabinet with members who have never served in government before," Ezrin noted. "Everybody will attempt to influence them before you." Ezrin advised to work at the grassroots level, meet MPPs in their home constituencies and have them participate in "Take Your MPP to Work Day." "Because of the province-wide reach of [PEO and OSPE], you have a reach in areas where they were elected," Ezrin said. "It's incumbent on you to help them achieve their goals because that's the most effective way to achieve your goals."

The morning's second session featured journalists Adrienne Batra, editor-in-chief of the *Toronto Sun*; Martin Regg Cohn, Queen's Park columnist for the *Toronto Star*; Marcus Gee, a columnist for *The Globe and Mail*; and Jim Warren, a national media commentator for CTV and Sun Media. All four panelists advised how to engage the media to spread PEO's and OSPE's mandates. "We won't come to you unless we need answers to why a bridge collapsed," Batra noted. "Make yourself available to us. If you're not the story of the day, you won't get covered." Regg concurred, adding: "Don't come to us with pitches when you won't take our calls when we need you (referring to the Algo Centre Mall collapse at Elliot Lake)… I get calls from architects saying, 'We're building this great library; come see it.' I never get calls from engineers, so the silent profession is accurate."

In one of the afternoon sessions, attendees heard from a panel of politicians representing Ontario's main political parties, including Progressive Conservative MPP Jim McDonell, P.Eng. (Stormont-Dundas-South Glengarry), New Democratic Party MPP Bhutila Karpoche (Parkdale-High Park), Liberal MPP Nathalie Des Rosiers (Ottawa-Vanier) and Green Party Deputy Leader Bonnie North. It was Karpoche, who serves as the NDP critic for mental health, who advised that MPPs have too much information to digest. "As engineers, you have to work with the engineering critic." She added, "I got here 15 minutes early today, and the first thing I asked was, 'Who's here from Parkdale?' That's what you should do.' Des Rosiers echoed the last point, stating that GLP and PAN members should work in their ridings.

As the afternoon wrapped up, Andrea Carmona, OSPE policy and government relations lead, and Jeanette Chau, P.Eng., PEO manager of government liaison programs, gave practical advice to attendees, who would attend PEO Day at Queen's Park (see p. 9) later that evening, where they would have the opportunity to speak with MPPs, cabinet ministers and political aides. "Advocacy has to change because it enables change; engineers can become leaders for change for all Ontarians," Carmona noted. "When you meet with them, you are one of many business groups. Do research, find out the MPPs' priorities, show your value to them. Don't just show up and expect them to know who you are. When you speak with them, use simple terms. They're not engineers. Sixty-seven per cent of what people remember is visual. It's better to overdress. And a third of what they remember is the tone of your voice."

Chau added: "Tell them you're all engineers, that OSPE is the voice of engineers, that PEO works for public safety. Now is a good time to set up meetings because they're new. There's a protocol to meet together (meaning a PEO representative and OSPE representative attend the same meeting). This is to help them understand there are two bodies: advocacy and regulatory. MPPs have limited time; they don't want multiple meetings."

The GLP, which was founded in 2005, is composed of volunteers from each of PEO's chapters. It has the mandate to facilitate strong, ongoing relationships between chapter members and their local MPPs.

2018 ONTARIO PROFESSIONAL ENGINEERS AWARDS CELEBRATE ENGINEERING INNOVATION

By Nicole Axworthy

The recipients of the 2018 Ontario Professional Engineers Awards are (clockwise from top left): Pat Di Donato (representing Nick Di Donato, P.Eng.), Paul May, P.Eng., David Lapp, P.Eng., FEC, David Beckman, P.Eng., Jennifer Drake, PhD, P.Eng., Gary J.E. Kramer, P.Eng., PE, Mark Nykoluk, P.Eng., Terrance Nord, P.Eng., John Bandler, PhD, P.Eng., Winnie Ye, PhD, P.Eng., and Ashraf El Damatty, PhD, P.Eng.

A total of 10 high-achieving awardees and one outstanding project shared the spotlight on November 17, 2018, at the 71st Ontario Professional Engineers Awards (OPEA) event in Toronto.

Co-presented by PEO and the Ontario Society of Professional Engineers, the annual gala brings together industry innovators, business leaders and policy-makers to celebrate and be inspired by engineering excellence and innovation. Since 1947, the OPEA event has saluted Ontario engineers who have made significant contributions to the profession and their community. Following are excerpts from the acceptance speeches of the 11 award recipients. Full biographies of award winners can be found on page 12 of the September/October 2018 issue of *Engineering Dimensions*.

PROFESSIONAL ENGINEERS GOLD MEDAL

John Bandler, PhD, P.Eng., professor emeritus, McMaster University

"I vividly recall my hand-waving sketches of space mapping as we strolled in a forest in Denmark and toured on a boat in Sweden. While flying back to Canada I toyed with certain formulas. It was two weeks later when Steve Chen said, 'Come and look at this.' On his computer screen, an equal-ripple response. Nothing unusual, equal-ripple responses are customary microwave filter design requirements. But his result, incredibly, came not from a fast circuit simulator. It came directly from Jim Rautio's full-wave electromagnetic solver—in just a handful of time-intensive simulations. Space mapping was born."

ENGINEERING MEDAL—ENGINEERING EXCELLENCE

Gary J.E. Kramer, P.Eng., PE, senior vice president and global practice director (tunnels), Hatch

"Project engineering is very much being part of a team. I've been with Hatch for a little under 30 years now and my reflection for tonight is that I've come to appreciate more fully that I've had the opportunity to be part of, and eventually lead, a number of teams of great engineers on some really great projects. I'm a tunnel engineer, which is a trinity of three disciplines: geotechnical, structural and construction engineering. And one doesn't achieve much as a tunneling engineer without being where the work is, and that requires a lot of support from your spouse and family."

David Lapp, P.Eng., FEC, FCAE, manager, globalization and sustainable development, Engineers Canada

"With any acceptance speech, there are too many people to thank in the time available. In my case, I've had the good fortune to work with dozens of colleagues and hundreds of volunteers on this work who have contributed to the effort to understand climate change… Climate change is real, and as engineers, we must be part of the solution, not the problem. We now have the tools, practice guidance and training

available—so take advantage of this incredible practice area that needs more engineers and engineering."

ENGINEERING MEDAL—ENTREPRENEURSHIP
David Beckman, P.Eng., CEO, Zeton Inc.

"I consider this award a recognition of what Zeton has accomplished as a team rather than what a single person has done. Zeton is a fitting example of entrepreneurship. As young engineers we could have taken jobs at big multinational companies, but the other founders and myself had a vision that we could create a specialty business designing and building pilot and demonstration plants. Today we have 250 staff operating in Oakville, Burlington and the Netherlands. As our business grew, very talented people joined the company as well. This is what led to the success of our team."

ENGINEERING MEDAL—MANAGEMENT
Paul May, P.Eng., vice president, project implementation, York Region Rapid Transit Corporation

"I've been blessed throughout my career, first in finding engineering as my true calling. I take great pride and pleasure in having a role in transforming and improving the communities in which we live and serving the public… I've often felt the greatest measure of success in a career is not your personal success, but that of those who have worked for you. And I take great pride in all of their accomplishments. I've been very fortunate to have had the opportunity to work with so many great staff. Any success can only be achieved through their hard work and dedication."

Terrance Nord, P.Eng., president, TNCC Global Aviation

"My whole career has been about airplanes and aviation ever since I was a young boy growing up on a farm in northern Alberta. My first airplane ride was in a DeHavilland Beaver from Hay River to Yellowknife at age 11 and that got me hooked… As I accept this award, I am strongly committed to promoting engineering opportunities in aviation for Canadian youth. I do this through my work with the Royal Canadian Air Cadets and other youth groups, encouraging those members to join the air force in the regular officer training program to obtain an engineering degree and a career like I have enjoyed."

ENGINEERING MEDAL—RESEARCH AND DEVELOPMENT
Ashraf El Damatty, PhD, P.Eng., professor and chair, civil and environmental engineering, Western University

"I would like to use this opportunity to tell young people about hard work and dedication that can make your dreams come true. Yes, you will face obstacles and challenges, but you can make it happen with hard work… There are many people I would like to thank today. My wife is here along with my three daughters, son-in-law and brother. I would like to thank them all because they have made a lot of sacrifices… I would like to thank all the sponsors of my research; and the 50-plus graduate students who are really the main cause of me standing here today."

Winnie Ye, PhD, P.Eng., associate professor, Carleton University

"I'm earnestly grateful for the recognition I have received for my work because I'm very sure that every other nominee for this award was just as deserving of winning this award. Winning this award would not have been possible without the inspiration I received from my colleagues and students for whom I have the deepest respect and from whom I have derived the strength to challenge myself constantly and motivate myself to work hard every day… I would like to thank everyone here tonight for making this the most memorable evening of my life."

ENGINEERING MEDAL—YOUNG ENGINEER
Jennifer Drake, PhD, P.Eng., assistant professor, civil engineering, University of Toronto

"In order for me to achieve this career as a professional engineer and academic, it would not have been possible for me to imagine this future and envision myself in these roles without real-life examples of accomplished women in STEM. I would like to recognize these women. My first role model is my mother… Next, I would like to recognize my high school teacher Ms. Chmara, who encouraged me to enroll in engineering for my undergrad. My academic advisor in grad school, Dr. Bradford, showed me what life might be like as a professor and I learned a great deal form her about managing work responsibilities and motherhood."

CITIZENSHIP AWARD
Nick Di Donato, P.Eng., president and CEO, Liberty Entertainment Group (award accepted by his brother and business partner, Pat Di Donato)

"Nick is out of town, so I'm here to receive the award. I'm fortunate to have an engineer as my partner because throughout our company, he has saved us a lot of money. He always looks ahead, and nothing is ever too big for him—he takes on projects that a lot of people walk away from… In 2001 we were awarded the Liberty Grand and we turned it into one of the premier venues in Toronto. We were very lucky because opportunities with beautiful buildings like that don't come around often."

AWARD FOR ENGINEERING PROJECT OR ACHIEVEMENT
York Region's 2nd Concession Project
Mark Nykoluk, P.Eng., senior project manager, transportation services, The Regional Municipality of York

"Imagine a beautiful, peaceful conservation area in the heart of three communities. Connecting these communities meant crossing the conservation area with a new four-lane road, three bridges and large, regional gravity forced-main sanitary sewers and watermain. Feedback from local residents has been hugely positive. There were many brilliant and collaborative minds at work on this project. I would like to acknowledge more than 100 staff at York Region and the many professional engineers who worked on the 2nd Concession Project on its nine-year span, along with our stakeholder who made this project possible."

PEO CHAPTER LEADERS CONFERENCE OFFERS LESSON IN RESILIENCY

By Adam Sidsworth

On November 17, 2018, leaders of PEO's 36 chapters participated in the annual, day-long Chapter Leaders Conference in Toronto, Ontario, to listen to keynote speakers and participate in breakout sessions to develop their resilient leadership skills.

Delegates were welcomed by the conference chair, Eastern Region Councillor Ishwar Bhatia, P.Eng., who noted: "In order for PEO to remain relevant, the chapters play an active role in promoting the licence as the most important thing. [But] if we want to remain a regulator, we have to regulate more than one cylinder." PEO President David Brown, P.Eng., BDS, C.E.T., also greeted the chapter leaders, informing them of PEO's upcoming review of its regulatory performance by an international advisor to the United Kingdom–based Professional Standards Authority (PSA) (see page 8): "Using that review," Brown said, "we will look at PEO as a whole and align it as a ship."

The morning's speaker was Engineers and Geoscientists British Columbia (EGBC) CEO and Registrar Ann English, P.Eng., who informed the chapter leaders of EGBC's positive experience working with PSA during their review of EGBC's policies and procedures. "Our council has a sincere wish to improve. They wanted somebody who could be objective… Our act was, like yours, over 100 years old; we hoped that this would [help] support updates to our act. PSA were the only people with the credibility; they understand the regulatory process." English warned that although PSA's review was largely positive and the government receptive to PSA's recommendations, EGBC may soon be placed under the supervision of a government-run Office of the Superintendent of Professional Governance, known as Bill 49. This act, English claimed, is not related to the PSA review but rather the result of a "perfect storm of circumstances," including some high-profile natural resource disasters, notably Mount Polley, which eroded public confidence in the regulatory professions, as well as international trending in professional regulation and political influence resulting from a fragile coalition government. Although the act has some positive features that will give EGBC the tools to be a more effective regulator, the act also has features that EGBC has concerns about, such as a requirement for all practitioners to submit declarations of competence and conflict of interest prior to undertaking any projects. It also allows the BC government to dictate many aspects of council governance, including the size of the council, how elections are run and the criteria for councillors to be nominated. "Politics is the lynch pin that brought this act about," English asserted, "but it can happen to anybody. In Ontario, are you one Elliot Lake away from this happening? Maybe."

Immediately after English's speech, conference participants split into four breakout sessions, during which they discussed how chapter leaders can help PEO promote its mandate at the chapter level. Christian Bellini, P.Eng., of PEO's Experience Requirements Committee led a session to explore how chapters, particularly in the province's more remote areas, can promote the Licensure Assistance Program and host engineering intern (EIT) candidates while they navigate the academic interviews. PEO Enforcement and Outreach Officer Ashley Gismondi helped chapter leaders understand the role of the regulator's enforcement efforts and brainstorm how licensed engineers can help enforcement at the chapter level. In a third session, PEO Manager of Enforcement Cliff Knox, P.Eng., helped chapter leaders find ways to effectively file a complaint while protecting public safety; and in a lively breakout discussion, Helen Wojcinski, P.Eng., chair of PEO's 30 by 30 Task Force, led a discussion on what chapters can do to encourage women to seek—and keep—their engineering licences. Wojcinski challenged chapter leaders: "If you have 14 per cent women in your chapters, let's not let that drop…but let's not get hung up on the numbers." This breakout also cited a study showing that while boys are interested in robots, girls are more interested in how robots help people.

The afternoon was devoted to Rumeet Billan, PhD, CEO of Viewpoint Leadership, a learning and development firm that specializes in helping people develop their leadership skills through resiliency. Billan defines resiliency as "the capacity to recover quickly from difficulty." She cites statistics that 80 per cent of all jobs in 2030 have not yet been invented and that in 2008—at the height of the last recession—the focus was on organizational resilience, but by 2018, the focus had shifted to personal resilience. "It was that deep-rooted sense of failure that led to success," she noted of her success. Billan encouraged the conference's attendees to participate in an online poll using their cell phones and discovered that:

- Most people in the room wanted to develop their self-confidence;
- The majority of people in the room were experiencing stress; and
- Most people believe that being resilient will make them competitive.

Breaking the chapter leaders into groups, Billan introduced group exercises to develop attendees' understanding of objective reason, which Billan defines as being able to overcome past experiences to see past our biases. "Bias is actually necessary," she noted, "but how many times do we back off and ask ourselves if we were wrong?" During one exercise, participants wore blindfolds while attempting to build the same structure with toy blocks. In the next exercise, participants once again attempted to build the same structure with toy blocks while wearing blindfolds, but instead of being able to speak with each other, they could ask questions only to observers who were not wearing blindfolds.

PRACTICE ADVISORY SERVICES REVIEW ADVANCES

By Adam Sidsworth

On October 18 and 25, 2018, PEO's policy and professional affairs department conducted two sessions with members of PEO's Professional Standards Committee, its subcommittees, PEO practice advisors and other practitioners in its continuing investigation to improve practice advisory services for certificate of authorization (C of A)-holding firms (see "Practice advisory services review project underway," *Engineering Dimensions*, November/December 2018, p. 9).

The sessions, conducted by design-thinking experts Overlap Associates, allowed participants to review the research results and insights to date—which highlighted top-ranked practice problems for C of A holders—engineering project cycle and persona journey maps and current practice advisory services and tools, and ideate on future direction and specific initial change proposals.

At the October 25 prototyping lab session, participants got involved in reprioritizing and building rough prototypes for four possible solutions to members' issues with PEO's practice advisory services and tools. During a discussion at the session, participants expressed issues with PEO's practice resources, such as "PEO doesn't offer advice on labour law or engineering law"; "People don't understand what you do"; "If you have to go to school, intern for four years and get licensed, why don't you have to be aware of the guidelines?"; "Information isn't easy to find"; and "There is overlapping information."

In late November, a virtual testing lab for users was created to test out and provide feedback on the prototyped solutions created at the sessions, which include:

- Adding prompts of professional practice guidelines and resource updates by engineering discipline to the annual licence renewal notice;
- Improved search parameters and added company regulatory information in the C of A directory;
- Educational materials for prospective clients and C of A practitioners on how to prevent or reduce practitioner-client disagreements; and
- Improved usability and feedback features for professional practice guideline e-learning modules.

Attendees participate in a breakout prototyping session designed to foster feedback for PEO's policy and professional affairs team.

COMMITTEE CHAIRS WORKSHOP FOCUSES ON UNDERSTANDING VOLUNTEERS' WORK STYLES

By Adam Sidsworth

On October 26, 2018, over 60 councillors, committee and task force chairs and vice chairs and staff advisors participated in PEO's 2018 Committee Chairs Workshop, which focused on the theme "Getting the most out of our volunteers." The workshop was organized by PEO's Advisory Committee on Volunteers.

The workshop, which PEO has conducted in previous years, was brought back with enthusiasm by PEO President David Brown, P.Eng., BDS, C.E.T., who, in his introductory speech to start off the day, noted that PEO has over 70 committees and subcommittees, most of which are volunteer run.

The all-day workshop was facilitated by consultant Gregg Brown, an expert in individual behaviour change and performance who focuses on education and organizational change initiatives in large, multi-generational organizations. Brown holds a master of social science degree from the United Kingdom's University of Leicester, with a focus on organizational psychology, leadership and performance and has consulted and volunteered his time with the health, criminal justice, not-for-profit and business sectors and was part of the team that opened the first wave of Starbucks stores in Canada.

Brown understands the unique challenges of volunteering: "When I was volunteering, I was always giving something and getting something," he said. "But the challenge is working with other people." Brown introduced workshop attendees to the DiSC model of working and behavioural approaches, which attempts to describe people's various work styles in four broad categories: dominance, influence, steadiness and conscientiousness (DiSC).

Brown noted that the styles are broad stereotypes that are meant to help you understand and adapt to other people's work styles. He readily admited that he falls into the dominance personality, stating: "I'm a high D (dominance) and can fill a room with conversation, but a more thoughtful personality doesn't get a word in… People can perceive high Ds as rude when really they're being direct."

During the morning session, attendees watched a set of videos involving a national sales manager at a company attempt to interact with four employees, each of whom represented a DiSC personality. In each segment, attendees were able to see the national sales manager successfully adapt his interactions based on each employee's personality. Later in the morning, participants broke into groups to discuss how to effectively deal with difficult personalities found in volunteer situations, including the slacker, the dominator and the bore. And in a challenging afternoon session, attendees got into groups and had to sort a deck of cards—which contained work scenarios—into a logical working order with the stipulation that participants could not hand the cards to each other. The scenario was designed to encourage attendees to better understand their colleagues' work styles. Brown encouraged people to broaden their perceptions of other people: "I love Cs (conscientiousness) because I'm a low C, and I rely on their precision," Brown said.

Education Committee Chair Paymon Sani, P.Eng., in a roundtable discussion at the Committee Chairs Workshop.

Brown noted that, ideally, people in leadership roles ask for everybody's insights. "Sometimes I have to make unpopular decisions, but if I get people on board, it's easier," Brown pointed out. "I've talked to leaders at TD Bank, and they say, 'I spend 80 per cent of the time convincing people.'"

The volunteer training session comes as PEO attempts to strengthen its organizational structure, given its self-regulatory mandate. As President Brown noted to attendees, PEO is hiring an international advisor to UK-based Professional Standards Authority to audit PEO's regulatory competence (see p. 8). President Brown noted that having over 70 committees and subcommittees is excessively large, given PEO's mandate: "I want us to look at ourselves with a proactive lens… Let's see if you can help get this organization on the right track," he said.

CURIOUS ABOUT YOUR WORKING STYLE?
Prior to the Committee Chairs Workshop, attendees were given an online questionnaire (openpsychometrics.org/tests/ODAT/) to determine their profile. It consists of roughly 40 statements that you can agree or disagree with; once you click on Submit, the survey will tell you your percentages in each category: dominance, influence, steadiness and conscientiousness. As behaviour expert Gregg Brown noted at the workshop, each style is broad, and we all have some traits in each; however, we tend to gravitate heavily towards one.

Dominance
- Shape their environment by overcoming opposition and challenge
- Get immediate results, take action and accept challenges
- Fear losing control of their environment and being taken advantage of
- Can be impatient with others but appear self-confident

Influence
- Shape their environment by persuading and influencing others
- Involve people and try to make favourable impressions
- Fear social rejection, disapproval and loss of influence
- Are impulsive and disorganized but appear enthusiastic and charming

Steadiness
- Achieve stability by co-operating with others
- Prefer infrequent change and stability and like sincere appreciation
- Fear the unknown, change and unpredictability
- Overly willing to give but appear patient, methodical and calm

Conscientiousness
- Work within circumstances to ensure quality and accuracy
- Place attention to standards and details and prefer clearly defined expectations
- Fears criticism of their work and slipshod methods
- Overly critical of self and others and indecisive but appear cautious, precise and diplomatic

BITS & PIECES

The de Havilland Canada DHC-2 MkI Beaver, a single-engine high-wing propeller-driven short takeoff and landing aircraft, was developed and built in Downsview, Ontario. It was designed to carry heavy loads into confined, rough terrain and was instrumental in northern development.

STUDENTS GIVEN CAREER-BUILDING ADVICE DURING PEO STUDENT CONFERENCE

By Julian Faita

The 2018 PEO Student Conference included the Engineering Student Societies' Council of Ontario executive team, conference chair and planning committee, student delegates, representatives from PEO and the Ontario Society of Professional Engineers, and Oshawa MPP Jennifer French.

PEO and the Engineering Student Societies' Council of Ontario (ESSCO) hosted undergraduate engineering students from ESSCO's 16 participating universities for the annual PEO Student Conference on November 2 to 4, 2018, at the University of Ontario Institute of Technology (UOIT) in Oshawa, Ontario, for an opportunity to network, participate in workshops and sessions and engage with engineering leaders. Speakers included not only representatives from PEO and the Ontario Society of Professional Engineers (OSPE) but also professors, entrepreneurs, a former president of ESSCO and an Oshawa-area MPP. The conference focused on enabling students to network with established engineering professionals and develop students' knowledge about the engineering field.

The conference began with an introduction from conference chair Gabriel Pizarro and the conference's organizing committee, Jenieshia Jeyachandrakanthan, Brooke Godding and Garie Kala-Ananthan, who spent months planning the conference. Tarlochan Sidhu, PhD, P.Eng., dean of the faculty of engineering and applied science at UOIT, also gave opening remarks.

continued on p. 20

continued from p. 19

During the first day, the students, most of whom are in their final two years and will be entering the job market soon, took part in a professional networking event; companies that attended included Trane, Bruce Power, Ontario Power Generation, BWXT Nuclear Energy Canada and Korechi Innovations. Students were able to speak one-on-one with the companies' representatives and share their resumes. The event was a success and may be used as a benchmark for networking events at future student events.

On the morning of November 3, students met with PEO's EIT/Student Programs Coordinator Sami Lamrad, EIT, who explained PEO's student outreach programs, the regulatory role of PEO and the importance of obtaining a professional engineering licence. Following Lamrad was OSPE Board Vice Chair Tibor Turi, P.Eng., who explained OSPE's advocacy mandate, which voices the concerns of engineering professionals and students to the government and public. Later in the day, UOIT Professor Sheldon Williamson and Vahid Jozi, an entrepreneur who works in the online and artificial intelligence sectors, spoke about their careers and how they have become successful in their respective fields.

Following the day-long sessions, Jennifer French, New Democratic Party MPP (Oshawa), hosted the students and professionals at the closing banquet, during which she spoke about her background as an educator and champion of social justice. She noted the prominent role of engineering in society and the importance of engineers becoming involved in politics.

The final day of the conference involved students engaging in an in-depth discussion on prominent issues that engineering students face, as well as possible solutions. Lots of important discussion was had and once everyone had their voices heard, the conference was closed with a message from Jake Lipohar, EIT, a former ESSCO president who is completing his engineering internship as a structural designer at Tacoma Engineers. He offered some important life lessons for the soon-to-be graduating students.

Julian Faita is ESSCO's vice president of communications and a third-year mechanical engineering student at Ryerson University.

2019 ONTARIO EVENT HIGHLIGHTS

It's that time of year again: National Engineering Month (NEM) is coming up in March 2019. This annual initiative, which connects students, teachers, parents, professionals, organizations and the general public through hundreds of engineering-related events across Ontario, is hosted by members of PEO, the Ontario Society of Professional Engineers (OSPE) and the Ontario Association of Certified Engineering Technicians and Technologists (OACETT). Events such as design competitions, workshops and interactive displays celebrate engineering and engineering technology while promoting a culture of diversity, collaboration and innovation within these fields. Every year, hundreds of volunteers contribute their time to support events in their local communities and to help make National Engineering Month a success.

Are you interested in getting involved? Reach out to your local PEO chapter and sign up to be an event volunteer. You can also bring your family to an event and share your passion for engineering and engineering technology. To stay up-to-date on all NEM Ontario news, follow social media using the hashtag #NEM2019 and on Twitter, Facebook and Instagram at @nemontario.

The following is a partial list of events hosted by PEO chapters during NEM 2019. Please visit nemontario.ca for an up-to-date event list and further details.

ALGOMA

Sault Ste. Marie Engineering Month Event, March 23, Sault Ste. Marie Station Mall

PEO and OACETT Algoma chapters are running a series of engineering outreach activities in various local schools leading up to the mall event. On March 23, they will be hosting an annual engineering day at the mall. This includes engineering displays from local businesses, a team math challenge, colouring contests and interactive displays such as robotics.

ALGONQUIN

Algonquin Bridge-Building Challenge, March 20, Pembroke Mall

This popsicle stick bridge-building challenge is open to students in grades 5 to 12 from the Ottawa valley. Teams of students build their bridges according to the rules provided ahead of the event. They present their bridge to a judging panel consisting of professional engineers. Bridges will be tested to failure, with students watching the results in person. Prizes are awarded for the most successful bridges (defined as the highest strength-to-weight ratio).

BRAMPTON

Popsicle Stick Bridge-Building Challenge, March 2, Greenbriar Middle School

PEO's Brampton Chapter popsicle stick bridge-building challenge is for students in grades 4 to 8 in the Brampton and surrounding area. Students design and build their bridges and present their research, design process and methods to a panel of professional engineer judges. Bridges are tested to failure, and students watch the results on the big screen. Top teams are awarded prizes.

CHATHAM-KENT

Impromptu Design Competition, March 9, Chatham-Kent Secondary School

PEO's Chatham-Kent Chapter is hosting an impromptu design competition for students in grades 7 to 12. Participants are given the criteria the day of and have to work as a team to build a working prototype and compete against others.

EAST TORONTO

The Catapult Challenge, March 30, S. Water Stewart Toronto Public Library

Fifty grade-school students and their parents are invited to participate in the catapult challenge, an interactive workshop where you can design and build different catapults. Each catapult will undergo several tests to determine accuracy and power. Volunteers will also be showcasing what engineering is, what it means to be an engineer and the value of continuing STEM in school.

ETOBICOKE

Engineering Idol 2019, March 2, Bahen Centre, University of Toronto

Students from across the Greater Toronto Area participate in a one-day competition. Each year provides a new and exciting challenge that requires presenting, promoting and building a prototype using a theme—this year's theme is ethically designed self-driving vehicles. The students are provided the unveil package in December and are to provide a preliminary report outlining how they will meet the problem statement. After receiving input from professionals in the engineering field, students have two months to build their design and prepare a presentation. We evaluate against their ability to perform the task, present their design and explain how their design interacts with our society.

GRAND RIVER

Mathletics Competition 2019, March 23, University of Waterloo

Seventy students in grades 5 to 8 are invited to participate in a math competition to apply math and physics to engineering principles. This event promotes the engineering profession to youth and encourages them to connect school topics with real-world engineering problems.

K'Nex Bridge-Building Competition, March 16–17, Kitchener Museum

A two-day event during which kids from ages three to 10 are encouraged to build a bridge structure that can support a specified weight. Volunteers from the engineering society of the University of Waterloo help explain the engineering behind the strength of structures. Winners will receive K'Nex build sets.

KINGSTON

Kingston Annual Bridge-Busting Challenge, March 16, Cataraqui Centre

PEO's Kingston Chapter's annual bridge-busting challenge invites local community members of all ages to construct their best popsicle-stick bridge. Bridges will be judged on their overall strength, visual aesthetic and complexity of design. Come out and challenge local engineers and aspiring engineers with your most creative bridge design.

KINGSWAY

Engineering in Hockey, March 19, Ricoh Coliseum

The Kingsway Chapter is partnering with the Toronto Marlies to present engineering in hockey. Bring your whole family to take part in fun activities like testing how fast you can hit the puck with different types of sticks and creating engineering buttons. You'll also learn how engineering can be studied in all facets of hockey, from designing the sticks, to ensuring the ice is in perfect condition to the arena construction.

LAKE ONTARIO

Mathletics, Popsicle Stick Bridge Competition, February 23 and March 23, University of Ontario Institute of Technology

The Lake Ontario Chapter is organizing the two events for National Engineering Month. The first event is the second annual mathletics competition. This competition will create passion in the application of mathematics in solving engineering-related problems. In order to succeed in this competition, students have to solve a variety of mathematics and engineering-related problems. Moreover, this event will promote the engineering profession among a wide population of primary school students. The second event is a popsicle stick bridge-building competition that has been organized every March for the past 14 years.

LAKEHEAD

Student Straw Tower Design Challenge, March 22, Lakehead University Fieldhouse

PEO's Lakehead Chapter is organizing a team design competition in which students will be challenged with designing and constructing a tower made solely out of straws and masking tape within fixed dimensional constraints defined by rules. With a limited amount of building materials, the goal is to build the sturdiest structure possible. The structure is tested by loading it from the top until failure. The teams that build the strongest towers will be awarded prizes.

LAMBTON

Engineering Discovery Day, March 2, Lambton Mall

The public is invited to participate in pick-up challenges where we use simple objects to demonstrate a scientific principle. All booths are geared towards hands-on participation. For instance, one booth encourages the public to make slime while learning about polymerization, and another teaches about buoyancy while participants guess which object floats or sinks. Booths are targeted to elementary school children. Participants are given a discovery day passport and when they visit a set number of booths they receive a small prize.

MISSISSAUGA

Bridge-Building Challenge, March 23, Tomken Road Middle School

PEO's Mississauga Chapter is hosting their annual bridge-building challenge. Teams will be provided with a kit of 200 popsicle sticks, white school glue and a set of rules. The challenge will be to research and create a design for a bridge and then build it from the supplied kit of popsicle sticks. On the day of the event, teams will bring their assembled bridge and give a short presentation about it in front of a panel of judges, who are all engineers. Their bridge will then be tested on a bridge buster and will record the load the bridge is supporting at the moment it breaks. Other aspects about the bridge, including design technique, construction quality, creativity and aesthetics, will also be evaluated by the judges.

NIAGARA

Design and Build Competition, March 2, Niagara College

PEO's Niagara Chapter invites secondary school students to participate in the design and build competition. The format of the competition is as follows: two weeks prior to the competition date, the engineering problem is released to students. During these two weeks students research the topic and come up with a design plan. On the

day of the competition, students will have a few hours to build their prototype, test it and present it to a panel of judges. All building materials will be supplied on the day of competition. The judging panel will be comprised of professional engineers and subject matter experts. Judging will be based on creativity, application of engineering principles, technology understanding and teamwork. Monetary prizes will be awarded to the top three teams at the end of the competition.

NORTH BAY

2019 Bridge-Breaking Competition, March 29, St. Joseph-Scollard Hall High School

The bridge-breaking competition is part of an ongoing PEO outreach program that seeks to foster innovation in schools. The competition introduces and discusses real-life technical issues faced by modern engineers, complementing the curricula being taught in schools. Students in grades 5 to 12 will construct bridges from balsa wood that will be tested to destruction to determine the load-carrying ability of the structures. The bridges will be judged on the basis of craftsmanship, conformity to guidelines and engineering content. There are typically over 100 entries submitted from schools across the region. Participants will have the opportunity to interact with local engineers and ask questions about engineering careers.

OAKVILLE

NEM 2019, March 2, Holy Trinity Catholic School

We invite a group of student volunteers, board members and chapter volunteers to participate and introduce children to various disciplines of engineering. There will be contests, interactive models, displays and presentations.

PETERBOROUGH

Peterborough Engineering Challenge, March 5, Evinrude Centre

In partnership with OACETT and the Institute of Electrical and Electronics Engineers, PEO's Peterborough Chapter invites students to participate in the Peterborough engineering challenge and construct an aircraft. The event will start with an introductory presentation about the science and physics behind building an aircraft and they will be given all of the necessary instructions and materials. Students will have a few hours to build the aircraft, which will be tested against a variety of criteria. There will also be a written work package that the students will be required to complete.

SCARBOROUGH

Popsicle Stick Bridge-Building Competition, March 9, Scarborough Civic Centre

PEO's Scarborough Chapter has been conducting an annual popsicle stick bridge-building competition since 2004. Students in grades 3 to 8 from Scarborough elementary schools build bridges of specified dimensions made out of ordinary popsicle sticks and school glue and weighing less than 250 grams. The bridges will be judged by a team of professional engineers and volunteers on the criteria of the students' presentation, technical explanation, creativity, construction quality, construction technique and aesthetics. Media coverage from various sources will be invited to cover the event. Political dignitaries are invited to enhance the PEO-government relationship and show how the chapter is involved in educating engineering concepts to the local community.

SIMCOE MUSKOKA

National Engineering Month Event, March 13, Bradford

PEO's Simcoe Muskoka Chapter is hosting a fun and vibrant event celebrating engineering achievement and inspiring the next generation of problem-solvers with a friendly competition and hands-on demos.

SUDBURY

PEO Sudbury NEM Mall Event, March 23, New Sudbury Centre

In partnership with OSPE, OACETT, local universities, colleges and high schools, PEO's Sudbury Chapter is hosting their annual mall event, which is always a big hit with the local community. They will set up different groups in the middle of a mall centre and have live interactive demos put on by student groups, the local science centre and engineering firms. The goal is to provide stimulating examples of how engineering affects our everyday lives as well as some information on how people can get involved.

THOUSAND ISLANDS

National Engineering Month Event, March 1 to April 5, schools within Upper Canada District School Board

Each year since 2006, PEO's Thousand Islands Chapter, in partnership with teachers and as many as 13 schools within the Upper Canada District School Board, has held a series of popsicle stick bridge-building competitions throughout the month of March. These competitions are held in-school during school hours and in many cases involve the entire staff and student body. This busy event calendar culminates with two additional events in the first week of April: The first is our regional championship, which is scheduled for April 3, when teams from each school who participated during March send their best teams to compete against other schools to determine the regional champion.

The second occurs at the Rideau St. Lawrence Science Fair in which organizers, teachers and science fair volunteers compete.

WINDSOR-ESSEX

Mathletics Competition, March 9, University of Windsor

Mathletics is a competition designed to create a passion in the application of mathematics in solving day-to-day scientific and engineering problems. Students will be challenged to be active and creative in the use of mathematics. Different facets of mathematics will be introduced and tested. An electronics audience response system (clicker) will be used for participants to answer a series of questions in both numeric and multiple-choice formats.

YORK

Engineering Design Challenge, March 27, Sir William Mulock Secondary School

PEO's York Chapter is organizing an engineering design challenge for grades 7 and 8 students in the York Region. Students in teams of four will design and build an object to achieve a goal within two to three hours. The teams will be judged on both presentation and the performance of the final product.

SHE'S A DIVERSITY WARRIOR, ENGINEERING CHAMPION AND VOICE FOR CHANGE

In this column, we highlight engineering interns who are on the path to licensure and who serve as examples of diversity and talent within the pool of applicants to the profession. Vanessa Raponi, EIT, has a clear passion for engineering, a deep sense of social justice and a calling to be an instrument of change.

By Marika Bigongiari

Despite not knowing any engineers when she was growing up, Vanessa Raponi, EIT, came to engineering through the encouragement of friends and family. "My mom always told me to take all the sciences and maths to keep my options open when it came to a career," she says. In Grade 12, Raponi had a conversation with a friend who told her about the schooling and community around engineering, and after another conversation with a friend's engineer father, she decided to apply. She was looking for a career that would help her to be financially independent, utilize her skillset and help her give back to the world, and engineering fit the bill: "I found all of that in engineering," she explains.

Vanessa Raponi, EIT, holds a degree in materials engineering and management from McMaster University.

A PASSION FOR THE PROFESSION

A caring professional dedicated to engineering, Raponi had many role models along the road of her STEM journey, beginning with radioactivity pioneer Marie Curie, who had a particularly significant impact on Raponi during high school chemistry class. "She was one of the first women in science I ever really learned about," she says. When Raponi entered university, her field of engineering mentors expanded significantly with everyday role models who were either engineers themselves or advocates for the community. She is keen to give thanks to a long list of mentors, among them: Bob Duffield, P.Eng.; Eli Levy and Mina Nourmansouri, P.Eng., at Bombardier Aerospace; Cal Clark, Ahmed Salman and Dave Denney at PepsiCo; Erica Lee Garcia, P.Eng., and Rebecca White, EIT, of Engineers of Tomorrow; and Lynn Stewart, PhD, and Kim Jones, PhD, LEL, from McMaster University. "These were mentors or supervisors who took the time to coach me, teach me and help me explore my potential," says Raponi, who also looks up to those she sees as "strong women in the engineering advocacy community," including Marisa Sterling, P.Eng., FEC, vice president of PEO; Annette Bergeron, P.Eng., FEC, president of Engineers Canada; Val Davidson, PhD, P.Eng.; and Mary Wells, PhD, P.Eng.

Raponi, who graduated from a five-year degree in materials engineering and management at McMaster University, stresses the value of the co-operative education portion of her degree, during which time she gained 28 months of full-time engineering experience in four different industries: aerospace manufacturing, academia abroad, food and beverage manufacturing and the not-for-profit sector. This not only gave her valuable business experience but opened her mind to possibilities beyond engineering. At Bombardier Aerospace, Raponi worked in the maintenance engineering department. Stepping from first-year engineering into a 4000-plus employee facility where airplanes were created in front of her was an eye-opening experience. Next, she went to France as a research assistant at the Grenoble Institute of Technology, where she assisted with the analysis of 3-D models of niobium nodules on the surface of solid oxide fuel cells. "It was a small contribution to a much larger research project, but it exposed me to the world of research and working with an international team of engineers," she says. At PepsiCo, Raponi used her time towards the 12 months of pre-graduation experience needed for licensure, working under a professional engineer in the manufacturing facilities for Quaker Oats in Peterborough, Ontario, and for Pepsi in Vancouver, British Columbia. While there, Raponi also worked on Lean Six Sigma projects for process optimization, supervised production, implemented change management programs and analyzed resource conservation projects. For her final co-op placement, Raponi stepped into the not-for-profit world, working with Engineers of Tomorrow, where she ran a provincial STEM youth outreach program. "Working here is what reconnected me with my desire to be an engineer and is why I have decided to pursue my P.Eng. licence by working in engineering manufacturing industries," Raponi says. "I entered into my degree as a lover of chemistry who anticipated business skills would be valuable, and I left as a lover of manufacturing processes who is 100 per cent confident that business skills are valuable."

Raponi's entry into the world of manufacturing and consumer packaged goods led her to her current position at Spin Master, a 24-year-old Canadian toy and entertainment

company. Raponi is part of the engineering management development program, which will require her to complete three six-month rotations in separate areas of the business before finally settling into one role. She is working under a P.Eng., gathering the remaining three years of work experience needed to get her licence. Raponi explains: "I'm currently wrapping up my time in product development, which is the engineering side of bringing a toy from concept to reality. It's a great mix of process thinking, manufacturing knowledge and project management—and a whole lot of people skills to boot."

Raponi relishes how the position takes problem solving to its extremes and demands the balancing of technical and business challenges to bring toy concepts to life. For her next rotation, she'll step into supply planning, where she'll learn about inventory management. "This will make me a better engineer by understanding the implications of how the changes in my production schedule affect the entire supply chain," she says. "I'll learn about systems thinking and I'll be tasked to manage and improve global processes." With a personality as warm, joyful and enthusiastic as Raponi's, working in the toy industry seems fitting. "Working in toys is very rewarding," she points out. "Spin Master has a true-to-its-core motto of fun—creating fun, selling fun, being fun! Knowing that our purpose is to bring joy to children's lives is very motivating, and I find our philanthropic work takes that to a new level." She has endless admiration for Spin Master's work with soup kitchens, shelters and overseas initiatives, and in the few months Raponi has worked there, she has participated in the Sick Kids and Breakfast Club initiatives, all of which adds personal meaning to the significance of the products she works to create.

VOICE FOR CHANGE

Don't let the innocuousness of the toy industry fool you—Raponi is as driven as they come. She's determined to obtain her engineering licence within the next three to five years. "I registered as an EIT about the millisecond I could, and I'm really excited to work towards the goal of licensure," she says. Raponi's goal is to obtain a position that will utilize her skillset and allow her to flex her organizational strategy muscles. She sees herself providing a valuable lifelong service to society, whether it's as an engineer, a businesswoman or a politician. "I have big ideas and big hopes for making the world a better place and revolutionizing how businesses can take the concept of corporate social responsibility (CSR) to a deeper and more integrated level in everything they do," she explains. "I think a key to unlocking society and humanity's potential is to break apart the notion that the concepts of business case and helping others are mutually exclusive." While Raponi believes most businesses view CSR as a pillar of their work, she wants to challenge them to integrate it more horizontally across all their functions. "Whether it's ethics, environmental factors, doing good for others, etc., there is a place for that type of thinking in everyone's jobs, from businesspeople to engineers to financial analysts," she says. "I'd love to see more thought about why and how decisions are made with this lens from all departments in a company. I think this is a strong millennial value, and I anticipate more of this thinking will be seen in the coming few years as more millennials enter decision-making roles."

DIVERSITY WARRIOR

The engineering profession recognized the value of bringing everyone to the table and the importance of inclusivity with the championing of the 30 by 30 initiative, which aims to increase the number of newly licensed women engineers to 30 per cent by the year 2030. Inclusivity is a concept Raponi holds close to her heart, and her acute sense of justice and equality is clear. While pursuing her education at McMaster, Raponi recognized a gap and founded EngiQueers (EQ), a national not-for-profit corporation that brings together 31 engineering LGBTQ organizations across nine provinces. These clubs focus on social connection, advocacy, education and professional development for their members. Raponi was recently recognized for this accomplishment by Engineers Canada, which awarded her the 2018 Gold Medal Student Award. "I started McMaster EQ as a second-year student in June 2013 and the national organization in September 2016," Raponi explains. "EQ started at McMaster due to a need for queer students to feel included and be more understood, and it grew to its national presence due to the overwhelming demand of these services nationwide. EQ is so important because we've approached the diversity topic from the unique lens of intersectionality. We care about the intersections and complexities of one's identity, and we strive to help all people feel included and welcome in engineering." Raponi has been to dozens of conferences across the country, where she delivered inclusivity training to thousands of engineering leaders and students and helped shift the national conversation around diversity in engineering. EQ Canada received national not-for-profit status in July 2017.

When it comes to inclusion, Raponi champions the idea of bringing diversity to the workplace, asserting that a person's ability to bring their full selves to work will simply help them perform better. Knowing that the fundamentals of who you are will not be challenged on a daily basis, whether overtly, as with harassment, or covertly through micro aggressions, will result in a better employee and ultimately a stronger company. "Work can be challenging, stressful and tiring at times, but being forced to hide who you are is all of those things, all of the time," Raponi says. "If you don't feel safe or comfortable being who you are, your performance will be impacted significantly… On my first day at Spin Master [for example] I was introduced to another young female who was openly queer, and I immediately felt more at home and accepted. I felt, 'Hey, this is a space I can be myself in,' and I've been a better employee everyday because of it. Diverse teams have been proven time and time again to come up with better solutions, and it's critical that this is fostered in engineering." **e**

SUMMARY OF DECISION AND REASONS

In the matter of a hearing under the *Professional Engineers Act*, R.S.O. 1990, c. P.28; and in the matter of a complaint regarding the conduct of a member of the Association of Professional Engineers of Ontario and a holder of a certificate of authorization.

The panel of the Discipline Committee met to hear this matter on March 26, 2018, at the offices of the Association of Professional Engineers of Ontario (the association) in Toronto.

The hearing proceeded by way of an Agreed Statement of Facts and a Joint Submission as to Penalty and Costs.

AGREED STATEMENT OF FACTS

This Agreed Statement of Facts is made between the Association of Professional Engineers and the holder and the member.

1. The member is a professional engineer who has been licensed pursuant to the *Professional Engineers Act* (the act) since 1992. He has held the designation of consulting engineer since 1998.

2. The holder has, at all material times, held a certificate of authorization issued pursuant to the act. The member is designated under section 47 of Regulation 941 under the act as assuming responsibility for the professional engineering services provided by the holder.

3. The complainant (the owner) purchased a post and beam house in Ontario in late 2007. She purchased the house from the owner/contractor (contractor) who had previously constructed the house. She moved into the house in January 2008.

4. The contractor builds post and beam houses using timber reclaimed from barns and had worked with the member on past post and beam residence projects. He retained the holder, under an oral contract, to prepare structural drawings to accompany his request for a building permit for the house in 2005.

5. The holder prepared two drawings, namely: Drawing S-1, entitled "Specification & Plans"; and S-2, entitled "Roof Framing Plan & Specifications" (the structural drawings). The structural drawings are dated July 25, 2005, and are stamped with the member's seal. The structural drawings specify 10"x10" main beams in Douglas fir, and spruce-pine-fir no. 1 for the floor joists.

6. Clause 9.4.1.2 of the Ontario Building Code 1997 requires that post, beam and plank constructions with loadbearing members shall be designed in conformance with subsection 4.3.1, which requires conformance with CAN/CSA-086 Engineering Design in Wood. CAN/CSA-086 Engineering Design in Wood requires standard grading of wood used in building projects.

7. The structural drawings failed to:
   a. specify the minimum grade of timbers to be used in the house;
   b. specify the connection details for all Douglas fir elements;
   c. specify an assumed founding elevation for various interior spread footings for the foundation and first floor framing;
   d. ensure that wood members were separated from direct contact with concrete, contrary to Ontario Building Code clauses 9.17.4.3 (posts), 9.23.2.2 and 9.23.2.3 (timber joists) and 9.15.5.2 (ground floor beams); and
   e. specify a continuous pocket with an anchored sill plate in the design of the ground floor timber joists to ensure adequate lateral support as required by s. 9.15.4.2 of the Ontario Building Code.

8. The building permit was issued in September 2005, and construction of the house was completed in the fall of 2006. The municipality requested a review of the post and beam construction by an engineer. The contractor requested that the member conduct a site visit, and that he provide a review letter to the municipality.

He agreed to do so. As a result, in or about October or November 2006, the member attended at the house for the purpose of reviewing the post and beam construction.

9. The member had not signed any Commitment to General Review in connection with the project. He did, however, prepare, sign, seal and send to the municipality a letter dated November 1, 2006. It reads in full as follows:

> During the course of construction of the above project, personnel from our firm carried out periodic site reviews of structural work in accordance with the requirements of section 2.3.2 of the Ontario Building Code and requirements of section 78 of Ontario Regulation 941/90, as amended, made under the *Professional Engineers Act* 1990, as amended. These reviews were conducted following the procedures described in the Professional Engineers Ontario guideline for *Professional Engineers Providing General Review of Construction as Required by the Ontario Building Code*.
>
> On the basis of these, it is our opinion that the work is in general conformity with the drawings and specifications prepared by the holder, under the professional seal of the member which formed the basis for issuance of the building permit and any changes thereto authorized by the chief building official.
>
> This opinion is based on the above parameters and should not be construed as a guarantee of work.

10. In fact, neither the member nor anyone from his firm had carried out periodic site reviews during the course of construction. In addition, the work was not in general conformity with the drawings and specifications prepared by the holder under the member's professional seal. There were in fact a number of deficiencies and variances, which were known or ought to have been known by the member. These included:
    a. the use of reclaimed material for the heavy timber members, not new material, without independent testing as to their species, grade, design value or structural integrity;
    b. the use of "TJI" joists that were installed at the ground floor and "TJI" rafters at the roof, where sawn timber was specified, without any additional calculations to ensure this substitution was acceptable and without submission of engineered shop drawings for the "TJI" elements;
    c. missing connection brackets between ground and second floor column lifts;
    d. missing and inadequately fastened knee bracing at the second floor;
    e. exterior stud wall framing being located beyond the face of heavy timber columns with no connection between the two elements;
    f. roof rafters being supported on exterior stud wall framing instead of on the heavy timber beams; and
    g. columns not being continuous across the ground floor with a lack of blocking being in place to transfer loads across the floor plate.

11. On the basis of the November 1, 2006, letter, the municipality's chief building official granted occupancy.

12. After the owner moved in, she noted numerous problems. As a result:
    - the house was inspected on numerous occasions by the municipality, which found deficiencies in several areas of construction and design;
    - the municipality eventually issued an Unsafe Building Order, and the owner had to move out of the house to a trailer;
    - the house was inspected by numerous independent structural engineers and pest control experts, who observed evidence of structural failure and pest infestation; and
    - litigation ensued; it was ultimately settled.

13. The structural drawings of the house failed to comply with the Ontario Building Code and failed to specify sufficient information, including as set out above in paragraph 7. In the circumstances, the holder and the member failed to maintain the minimum standards that a reasonable and prudent practitioner would maintain in the circumstances.

14. The November 1, 2006, letter was not accurate in that the holder and the member had not completed periodic site reviews of the house during the construction, and in that there were numerous variances and deficiencies in the construction of the house from the structural drawings such that the construction of the house was not in general conformity with the structural drawings.

15. By reason of the aforesaid, the parties agree that the holder and the member are guilty of professional misconduct as follows:

a. The holder and the member were negligent amounting to professional misconduct under section 72(2)(a) of Regulation 941. In particular, in preparing structural drawings and providing post-construction review to the owner in respect of the house, they knew or ought reasonably to have known the letter would be relied on by the township, the CBO, the owner and subsequent owners. They therefore failed to maintain the minimum standards that a reasonable and prudent practitioner would maintain in the circumstances.

b. The holder and the member failed to comply with applicable statutes, regulations, standards, codes, bylaws and rules amounting to professional misconduct under section 72(2)(d) of Regulation 941. In particular, in preparing structural drawings and providing post-construction review to the owner in respect of the house, they knew or ought reasonably to have known the review would be relied on by the township, the CBO, the owner and subsequent owners. They therefore failed to comply with sections 4.3.1, 9.4.1.2, 9.15.5.2, 9.17.4.3, 9.23.2.2 and 9.23.2.3, and/or 9.15.4.2 of the Ontario Building Code and/or the Canadian Standards Association Standards (CAN/CSA-086 Engineering Design in Wood).

c. The holder and the member engaged in conduct or an act relevant to the practice of zprofessional engineering that, having regard to all the circumstances, would reasonably be regarded by the engineering profession as unprofessional, amounting to professional misconduct under section 72(2)(j) of Regulation 941. In particular, in preparing structural drawings and providing post-construction review to the owner in respect of the house, they knew or ought reasonably to have known the review would be relied on by the township, the CBO, the owner and subsequent owners. They therefore failed to meet the standard of professionalism expected of practitioners.

The respondents have had independent legal advice with respect to their agreement as to the facts, as set out above.

PLEA BY MEMBER AND/OR HOLDER

The panel conducted a plea inquiry and was satisfied that the member's admission was voluntary, informed and unequivocal. The panel accepted the explanations, accepted that the penalties were not contrary to the public interest and would not bring the administration of justice into disrepute, and followed the law and accepted the Joint Submission as to Penalty and Costs.

THE PANEL ORDERS

The panel concluded that the penalties and costs set out in the joint submission were appropriate and the panel orders:

a. Pursuant to s.28(4)(f) of the act, the holder and the member shall be reprimanded, and the fact of the reprimand shall be recorded on the register for a period of six (6) months;

b. Pursuant to s.28(4)(i) of the act, the finding and order of the Discipline Committee shall be published in summary form in PEO's official publication without reference to names;

c. Pursuant to s.28(4)(d) of the act, a term or condition shall be placed on the member's licence that he shall, within 14 months of the date of pronouncement of the decision of the Discipline Committee, successfully complete the association's professional practice examination (PPE);

d. Pursuant to s.28(4)(b) and (k) of the act, in the event that the member does not successfully complete the PPE with the time set out in (c) above, his licence shall be suspended for a period of ten (10) months thereafter, or until he successfully completes the PPE, whichever comes first; and

e. There shall be no order as to costs.

PENALTIES AND COSTS DECISION

The panel concluded that the penalties and costs set out in the joint submission were appropriate as they fell within a reasonable range of acceptability, taking into account the following items:

a. protection of the public interest;

b. remediation of the holder and the member;

c. maintenance of the reputation of the profession in the eyes of the public;

d. general deterrence; and

e. specific deterrence.

The holder and the member have co-operated with the association and by agreeing to the facts and proposed penalties have taken responsibility for their actions and have avoided unnecessary expense to the association.

Additional Note:

The panel administered a verbal reprimand at the conclusion of the hearing.

The Decision and Reasons was signed on May 3, 2018, by the panel chair, Patrick Quinn, P.Eng., on behalf of the panel, which included James Amson, P.Eng., Rishi Kumar, P.Eng., Lew Lederman, QC, and Leslie Mitelman, P.Eng.

COMPLAINTS COMMITTEE: VOLUNTARY UNDERTAKING UNDER SUBSECTION 24(2)(C) OF THE *PROFESSIONAL ENGINEERS ACT*

In the matter of a complaint regarding the actions and conduct of a member of the Association of Professional Engineers of Ontario, and a holder of a certificate of authorization.

BACKGROUND

1. The complaint relates to the work done by the member and holder in relation to the design and construction of five separate structures comprising part of a greenhouse facility.

2. The holder was retained by the manufacturer/builder of the facility to provide structural design services and general review of construction. The manufacturer/builder prepared structural drawings for the facility and the holder was to ensure the adequacy of the drawings for five of the structures and seal them.

3. The structural drawings, signed and sealed by the member, included a greenhouse, boiler room with in-floor water storage, cooler area structure, packaging area structure and circular high-water storage tank.

4. From the beginning of construction, to the final termination of the holder's services approximately seven months later, the member and holder conducted only three site visits/inspections. At the time that the holder ceased providing services, the majority of the construction of the facility was complete.

5. The owner of the facility retained another construction contractor to complete the facility, and the member and holder were no longer involved with the project. Subsequently, there were reported issues with construction not having been completed as per the approved drawings, issues with construction elements being missing, loose and damaged; and the design of some construction elements was questioned.

THE COMPLAINTS

6. The complaint raised issues concerning the work of the member and holder with regards to the adequacy of general reviews of construction, the adequacy of General Review Reports prepared and the sufficiency of information included on the sealed structural drawings.

7. The Complaints Committee (committee) received a candid and fulsome response to the complaint from the member and holder including a number of clarifications and explanations relating to the member and holder's scope of work on the project.

THE CONSIDERATION OF THE COMPLAINTS COMMITTEE

8. The committee considered the complaint on April 4, 2018, and June 27, 2018. The committee considered the response received and carefully considered the issues raised in this matter. The committee considered whether a referral to the Discipline Committee was warranted in all the circumstances, and whether it was in the interest of the public and the profession to proceed with the matter. The committee decided that if the issues raised in the complaint were addressed through certain proactive remedial efforts on the part of the member and holder, as well as publication of a summary of this matter, that the public interest issues raised by the complaint would be addressed.

VOLUNTARY UNDERTAKING

9. The member and holder voluntarily undertook to:

a. Execute detailed written contracts for all projects;

b. When reviewing and sealing drawings prepared by others, clearly indicate the limitations of the member's professional seal on the sealed drawings;

c. Ensure that there is engineering accountability for any final engineering content provided by others for the member's review;

d. Inform non-engineer client firms (such as manufacturers) that they must have all, not just some, engineering content sealed by a professional engineer;

e. Ensure that their drawings and reviews contain all design assumptions regarding loads and material properties;

f. Ensure that the components to be designed by others are clearly identified as such and all necessary loads and forces to be considered by others are clearly indicated on the drawings;

g. Follow diligently PEO's practice guidelines related to General Review and Provision of Structural Engineering Services in Buildings;

h. For general review, not rely on the contractor to inform when a review is warranted but work this out in advance and have a plan, ensuring that frequency of site visits will be sufficient to provide a rational and defensible sampling of the work;

i. Provide comprehensive General Review Reports of the actual structural conditions reviewed, noting any deficiencies including incomplete items and work in progress, and corrective action required; and

j. Retain an independent structural engineer to review the member's projects, for a period of one year. The independent engineer will provide a report of his or her review, which will be provided to the registrar of PEO.

10. The member and holder acknowledge that when serving as the engineer for a fabricator who has no engineer of their own, the requirements are different; and as the only engineer, they may be exposed to a higher level of expectation and responsibility. They undertook to make sure that clients understand this.

11. The member and holder voluntarily agreed that a summary of this matter and the voluntary undertaking would be published in PEO's Gazette without their names.

12. The voluntary undertakings described above were accepted by the committee as a dispositive measure, and pursuant to its powers under section 24(2)(c) of the act, the committee decided that this matter would not be referred to the Discipline Committee.

THE PROFESSIONAL BENEFITS OF PARTICIPATING IN PEAK

By Arden Heerah

Engineers perform professional engineering to develop solutions to everyday challenges encountered by society. They perform their activities in a way that safeguards public welfare and the environment, as proclaimed in Ontario's *Professional Engineers Act* (PEA) through its definition of professional engineering. However, at times, engineers might find themselves unsure of their day-to-day engineering practice and development activities in delivering on their public promise.

This is where PEO has stepped in to provide support to Ontario's engineering licence holders. Through PEO's voluntary Practice Evaluation and Knowledge (PEAK) program—which was implemented in March 2017—engineers and their employers have regulatory support when it comes to improving their engineering practice. The goal of the PEAK program is to serve as a practical and effective layer of regulatory protection in the public interest regarding the practice of professional engineering.

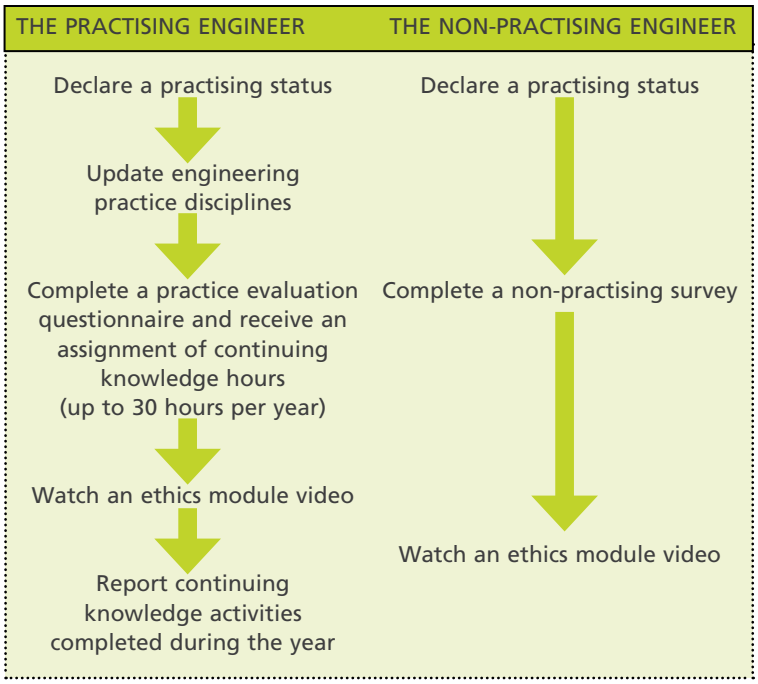
A principal outcome of PEAK is more public visibility regarding engineers who are practising and taking the extra step to inform PEO of their participation in continuing knowledge activities and also watch PEO's ethics and professionalism refresher video every year. It is an outcome that strengthens public trust in the profession and provincial regulation of engineering.

Because the program is based on professional engineers' voluntary participation, PEO Council has incorporated an incentive in the PEAK program, which is to track engineers' commitment to maintaining and elevating their engineering services, skills and professionalism and publicly post which engineers have completed their PEAK program elements on PEO's online directory.

However, engineers understand the merits of the PEAK program without its gamification feature, as noted in the 2015 final report by PEO's Continuing Professional Development, Competence and Quality Assurance Task Force on its findings from member consultation. It is a continuing knowledge reporting program that promotes the maintenance and elevation of engineering practice through insights and activities geared toward continuing competence and professionalism. By participating in a voluntary regulatory program that was created to protect the public interest, engineers recognize that it shows their dedication to the public, their employer and clients and themselves as professionals—through their ongoing promise of competence in the engineering services they undertake and remaining knowledgeable of developments in those engineering areas.

PEAK's THREE ELEMENTS

There are three elements of the program: a practice evaluation, ethics module, and CPD reporting mechanism. PEAK's website (www.peoPEAK.ca) provides an outline, the goals and the development history of the program, as well as additional support for the public to learn about the program and why it's important for PEO licence holders to complete it each year.



The first step of the PEAK program is for members to declare their practising status, which determines whether they require continuing knowledge relevant to their practice areas.

The questionnaire

The practice evaluation questionnaire achieves two things: (1) the practising status question quantifies how many engineers actively practise engineering in Ontario, and (2) tracking how engineering procedures are conducted in the performance of engineering. The questionnaire works much like an engineering practice audit or review. However, unlike a technical review, which results in an opinion on whether the reviewed engineering work complies with technical and industry standards and is appropriate for the outcome of the work, the practice review evaluates the policies and procedures in place for how the practice of engineering is being performed.

The distinction between practising and non-practising status is especially useful: The public needs to know the practising status of an engineer to make an informed choice; the engineer must be clear about their professional practice activities; and PEO needs to know which engineers are practising in which practice area at a given time. It allows PEO to compile data on which Ontario engineering licence holders are practising engi-

neering—for work, volunteer, unpaid or pro bono projects—and in which engineering disciplines. In fact, the first step in the program asks licence holders to reflect on the definition of engineering practice and whether, by that definition, they are practising. From the practising participants, PEO is learning the breakdown of engineering practice demographics in Ontario, such as engineering responsibility level, corporate quality management systems and personal and corporate continuing knowledge programs. These are useful regulatory details for the public and PEO because the regulator's activities—which are focused on protecting the public interest—will have data and evidence needed for policy making.

Engineers' answers to the online questionnaire will prompt a recommended number of continuing knowledge hours. A risk-based method is used to generate the recommended continuing knowledge hours. It delivers an informal review of the engineering risks to the public by looking at how the engineer and their employer carry out engineering procedures and reduce those risks. To do this, the questionnaire covers 20 risk-influence topics that address a wide range of member demographics, such as engineering discipline, experience level, supervisory level, size of organization and private and public sector.

RISK-INFLUENCE TOPICS IN THE PEAK PRACTICE EVALUATION QUESTIONNAIRE

1. Organizational structure of practice
2. Engineering role within the organization
3. Engineering standards
4. External engineering reviews
5. Internal engineering peer reviews
6. Engineering quality management system
7. Engineering outcomes
8. Technical certifications
9. Membership in technical societies (PEO excluded)
10. Responsibility level
11. Audits
12. Practice improvements (lessons learned program)
13. Experience within current area of practice
14. Engineering mentorship or peer network
15. Review of relevant technical information
16. Reference library
17. Industry updates
18. Organizationally-provided training
19. Breadth of practice
20. Continuing professional development programs (outside PEO)

The risk-influence topics help PEO determine a recommended number of continuing knowledge hours for practising members.

The practice evaluation questionnaire achieves three goals: First, the engineer and his or her employer get an opportunity to reflect on their processes for performing professional engineering, and every time they complete the questionnaire, their responses benchmark how they see their processes. Second, because of the topic areas in the questionnaire, engineers and their employers are both inspired to maintain or improve their processes for performing engineering. This means future completions of the yearly questionnaire will draw their attention to the improvements they made and the process components they may wish to work on. Third, through the annual completion of the questionnaire, PEO will learn how engineering practice is being conducted and how it is evolving. This information strengthens PEO's position as the provincial regulator and could guide PEO's activities in better supporting licence holders in maintaining and improving their professional engineering practice.

An ethics refresher

A universal element of the PEAK program is the ethics module. Here, all engineers—whether practising or non-practising—watch a video created by PEO to reacquaint themselves with their statutory and ethical obligations as a professional engineer. The module provides an understanding of how to apply those obligations to real-life situations. In addition to Ontario's PEA, a key focus of the ethics module is Ontario Regulation 941, which provides details on how to implement the PEA. Additionally, it specifically covers professional misconduct by engineers in section 72 and recommends the principles of a trusted engineer in the Code of Ethics in section 77. References to practitioners' obligations and recognized best practices can be found in O.Reg. 260 and PEO's professional standards and guidelines. All of these documents are available on PEO's website, www.peo.on.ca.

A continuing knowledge reporting form

The final element of the PEAK program is the online reporting of continuing knowledge activities. This is where practising engineers report back to PEO on the continuing competence activities they have completed—specifically, the activities that are relevant to their engineering practice areas and help to maintain or enhance their technical engineering skills and practice of professional engineering. The program accommodates a variety of topics and ways by which engineers learn, as long as the content of learning activities align with the goals of the PEAK program.

THE BENEFIT OF SELF-REFLECTION

The program's focus on self-reflection is insightful: The engineer and their employer become more aware of their practice activities and their engineering risks to the public from the way they apply engineering codes, standards, best practices and risk-reducing steps. Because the practice evaluation questionnaire is a self-directed practice review, engineers are compelled to reflect on their practice habits, guided by the risk-influence topics listed above. For example, an engineer practising in the same role for many years but not following updates to developments in their practice areas should be motivated by the PEAK program to modernize his or her engineering knowledge and

competence level. In another example, an engineer practising in a supervisory engineering role within a new and emerging practice area that has few published guidance documents will be propelled by the PEAK program—if he or she is not already moved to do so by employer and market forces—to stay meticulously up-to-date on codes and best practices in order to reduce the risks their practice activities present to the public. After all, Ontario legislation allows and reinforces engineers to practise in any engineering area as long as they become and remain competent to do so.

Another benefit of this self-reflection is the engineer becomes aware of the quality assurance measures they can employ in their practice. These measures are intended to reduce the risks their practice activities present to the public—risks from errors and omissions in engineering procedures. Sometimes these measures do not exist, are internally designed and implemented in an ad hoc manner or are strictly administered and industry recognized. And because the responses to the questionnaire remain confidential and can be updated anytime, engineers can use it as another instrument in their toolkit for delivering high-quality and modern engineering practices to their clients.

When reflecting on their continuing knowledge activities, the engineer becomes more aware of their practice activities and their engineering risks to the public from the way they follow updates to engineering codes, standards, best practices and risk-reducing steps on a continuing basis.

Another benefit is the engineer becomes aware of their continuing education plan. Continuing knowledge is the process of planning, pursuing and tracking activities that support learning targets on an ongoing basis. The PEAK program propels the engineer to review what continuous learning they have completed (the topics and learning format) and contemplate what to do next for their current, and perhaps future, engineering roles. The outcome is a continuously informed and in-touch professional engineer.

The PEAK program was created for the public and founded on engineer participation. Therefore, feedback from the public and engineers is important to refining the program to meet and maintain the goal of serving and protecting the public. To learn more about the PEAK program, visit www.peoPEAK.ca. The PEAK program team is also available for questions and feedback by email at peoPEAK@peo.on.ca and phone at 416-224-1100 or 800-339-3716.

Arden Heerah, P.Eng., is PEO's PEAK program coordinator.

HAMILTON

A COMMUNITY EXEMPLIFYING ONTARIO'S ROAD SAFETY

Despite recent sensationalist news coverage to the contrary, Ontario has one of the safest road networks in North America. Traffic and vehicular engineering have allowed the number of fatalities and injuries on Ontario's roads to drop significantly in the past four decades, despite the exponential growth in vehicular traffic and population. We use Hamilton—a large Ontario city with significant urban and rural areas—to explore Ontario's embrace of Vision Zero principles to bring even more safety to our roads.

BY ADAM SIDSWORTH

Hamilton, Ontario, is a city of contradictions. The city's nearly 537,000 inhabitants occupy a geographically large area—over 1100 square kilometres—giving it a deceptively low density compared to other large cities in southern Ontario. This, no doubt, is a result of the provincial government's January 2001–imposed amalgamation of the former Regional Municipality of Hamilton-Wentworth with its six lower-tier municipalities, all of which had versatile characteristics. The old city of Hamilton, as densely populated as parts of Toronto, was crisscrossed with one-way streets devoted to the car and was historically reliant on heavy industry for jobs, while nearby Dundas was a bedroom community with a thriving arts scene; Flamborough, located on the Niagara Escarpment, was largely agricultural and dissected by the Bruce Trail; and Stoney Creek, located on Lake Ontario near Niagara wine country, was a small town with large portions devoted to fruit farms.

It's been 18 years since amalgamation, and Hamilton is still a city of contrasts. As recently as September 2018, the *Waterloo Region Record* reported that "Dark pine forests fringes with wildflowers are all you see on southbound Highway 6 as the sign tells you you're inside the city limits.

And for the next 20 kilometres, as farm and gas stations give way to light industry and garden centres, until you get to the tangle of highways at the edge of Lake Ontario, Hamilton is a city that doesn't look like a city." But things are changing: Hamilton is the country's eighth-largest city. Its downtown core, long the sight of empty storefronts and boarded-up windows, is now gentrifying, complete with a three-kilometre bike lane, improved lighting and beautifying projects and 20 proposed residential towers, some over 20 storeys. And former agricultural areas, such as Waterdown and Flamborough, are witnessing quickly built residential areas. The city has $1.3 billion in development, and Metrolinx has sunk $100 million into a proposed $1 billion light rapid transit line that will connect Stoney Creek, downtown Hamilton and McMaster University.

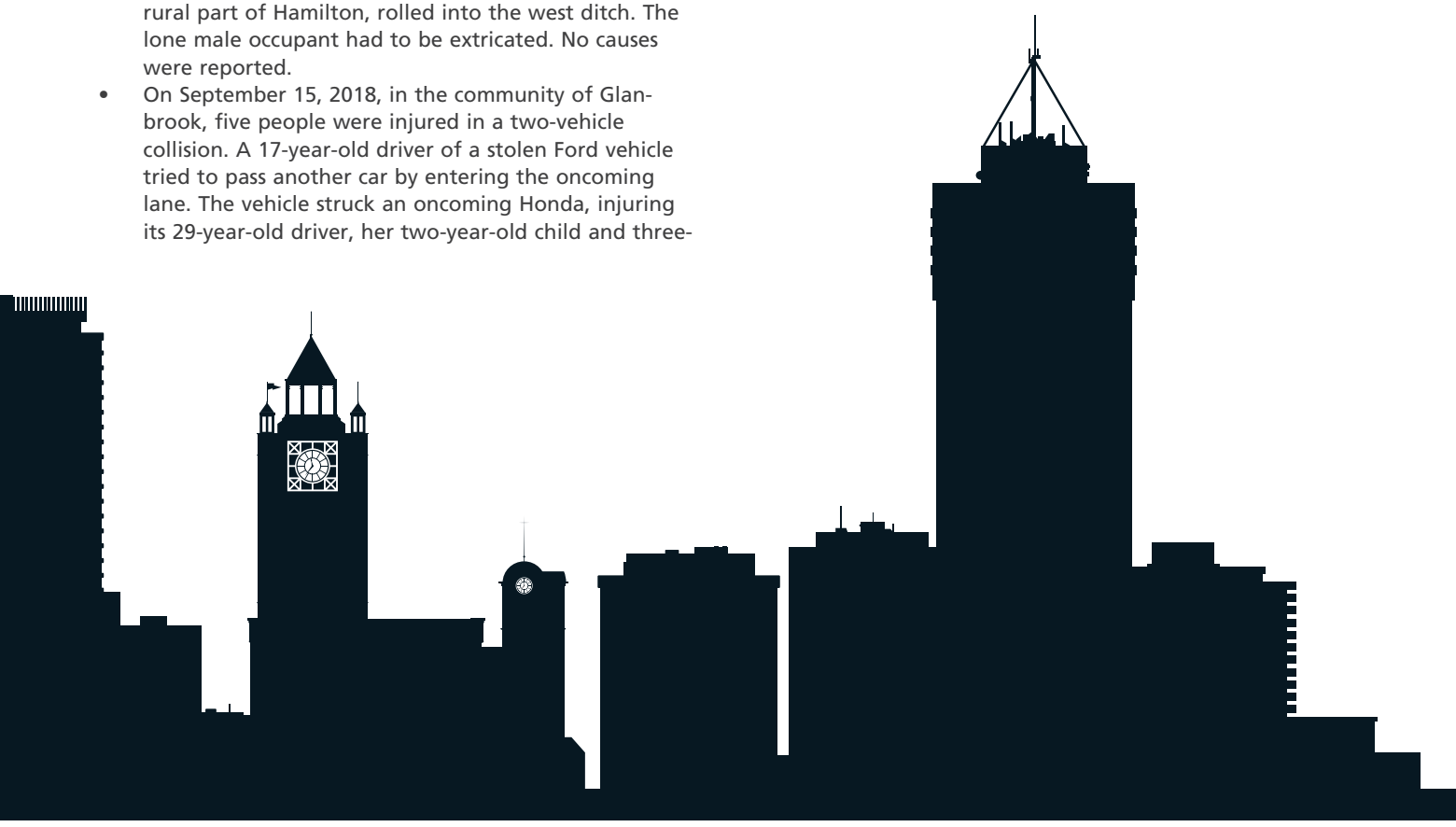
Hamilton's urban, suburban and rural areas have unique traffic demands, no doubt presenting a challenging balance between planning of traffic engineering and safety and future civic growth. Consider these recent headlines:

- On February 7, 2017, the Ontario Provincial Police (OPP) reported that two people died after two vehicles collided in a deadly crash on Eastport Drive, just south of the lift bridge near Burlington Bay, close to a heavily industrial part of Hamilton. One vehicle struck a wall, rolled over and burst into flames. No causes were reported.
- On November 9, 2018, a vehicle heading north on Highway 6, between Maddaugh Road and Gore Road, in a rural part of Hamilton, rolled into the west ditch. The lone male occupant had to be extricated. No causes were reported.
- On September 15, 2018, in the community of Glanbrook, five people were injured in a two-vehicle collision. A 17-year-old driver of a stolen Ford vehicle tried to pass another car by entering the oncoming lane. The vehicle struck an oncoming Honda, injuring its 29-year-old driver, her two-year-old child and three-week-old baby. An 18-year-old passenger of the Ford was also injured. The Ford's driver was charged with four counts of dangerous driving causing bodily harm.

Although Ontario media, notably in urban areas, where vehicles and vulnerable road users (notably pedestrians and bicyclists) interact more often, have recently focused on traffic safety and fatalities, Ontario is one of the safest jurisdictions in North America. In 2015, the Ministry of Transportation of Ontario (MTO) declared: "In 2014, Ontario's fatality rate of 0.53 per 10,000 licensed drivers was the lowest ever recorded in Ontario (matching a record low in 2011). It was the second lowest in all of North America, behind only Prince Edward Island. In 2014, the number of traffic fatalities on Ontario roads was 517, which is the second-lowest number of fatalities since 1944."

Consider that in its *Ontario Road Safety Annual Report 2014*, MTO reported that:

- Between 1995 and 2014, the number of licensed drivers grew by 37 per cent, yet fatalities in real numbers dropped by 48 per cent;
- There was a 75 per cent increase in large trucks registered in Ontario between 1995 and 2014, yet by 2014, they were responsible for 40 per cent less deaths;
- Between 1995 and 2014, the number of pedestrian deaths from collisions dropped by 13 per cent, and serious injuries dropped by 48 per cent; and



Top and middle: An example of inconsistently designed bicycle facilities. The use of bicycles has become increasingly popular, and Ontario's roads are ill equipped to safely accommodate bicycles.
Photos: Alexandre Nolet, P.Eng.

Bottom: A section of Hamilton's three-kilometre bicycle lane, implemented as part of Hamilton's bid to beautify the city and improve vulnerable road users' safety. The city used MTO's *Ontario Traffic Manual Book 18* as a guideline. Photo: City of Hamilton

- By contrast, the number of fatalities from inattentive driving increased by 85 per cent between 1995 and 2014, and the number of injuries from inattentive driving increased by 88 per cent. This may be due largely to living in the era of the personal electronic device.

In 2014, vulnerable users resulted in a small minority of injuries and deaths. There were 4053 pedestrian injuries and 110 pedestrian fatalities, and 1785 bicyclists injured and 16 bicyclists killed. Compare that to drivers and passengers, who experienced 45,857 injuries and 322 deaths. However, vulnerable road users, if hit, are more likely to sustain serious injury or death.

MTO has also released its *Preliminary 2016 Ontario Road Safety Annual Report Selected Statistics*, and although not a complete report (the final numbers will vary), the report indicates a continuing trend of increasingly safe streets and decreasing fatalities and serious injuries, despite the increased number of drivers, vehicles and total number of kilometres travelled. The total number of persons killed was down to 0.49 per 10,000 licensed drivers—483 in real numbers—and the number of pedestrians killed dropped to 96, and driver and passenger deaths decreased to 308.

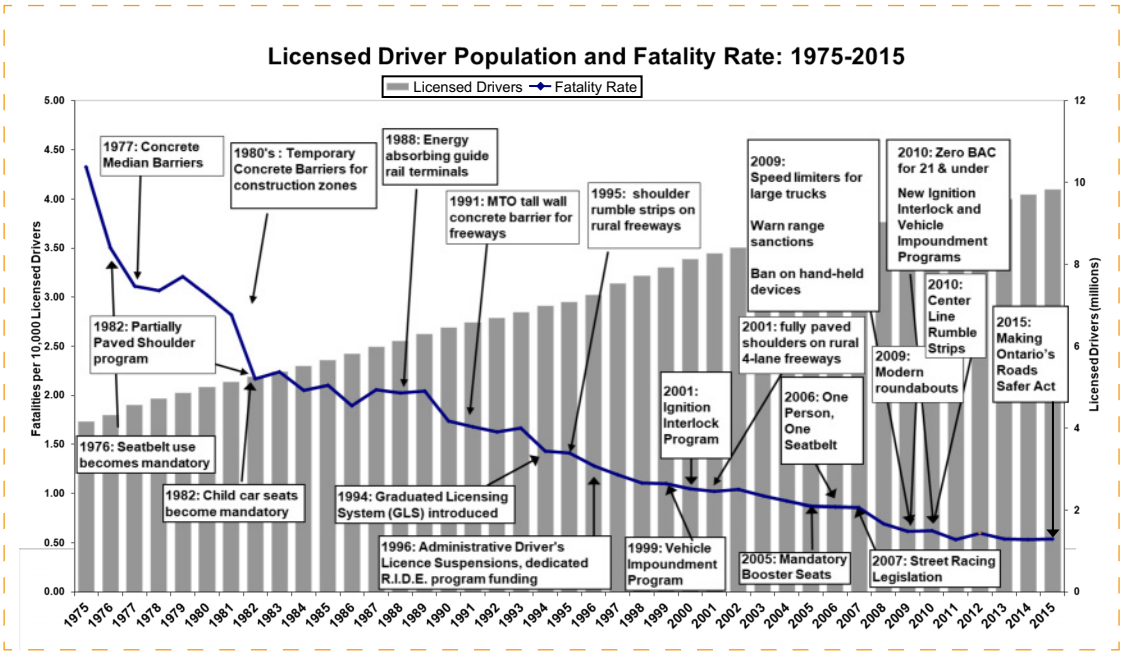
It seems too early to assess the numbers for 2017, although both CBC and Global News cite statistics released by the OPP reporting that 2017 witnessed a five-year high for the number of fatalities on OPP-patrolled roads. Inattentive- and speed-related factors played major roles (as did animal collisions). However, despite this surge, Ontario roads remain safe.

VEHICLE AND ROAD DESIGN IMPROVEMENTS

Kevin Bentley, P.Eng., executive director and chief engineer of MTO's provincial highways management division, told *Engineering Dimensions*, "Engineering factors, both in vehicle and road design, have played significant roles in saving lives." MTO's statistics, for example, state that in 1964, there were only roughly 2.7 million licensed drivers in Ontario, with over 111,000 collisions, over 1400 killed and almost 55,000 injured. Yet in 2014—50 years later—there were more than 9.7 million drivers, but the number of collisions had only doubled, to roughly 217,000, with 517 killed and roughly 54,000 injured. According to MTO: "Over the 10-year period from 2006–2015, the number of licensed drivers in Ontario grew by 11 per cent, while the fatality rate decreased by 40 per cent, and the injury rate by 26 per cent. In fact, the number of licensed drivers in Ontario has doubled since 1980, while the fatality rate has decreased by 81 per cent in the same time period." Bentley noted that the large safety improvements are likely due to:

- effective legislation, regulation and evidence-based policy and programs;
- effective tools for law enforcement;
- targeted public education campaigns; and, importantly,
- significant improvements in vehicle technology and road infrastructure.

Bentley acknowledges that the improvements "target not only highway design but also other factors, including driver



Ontario's roads have witnessed dramatically decreased fatality rates over the past four decades, despite the increased number of people on the road. This graph demonstrates the improved safety on Ontario's roads, along with key safety regulations in Ontario. Graph: MTO

behaviours such as impaired driving and speeding." However, according to forensic engineer Alexandre Nolet, P.Eng., a senior associate with True North Safety Group, road design and behaviour go hand in hand. Nolet provides independent legal opinion to issues related to the design, construction, operations and maintenance of transportation facilities, including intersections, interchanges, highways and railway crossings. Nolet has experience working with MTO and many Ontario municipalities and notes that their engineering safety and traffic engineering are improving. "The biggest hurdles are our politicians," Nolet says. "The practice had been to meet our design standards: follow the standards, that's it. Now it's more proactive: We are consistently screening our road network to determine where improvements can be implemented for the greatest impact on safety to be achieved. There's a higher level of standard."

And road design is improving, Nolet notes, with Ontario embracing conservation, especially for vulnerable road users; however, the road network is still designed for vehicles. "More and more attention is going to infrastructure for pedestrians and cyclists," Nolet points out. "For too long, it had not been the case. The concepts of growth aren't new, we're just still learning how to effectively design for anything other than vehicles." Noting the huge factor that speed plays in road safety, Nolet uses wide suburban roads as an example. "If you don't change the environment on a six-lane road, things won't change," he says. "You'll still have motorists at 70 [kilometres per hour]. When we reduce speed, we also have to make physical changes in the road and its surroundings. You should need to look for the posted speed sign to determine a comfortable speed to travel at, but the environment should dictate the speed." Nolet cites effective visual cues such as traffic calming, curb extensions and buildings and trees closer to the roadway.

Although Ontario's roadways are safe, there are ambiguous and inconsistent road designs that Nolet would like to see improved. One big concern is road construction sites, where the layout and signs used to guide road users through temporary work zones is often not intuitive and leads to driver errors. Bentley, however, asserts that MTO has "best practices for traffic control for work on provincial highways…as well, individuals or agencies that perform on any street or highway open to the public in Ontario should follow [specific] fundamental safety principles and guidelines," such as traffic protection plans for workers and appropriate police enforcement and construction staging plans.

Nolet also cites the confusing design of right-turn channels—the islands that allow pedestrians to stand on the road at an intersection as cars turn right behind them. Pedestrians will cross without looking for traffic, not realizing that vehicles actually have the right of way. And new innovations, such as mid-block crossings for pedestrians and pedestrian crossings with the flashing lights above the street may not be effective if motorists don't realize they must come to complete stops. And although bicycling is rapidly gaining popularity, Ontario's roads are not equipped to accommodate them, and the wide-ranging bicycle facilities being implemented is a concern to Nolet.

At delineating conflict locations, multiple treatments are interchangeably used, including green pavement markings, sharrows, dashed white edge lines and continuous white edge lines. "Although their differences may be obvious to traffic engineers, they can be confusing to the layperson," Nolet says. He is hopeful, though, because Ontario is updating its province-wide design manual for bicycle facilities, which should hopefully result in more uniform implementation. Nolet adds that the province and municipalities should consider alternatives to ensure all road users are properly educated on the rules of road sharing. To accent this confusion, Nolet points to the implementation of roundabouts: "They function well in Europe because they've been there so long, but we cannot expect their safety benefits to be immediate in Ontario," he says. "It requires major educational campaigns and drivers to gain experience before we see comparable safety levels to Europe." However, MTO is developing a province-wide design manual that, although not mandatory, will be available to all municipalities.

An example of the Ministry of Transportation of Ontario's integration of roundabouts on Ontario's highways, used to help calm traffic. This roundabout is at Holt Road and Highway 401 in Clarington, Ontario. Photo: MTO

USE OF BEST-PRACTICES GUIDELINES

Nolet adds that MTO and most municipalities use similar network screening methods to record their collisions to determine location and network design priorities, with a shift towards one of conservation, especially for vulnerable users accessing a network designed largely for vehicles.

MTO uses a six-step method to assess the provincial highway network, including network screening, diagnosis and prioritization of projects in its continuing quest to maintain the province's commitment to safety. "The ministry regularly reviews the safety performance of provincial highways using historical collision data collected from police services and utilizes a proactive approach to make improvements," Bentley asserts. "MTO has been progressively implementing new roadside safety hardware that meets the American Association of Highway Transportation Officials' *Manual for Assessing Safety Hardware* and is one of the leading jurisdictions."

Planning and preliminary engineering for highway expansion occurs decades in advance; however, MTO has a multi-year program for the rehabilitation of the existing road network, with the preliminary design three to five years before construction begins, and engineering two to three years prior to construction. MTO uses numerous best-practices manuals, including Transportation Association of Canada's *Geometric Design Guide for Canadian Roads*, *MTO Roadside Design Manual*, *Highway Safety Manual* and *Ontario Traffic Manual*. MTO engineers must consider:

- traffic operation;
- active transportation (pedestrians and bicyclists);
- rural versus urban locations;
- construction staging;
- terrain;
- human factors; and
- access management.

Bentley echoes Nolet's concern on uniformity, stating that for traffic signs, "simplicity in design, position and application are crucial. Uniformity in sign design includes sign shape, colour, dimensions, symbols, wording, lettering and retro-reflectivity or illumination…approved by the national Committee on Uniform Traffic Control Devices for Canada after a thorough review of various designs used in Canada, supplemented by test studies."

Bentley notes that "urban conditions differ from rural conditions with respect to speed, number of intersections, traffic congestion, parking and competing lights." Bentley was speaking specifically about signage, stating: "Sign design must take into account these differences. These conditions will determine requirements for letter size, the selection of font, contrast, retroreflectivity, spacing and borders, message layout and reading time, as well as sign spacing and placement."

This, undoubtedly, may be a challenge for a municipality like Hamilton, with both urban and rural areas, for Hamilton must meet the challenge of uniformity of its traffic design while addressing the safety issues in its vastly different areas.

Transport Canada published its *Road Safety in Canada* in 2011, in which it stated that "contributing [safety] factors are impaired driving (i.e. alcohol, drugs, distraction and fatigue), speed and aggressive driving and occupant protection," an assertion that is backed up by MTO statistics.

Speeding and aggressive driving have become a major focus for Ontario municipalities, and Hamilton is no different. Consider the case of Hamilton's one-way streets. In 1956, the city converted a significant amount of its main arteries to one-way streets, a decision that the *Hamilton Spectator* called in a December 23, 2015, editorial "to meet the needs of an increasingly car-dependent society." The paper, which was frustrated at the city's slow-moving 15-year attempt to convert the streets back to two-way traffic, noted that one-way streets "are debatably less safe because it is generally agreed that motorists drive faster…[and they] are difficult to navigate and cost money for business and taxpayers and tourist outlets." However, Edward Soldo, P.Eng., Hamilton's director of roads and traffic, states: "In the past 10 years, the number of one-ways have dropped, and it's had a direct correlation to safety. We're no longer focusing on moving the automobile. We're slowing down traffic. Two-way conversions are a really good approach in terms of moving all modes."

ADOPTING A VISION ZERO APPROACH

Soldo is also the president of the Canadian Institute of Transportation Engineers (CITE), which consists of over 2000 traffic engineers, planners, technologists and students from across the country and is dedicated to the "safe and efficient movement of people and goods." CITE embraces the values of Vision Zero, a Swedish-born approach to traffic safety that CITE describes as "built on the

basis that traffic deaths and severe injuries are preventable. Launched in 1997, Vision Zero emphasizes a safe systems approach, which acknowledges that people make mistakes and focuses on "influencing system-wide practices, policies and designs to lessen the severity of crashes."

The traditional approach to safety says that traffic deaths are inevitable, attempts to make individuals responsible for collisions and states that saving lives is expensive. Vision Zero, on the other hand, looks at a systems approach and states that traffic deaths are preventable and that saving lives is not expensive. On a practical level, a Vision Zero approach assures that "complete streets concepts are integrated into community-wide plans through projects to encourage a safe, well-connected transportation network for people using all modes of transportation" and that "travel speeds are set and managed to achieve safe conditions for the specific roadway context and to protect all roadway uses, particularly those most at risk in crashes."

Hamilton is one of many Ontario municipalities that have actively embraced Vision Zero, which is also embraced by MTO's Vision Zero and is a focal point of Canada's Road Safety Strategy 2025. Using the Vision Zero approach, Hamilton recognizes that between 2011 and 2015:

- There averaged over 7900 collisions a year;
- Vehicle-only collisions accounted for 95 per cent of collisions;
- There were fatalities or injuries in 20 per cent of vehicle-only collisions
- When a pedestrian or cyclist was involved in a collision, there was a fatality or injury 87 per cent of the time;
- There were on average 16 fatalities a year (0.2 per cent of collisions) and 1824 non-fatal injuries (23 per cent of collisions); and
- 60 per cent of Hamiltonians have been in a collision, with 48 per cent resulting in a mild injury.

The period of 2013 to 2017 reported very similar numbers of fatalities and non-fatal injuries, and Hamilton reported that they represented "96 per cent of the total collision cost to society."

The numbers are improving still, Soldo reports. "In 2014, we created a Hamilton Strategic Committee, and that was an initiative done with Hamilton Police Services, Hamilton Public Health, Public Works and Engineering Services, and through our collaborations, we've seen a drop in injuries starting in 2016, and we're trending towards a 15 per cent [drop]," Soldo says. "It's good news because we're focusing on injuries and fatal collisions, and we're starting to see a result. Fatal collisions are a little more difficult to control, and we haven't seen a trend in the past five years. We find that they tend to be related to rural issues, where the speeds tend to be a little higher." Soldo admits that although the number of injuries is going down, collisions are actually going up, a phenomenon he attributes to Hamilton's population growth.

Soldo attributes Hamilton's ability to successfully lower its injury rate to a number of factors, although "it's difficult to pin it down on one thing," he says. "When you think about red-light cameras, that has had an impact, especially on right-angled collisions, which tend to be a bit more severe. Of those safety measures, they're starting to take effect. Enforcement is important because it changes the behaviour of people. Education is important, but the main thing you can do to reduce injuries from an engineering perspective is to make those design changes to reduce the impact." Hamilton's design changes so far include:

- Developing its cycling infrastructure to include barrier separation and identifying specific conflict points to include design modifications to increase cyclists' safety;
- Extending crosswalk times for pedestrians at intersections and implementing curb radius modifications;
- Effectively identifying that residential roadways are the sights of concern, and including traffic calming, traffic controls, narrowing of streets to encourage neighbourhood livability; and
- Designing and engineering streets to be forgiving if a collision occurs and to encourage slower speeds.

"[We] are taking ownership of collision patterns rather than specifically focusing on the motorists' actions and behaviour," Soldo notes. With the city now focusing on killed serious injury values, Soldo notes: "Traditionally, traffic engineering has focused on ranking collisions completed through a network safety performance function; however, in this traditional evaluation tool, locations with high numbers of injuries could be missed. Now the system works in tandem to ensure traffic safety professionals are addressing locations with high injury trends." To help do this, Hamilton has developed neighbourhood committees to address local residential roadways using a holistic approach rather than as one-off locations.

But given Hamilton's diverse urban and rural characteristics, speed appears to be the most pressing concern for Soldo, who mentioned the province's May 30, 2017, passing of the *Safer School Zones Act*, which allows municipalities to expand their community safety zones, introduce speed restrictions and, importantly, use automated speed enforcement (ASE). The technology, similar to red light cameras, records speeding vehicles and mails the owner a fine. Hamilton has been working with MTO, the attorney general, the Ontario Traffic Council and other municipalities to implement the technology, which will be used only on municipal roads, where MTO notes that three-quarters of every speed-related collision occurs. Although the technology isn't currently available, Soldo will be asking city council to implement it when it is.

Soldo adds that there is a direct correlation between speed and safety: "The greater the speed, the greater the impact, the more severe the impact," he explains. "By reducing the speed, it reduces the severity of the collisions and consequently the severity to pedestrians." Other municipalities, including many in the United States as well as Calgary and Toronto, have implemented lower speeds, and Hamilton is considering lowering its municipal standard of maximum speed from 50 km/hr to 40. With its commitment to design and community building, Hamilton may prove to be a model for traffic safety in Ontario. **e**

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ENGINEERS WORK TO STEM THE TIDE AS CITY STORMWATER INFRASTRUCTURE STRUGGLES WITH THE IMPACT OF INCREASINGLY SEVERE WEATHER

• BY MARIKA BIGONGIARI •

When you step into an elevator, drowning in it is likely the furthest thing from your mind. But two men in Toronto, Ontario, faced that grim possibility during a severe storm in August 2018, when they stepped into an elevator headed for the parking garage of the downtown building in which they worked. Klever Freire and Gabriel Otrin were rescued by police, who, fortunately for the two, were nearby, when their 911 call for help went out. The officers, who swam to the men's aid in the flooded basement, pried open the doors of the stalled elevator—which was rapidly filling with water—with minutes to spare. Although this is an extreme example, it's far from the only one: Toronto Transit Commission riders have been repeatedly stranded in streetcars that have become partially submerged in flooded underpasses, GO Transit riders have needed to be rescued by boat when the tracks their train was traveling on were washed out and city dwellers have suffered catastrophic losses to property time and again. Urban flooding has become all too common in an era of increasingly severe weather and city stormwater infrastructure that has, in places, fallen behind the times.

With the fallout of extreme weather events highlighting the vulnerabilities of current stormwater management, determining how vulnerable critical infrastructure is failing during severe storms is critical, and identifying ways we can ensure our infrastructure is resilient, adaptive and flexible is key.

THE IMPACT OF SEVERE WEATHER

Rayna Volden, P.Eng., program manager at Jacob's Engineering, has worked in linear infrastructure—including city works like sewers, sanitary-storm combined sewers, watermains and roadwork—for most of her career. She has extensive experience dealing with the impact of severe weather on stormwater (water generated from precipitation) and wastewater (water generated from home or business use) systems. She's been working with the city on the City of Toronto Basement Flooding Protection Program. "The city started the program in 2008 because in 2005, August 19, a large storm event went through the northern part

of the city of Toronto, causing severe flooding in a substantial portion of North York," Volden explains. "As a result, the city realized they needed to take measures to improve infrastructure to deal with the type of flooding they were seeing from storm events that were occurring."

Volden says the flooding Toronto was observing was not just related to the size of the storms and how often they were occurring but also to the fact that the city's infrastructure wasn't built to handle these types of events. "When you build a storm sewer system, you have pipes that take low flows for the minor system, and for the large flows, you use the topography and streetscape to get the water to the rivers, streams or lake," she says. "And what they found is as development was happening, those overland flow paths didn't exist anymore, because it's not part of the planning process. It should be, but it's not." Because of that issue, she's been working with the city to come up with solutions to stop basements from flooding. "The City of Toronto has a lot of inflowing infiltration into their sanitary system, so every time there's a large storm event, or even in small storm events, water gets into the sanitary system and then the wastewater treatment plant must process more flow," Volden says. "There is also a portion of Toronto that has combined sewers, so every time it rains, the wastewater treatment plant must process more flow, and when a large storm event happens, you have flooding." Volden is also concerned about the impact of excess flow on water quality, erosion and the risk to aquatic life. "Rainfall is cleaning all the stuff that's on the streets, and it's all going into the waterways," she adds. In addition to the resultant damage to property, she points out another critical factor associated with basement flooding as a result of sanitary sewer backups: "It's a health concern," she says.

Christine Zimmer, P.Eng., senior manager, water and climate change science at Credit Valley Conservation Authority, also notes an issue with water quality that arises when stormwater is not adequately managed. Speaking about the impact of freeze-thaw events, she notes: "Real-time instream monitoring of the Credit River shows high spikes in chloride concentrations during winter months from road and parking lot salting. High spikes in concentrations can be significantly higher than aquatic life's tolerance limits and prove lethal. Limits may also change pollutant dynamics. Chloride-loaded water is heavier and tends to sink when entering rivers, lakes or ponds with lower concentrations. This dynamic may impact how nutrients and pollutants settle and disperse as they enter the water body. Where pollutants disperse may pose potential risks if near water intakes or shallow nearshore areas, making pollutants readily available for algae to grow during spring and summer months. Chloride-rich water also has the potential to cause anoxic conditions due to stratification impacting aquatic life. Often forgotten during extreme events is the impact flooding and wastewater bypass has on increasing pollutant loadings to receiving waters." Zimmer continues to explain how different types of severe weather negatively impact the systems that manage stormwater and wastewater in ways that go beyond basement flooding: "Short duration, high intensity rainfalls can overwhelm stormwater management systems, causing flooded basements, wastewater treatment plant bypass and infrastructure damage. These events come with little warning, unlike a hurricane, for which we have time to prepare. This adds complexity for flood warning, forecasting and emergency response."

While acknowledging the need to invest in infrastructure, Volden would also like to see stormwater regulated, saying there should be a mandate to regulate the stormwater going into our bodies of water: "The Ministry of the Environment, Conservation and Parks has guidelines in terms of how they'd like to see improvement, but they don't have anything like a law. There are laws about what the wastewater treatment plant can discharge for outflows. We don't have the same laws for what each outfall for stormwater you can discharge into rivers, streams and the lake at this point. Water quality is an important thing to tackle. There should be a stormwater utility that's responsible for the quality of water that comes from our system. There typically isn't a treatment process for stormwater systems in Canada. It's not mandatory."

THE CLIMATE CHANGE FACTOR

Experts are on the same page regarding the increasing frequency and severity of weather events. David Lapp, P.Eng., FEC, manager of globalization and sustainable development at Engineers Canada and winner of a 2018 Ontario Professional Engineers Award in Engineering Excellence, explains: "Climate change makes the situation worse, especially in older areas that have less or no stormwater management. With our changing climate, it is expected that there will be more water falling in a shorter time and the number of times this happens in a year will increase significantly in the next 50 to 100 years. Climate change compounds the impacts on stormwater quality now and will more so in the future. As Ontario becomes more urbanized and development more extensive and intense, we need to rethink the strategies and safety factors used for stormwater design based on our changing climate. We need to improve our monitoring of the changes and learn from extreme events, so we can be better prepared in the future as our climate changes."

Aerial photo of the mouth of the Credit River showing a plume of pollutants after heavy rainfall in July 2018. Photo: Credit Valley Conservation Authority

Jennifer Drake, PhD, P.Eng., on a Toronto, Ontario, green roof—a tool to mitigate stormwater. Photo: Tyler Irving

Volden also notes a different weather pattern emerging in the form of increasingly frequent, severe and impactful storm events. "We're having more severe rain events, larger snow events and warmer weather, which means the water levels are higher, and that impacts your ability to discharge water," she says. "In the city of Toronto, last year, when Lake Ontario was at record high levels, it caused flooding for the municipalities and cities that live along all of Lake Ontario because the water level was so high."

OTHER CRITICAL ISSUES

But there are issues beyond a changing climate to consider. Toronto's stormwater and wastewater systems are struggling to handle extreme weather due to several factors: We have high-dense communities, which create large areas of impermeable surfaces that generate run-off; we have aging infrastructure; and we have areas of the city on a combined sewer system. "Like many North American cities, much of the downtown core is on a combined sewer system that is easily overwhelmed during extreme weather, which leads to urban flooding," says Jennifer Drake, PhD, P.Eng., assistant professor at the University of Toronto's department of civil and mineral engineering. "This is a pervasive issue throughout North America. Our most established cities were built at a time when you only needed one sewer system, and all the sewers go to the wastewater plant. But when you have a lot of rainfall, it can get overwhelmed, so it becomes a catch-up game: We can build additional detention tanks, but the entire core of the city wasn't designed with drainage in mind."

Drake holds a doctorate in water resource engineering from the University of Guelph and is the winner of a 2018 Ontario Professional Engineers Award in the Young Engineer category. She was also awarded a 2018 Early Researcher Award by the Ontario Ministry of Research and Innovation for her work on low-impact development (LID) stormwater management and the impact of LID technologies on aquatic environments, urban water security and wet weather policy. She serves on the Toronto Region Conservation Authority board of directors and regional watershed alliance, which is committed to increasing the public's knowledge and understanding of issues related to urban flooding and flood prevention. She outlines how the increase in impervious areas in urban centres and the resultant removal of natural flow paths and removal mechanisms is a primary driver of urban flooding, further exacerbated by climate change, which is amplifying the situation by changing the intensity and frequency of rain events.

Drake suggests a critical factor is an infrastructure deficit and the essentiality of having our infrastructure in a continual state of good repair: "We have sewers here that are a hundred years old, and for the entire system to work properly, we must care about the details," she explains. "It's important to have good practices in place to keep renewing and investing in our existing infrastructure, and day-to-day maintenance is also important to ensure that there's a drainage path for the water. This can be simple stuff like making sure your catch basins are clear. If they're blocked with leaves in the fall and we get a huge storm, that could flood out several homes. It's these details—making sure we have things in a continual state of good repair and good operations—that are important."

For high-density urban landscapes like Toronto, especially in the core, there's very little space for additional infrastructure, necessitating engineering ingenuity, like the implementation of green roofs. "One of the options the city has been pursuing for many years now is the implementation of green roofs," Drake says. "First, they act as a sponge, so a portion of rain water will be held and then evaporated or transpired back into the atmosphere, so it's not going down into a pipe." Drake details how, with a large event, a green roof can't capture all the rain water, but what it does do is slow it down with a more complicated system. If the water has to first infiltrate the green roof and then travel to a connecting pipe, the act of holding the water back onsite for a longer period can prevent existing infrastructure from becoming overwhelmed. "Flooding is an issue of volume and timing," Drake says. "If we can slow down the water, so it's moving through the city at a slower pace, we can handle it because we're not receiving it at the bottleneck points all at the same time." For this reason, she explains, the City of Toronto has adopted a green roof bylaw to ensure all new construction has a portion of their roof vegetated: "This is taking advantage of an underutilized space in the urban landscape and creating the opportunity to detain waters longer and evaporate it back to the atmosphere. Thinking about how we can detain, retain and remove water early in the design process of new construction is important. And with redevelopment, we should be looking for opportunities to integrate alternative ways of holding water longer or allow it to go in a different direction, so it doesn't become runoff in the first place. We're continually looking for opportunities to increase capacity, increase detention and increase infiltration or evapotranspiration or alternative flow paths for stormwater. On top of that, we have the reality of a changing climate, which leads to a lot of uncertainty in terms of the characteristics of our rainfall events moving forward, as well as the potential for an increase in high intensity isolated storms, like we just saw in August, which hit a very small section of the city but can overwhelm our infrastructures."

WHY WE NEED A NATIONAL STANDARD

Another concept aimed at having a resilient infrastructure in place that's flexible in the face of a

changing climate is developing a national standard that would help provide a uniform approach to defining level of service and level of risk, documenting and tracking maintenance and monitoring for stormwater facilities to ensure levels of service are maintained throughout the design life of the system. "There is a need to provide a service that goes well beyond flooding alone," says Zimmer, who also points out that rainwater provides watershed services such as groundwater recharge, water balance, assimilative capacity, water quality and erosion. She outlines a need to address older urban areas and subdivisions with limited stormwater capacity, making older areas more vulnerable to overland and riverine flooding, erosion, pollutant loading, sanitary backups and wastewater bypasses. Also, of importance is the impact flooding has on other municipal services and the community. Socially vulnerable populations may be less resilient to flooding, requiring more municipal services such as temporary housing and evacuation—and emergency plans need to consider flood hazards. Zimmer stresses that some older urban areas don't have the capacity to deal with extreme rainfalls—which will only become a bigger problem in the future as weather becomes more severe—and their vulnerability will increase along with the frequency and intensity of events unless something is done. "There is a need to bring level of service up in these areas, but there is a lack of guidance on how to do so," she says. "There is also a need to consider climate change in greenfield (new construction) particularly because many new developments are upstream of older areas and it is important they don't exacerbate flooding, water quality and erosion downstream."

Zimmer co-authored a July 2018 report on stormwater quality management—also authored by Amna Tariq, P.Eng., of the Credit Valley Conservation Authority and Olena Kholodova and Joanna Kyriazis of Zizzo Strategy—funded by the Standards Council of Canada. The report was administered by Engineers Canada, where Lapp acted as project adviser and report reviewer. *Developing a Stormwater Quality Management Standard in Light of a Changing Climate* is a seed document to support the development of a national standard that municipalities, engineers and other professional practitioners working in stormwater management could draw on. "Inconsistent approaches and failure to document rationales can expose municipalities and engineers to risk," Zimmer explains. "With credible and authoritative documents like a stormwater quality management standard that informs decision-making, building consistent approaches and documenting rationales and decisions will help in demonstrating duty of care."

Lapp points out stormwater management is evolving as a recognized practice but is highly variable in its application across municipalities. "There are many examples of stormwater system failures from extreme events that have simply overwhelmed systems," he says. "Probably the biggest area for improvement is in older urban areas and subdivisions, where stormwater management was not generally applied prior to the 1980s."

"STANDARDS ARE A KEY INSTRUMENT FOR ENGINEERS TO ENSURE THEIR DUTY OF CARE TO THE PUBLIC."
David Lapp, P.Eng., FEC

Although Volden believes the City of Toronto is on the right track with the basement protection flooding program, she's on the same page as Lapp and Zimmer on the difficulties that arise from not having a national standard. "The city has a huge commitment to improve infrastructure, so in that respect, they've taken the right steps," she says. "But this is one municipality out of many in Ontario. Have other municipalities taken that on? I don't think so. All infrastructure needs to be improved and maintained as it ages, like anything. And it's a very costly process."

As communities struggle to define and maintain levels of service and manage the costs associated with replacing aging infrastructure, the challenges they must navigate are many, from a varying level of service for stormwater to a lack of a sustainable funding mechanism and the absence of a national standard. Zimmer elaborates: "Currently, there is no consistent understanding of what level of service means in the context of stormwater and no standard for how to assess appropriate levels of service and risk. Other water systems such as drinking water and wastewater have strict provincial and federal regulations, resulting in political will on the part of councillors and senior managers to develop dedicated funding mechanisms for upgrades, maintenance, monitoring and tracking. Stormwater, on the other hand, does not have similarly clear policies, regulations or dedicated funding—although some municipalities such as Kitchener and Mississauga have begun to adopt dedicated funding through a stormwater rate mechanism. Therefore, most municipalities must compete annually for stormwater funding with other municipal services as part of their general tax base budget. This makes long-term planning, operations and maintenance difficult." Zimmer goes on to explain that, unlike water and wastewater, the legislative framework is less defined for stormwater, and traditionally reporting and enforcement has not been as prescriptive as with water and wastewater systems.

Lapp makes an analogy to the Walkerton tragedy, which led to the development of drinking water quality standards for all systems. He points out there is a much-reduced risk of another Walkerton happening with these standards in place: "Standards also allow the development of training and enforcement methods, neither of which are in place now for stormwater. Standards are a key instrument for engineers to ensure their duty of care to the public." Zimmer also warns there are gaps in the systemic management of water: "Lessons learned from extreme rainfall events highlight the interconnections between water, wastewater and stormwater. If stormwater is not adequately managed, it could interfere with drinking water and wastewater treatment and levels of service."

Both Lapp and Zimmer assert a stormwater quality management system will provide a consistent framework and logical process that would enable municipalities to respond appropriately to their own situations. They caution that there are legal risks in not taking extreme weather and climate change into account in the design, operation and maintenance of stormwater infrastructure and that there's an imperative to act. Understanding the risks and having a framework to plan within and implement would enable putting an action plan in place, as well as a budget and the requisite human resources—all of which are currently lacking. **e**

THE DUTIES OF ENGINEERS IN NON-ENGINEERING ROLES

By José Vera, P.Eng., MEPP

When engineers take on non-engineering roles—whether it is a paid or volunteer role—it is important for them to understand the laws and codes of conduct that apply to their specific roles. Here, we provide insight into an engineer's duties when taking on a non-engineering role, such as volunteering on a condominium board or working as an investment analyst.

Example 1: When an engineer becomes a director on a condominium board

Melissa, an engineer, runs for election on her condominium's board of directors. During her election speech, she emphasizes her current experience working for a chemical plant. However, she clearly notes that as a director she is not there to give engineering opinions but, rather, to help make the board a sophisticated client of engineering services. The owners are impressed by Melissa's engineering background and experience selecting engineering services, so they elect her in a landslide vote.

A few months later, on a weekend when the property manager is away, Melissa receives a call from Colin, another board member, informing Melissa of some cracks in parking garage columns; the cracks had been recently reported by residents. Colin tells Melissa: "The property manager is away, so as a board member, you must inspect the columns and give me your opinion. Aren't you an engineer?" What should Melissa's answer to Colin be?

When faced with similar situations, it is advisable for engineers to stop and asks themselves: What does the law say? This is important because often, as engineers, we may focus solely on the Code of Ethics and miss the fact that there are other laws that apply to specific situations. In this specific case, Melissa, as a director on a condominium board, needs to understand the *Condominium Act*, specifically section 37 Standard of Care (www.ontario.ca/laws/statute/98c19#BK120), which states:

> Standard of Care
> 37 (1) Every director and every officer of a corporation in exercising the powers and discharging the duties of office shall
> (a) act honestly and in good faith; and
> (b) exercise the care, diligence and skill that a reasonably prudent person would exercise in comparable circumstance
> …
> Liability of directors
> (3) A director shall not be found liable for a breach of a duty mentioned in subsection (1) if the breach arises as a result of the director's relying in good faith upon,
> …
> (b) a report or opinion of a lawyer, public accountant, engineer, appraiser or other person whose profession lends credibility to the report or opinion…

Based on the above, to meet the standard of care expected of a director, Melissa needs to inform her fellow board members that the board must rely in good faith on an independent engineering assessment of the parking garage columns. While it might be argued that Melissa is an engineer, a key fact is that she is a director on the board and not the board's engineer. Consequently, Melissa's response to Colin should be: "I may be an engineer, but I am not the board's engineer. I am a director and I am letting you know, as a director, we need to contact our engineering firm, ABC, immediately to perform an assessment of the parking garage columns and provide the board with a report containing recommendations."

Example 2: When an engineer becomes an investment analyst

Marc is an engineer who has worked for numerous years in renewable energy engineering design projects. His vast knowledge of engineering and construction costs has helped him land a new career as an investment analyst for a well-known pension fund. Marc knows he will no longer be working as a professional engineer in his new role, but he decides to keep his licence in case he goes back to engineering one day.

A few months after landing his new job, Marc is sent to a solar panel installation in Prince Edward County, Ontario, to perform a financial evaluation for potential investors. Sarah, who works for the owner of the solar panel site, learns that Marc is a professional engineer. During their meeting, Sarah informs Marc that the solar panel system is generating less energy than originally expected and asks Marc to perform an engineering energy study with recommendations on how to improve efficiency. What should Marc's answer to Sarah be?

Again, engineers need to ask themselves: What does the law say? In this specific case, Marc, as a professional engineer, needs to understand the *Professional Engineers Act*, specifically section 12 Certificate of Authorization (www.ontario.ca/laws/statute/90p28#BK11), which states:

> Certificate of Authorization
> (2) No person shall offer to the public or engage in the business of providing to the public services that are within the practice of professional engineering except under and in accordance with a certificate of authorization (C of A).

It might be argued that Marc could in theory apply for a C of A to offer engineering services. However, because Marc is employed in a non-engineering capacity, his employer will probably not allow Marc

to provide engineering services to their clients. After all, a key fact is that Marc was hired to be an investment analyst not an engineer.

Furthermore, Marc, as a professional engineer, needs to understand Regulation 941, specifically section 72 (www.ontario.ca/laws/regulation/900941#BK88), which states:

> (2) For the purposes of the act and this regulation, "professional misconduct" means,…
>
> (i) failure to make prompt, voluntary and complete disclosure of an interest, direct or indirect, that might in any way be, or be construed as, prejudicial to the professional judgment of the practitioner in rendering service to the public, to an employer or to a client, and in particular, without limiting the generality of the foregoing, carrying out any of the following acts without making such a prior disclosure:…
>
> 5. Expressing opinions or making statements concerning matters within the practice of professional engineering of public interest where the opinions or statements are inspired or paid for by other interests…

Based on the above, Marc should be aware that acting as both investment analyst and energy study engineer could be perceived as a conflict of interest, since it could be argued that his engineering opinion cannot possibly be independent. Furthermore, Marc could be in an alleged conflict of interest situation not only under the *Professional Engineers Act* but also under securities law.

Consequently, Marc's response to Sarah should be: "I may be an engineer, but I am not the owner's engineer. I am an investment analyst and I am letting you know, as an analyst, you need to contact your engineering firm XYZ to perform the energy study."

Engineers working in non-engineering roles need to understand the laws and codes of conduct that apply to their specific roles. Melissa, as director in a condominium board, needs to understand the *Condominium Act*. Marc, as an investment analyst, needs to understand securities law. Certainly, for professional engineers, the Code of Ethics and *Professional Engineers Act* are relevant; however, for engineers working in non-engineering roles, it is the laws that apply to their actual roles that may prove to be more relevant.

Finally, PEO's practice advisory team is available by email at practice-standards@peo.on.ca and is happy to assist engineers looking for more information on their duties in non-engineering roles. However, engineers looking for assistance on resolving legal problems occurring in specific, concrete situations should always contact their lawyer. **e**

José Vera, P.Eng., MEPP, is PEO's manager of standards and practice.

P.ENGs AND ENGINEERING STUDENTS RECOGNIZED WITH AWARDS

By Marika Bigongiari

Excellence Canada announced the recipients of the 2018 Canada Awards for Excellence at a recent gala. **Engineers Canada**—the national organization of Canada's 12 provincial and territorial engineering regulators—was honoured with a silver Excellence, Innovation and Wellness Award. Excellence Canada is devoted to helping organizations become the best they can be by implementing standards of excellence. The annual awards program recognizes organizations doing outstanding work across the country.

McMaster University materials engineering professor **Joseph McDermid, PhD, P.Eng.,** has won the prestigious Dale CH Nevison Award. The award recognizes those who have made significant contributions in the galvanizing field.

Also, McMaster professor **Robert Flesig, PhD, P.Eng.,** has been honoured as one of Ontario's top teachers. Flesig, who teaches design engineering, is one of five educators who were honoured by the Ontario Confederation of University Faculty Associations. He heads a special program in which engineering students are challenged to design assistive devices.

A bevy of University of Toronto (U of T) engineering alumni volunteers were honoured with Arbor Awards at the university's annual gala, among them: **Daniel Alonzi, P.Eng., Jennifer Alonzi, P.Eng., Frank Palmay, P.Eng., Larissa Rodo, EIT, Michael Gotama, PhD, P.Eng.,** and **Ahthavan Raja Sureshkumar, P.Eng.** The Arbor Awards are given in recognition of graduates whose loyalty, dedication and generosity have significantly added to the U of T experience.

The Canada's Safest Employers Awards winners have been announced. The awards recognize Canadian companies making a difference in promoting the health and safety of their workers. With 10 industry-specific categories ranging from hospitality to mining and natural resources, the awards judge companies on a wide range of occupational health and safety elements. This year's winners include: **Ausenco Engineering Canada,** which took the gold; **Kenaidan Contracting,** which took the silver in the building and construction category; **Klohn Crippen Berger,** which nabbed the silver, both in the mining and natural resources categories; and **Innovative Automation,** which took a silver in the young worker safety category.

The Royal Society of Canada (RSC) and its members have elected this year's new fellows and have also named its incoming class of the College of New Scholars, Artists and Scientists. Eighty-nine new fellows in the Academies of Arts and Humanities, Social Sciences and Science were elected by their peers for their outstanding achievements. Among this year's cohort of new fellows: **Hoda Elmaraghy, PhD, P.Eng., Zhou Wang, PhD, P.Eng.,** and **Jianping Yao, PhD, P.Eng.,** in the Academy of Science, Division of Applied Sciences and Engineering; and **Feridun Hamdullahpur, PhD, P.Eng.,** as a specially elected fellow. The RSC also welcomed 52 new members of the College of New Scholars, Artists and Scientists, including: **Alison McGuigan, PhD, P.Eng., Carolyn Ren, PhD, P.Eng.,** and **Alexander Wong, PhD, P.Eng.** The RSC recognizes excellence, serves in an advisory capacity to government and society and promotes a culture of knowledge and innovation.

Aaniin Community Centre and Library in Markham, Ontario, designed by structural engineering firm CH2M Hill, is an Ontario Wood WORKS! Wood Design Awards winner.

The winners of the Ontario Wood WORKS! Wood Design Awards have been announced, honouring architects, engineers, developers and other construction industry professionals across Ontario in recognition of their design excellence, advocacy and innovation in featuring wood in their projects. Wood WORKS! is a national, industry-led initiative of the Canadian Wood Council, working to promote and support the use of wood in all types of construction. Among this year's winning projects are: DARE (discovery, applied research, entrepreneurship) District, Algonquin College in Ottawa, Ontario, designed by structural engineering firm **Adjeleian Allen Rubeli Ltd.**; Cowbell Brewing Company in Blyth, ON, designed by **Tacoma Engineers** and **Debbert Engineering Inc.**; Clear Water Retreat in Lake of the Woods, ON, designed by **Wolfrom Engineering Ltd.**; AquaBlu Condominiums in Grimsby, ON, designed by structural engineering firm **Leonard Kalishenko & Associates Ltd.;** Indigenous Sharing and Learning Centre, Laurentian University in Sudbury, ON, designed

Albion District Library in Etobicoke, Ontario, designed by structural engineering firm Blackwell, is an Ontario Wood WORKS! Wood Design Awards winner.

Dillon Consulting Limited is a Canadian Consulting Engineering Awards winner for the Ottawa-based area risk assessment for ship-source spills project.

Kerr Wood Leidal Associates Ltd. is a Canadian Consulting Engineering Awards winner for the Squamish integrated flood hazard management plan in British Columbia.

by structural engineering firm **Blackwell**; Aaniin Community Centre and Library in Markham, ON, designed by structural engineering firm **CH2M Hill**; OakWood Showroom and Design Centre in Ottawa, ON, designed by structural engineering firm **Levac Robichaud Leclerc Associates Ltd.**; North Bay Parry Sound District Health Unit in North Bay, ON, designed by structural engineering firm **Read Jones Christoffersen Ltd.**; and the Albion District Library in Etobicoke, ON, designed by structural engineering firm **Blackwell.**

The 2018 Canadian Consulting Engineering Awards were handed out at a gala in Ottawa, ON, where 20 projects were honoured for exemplifying the highest standard of engineering excellence. The awards, which honour outstanding achievements in the consulting engineering industry, are presented jointly by the Association of Consulting Engineering Companies-Canada and *Canadian Consulting Engineer Magazine*. In addition to giving out awards for categories ranging from buildings and transportation to the environment and wastewater treatment, the event recognizes special individual and team achievements and includes a lifetime achievement award. This year's winners include the following firms, receiving Awards of Excellence in the building category: **Bouthillette Parizeau** for the Bank of Canada head office renewal project, a landmark building, and the nation's central bank, Ottawa, ON; **HH Angus and Associates Limited** for the Centre hospitalier de l'Université de Montréal, Quebec, which also took home the Schreyer Award for that project; **RJC Engineers** for the Shane Homes YMCA at Rocky Ridge, Calgary, Alberta; and **Stantec** for the Calgary compost facility, Alberta. In addition, the following firms were recognized with Awards of Excellence for projects in the transportation category: **COWI North America** for the St. Croix River Crossing, joining Oak Park Heights Minnesota to St. Joseph, Wisconsin; **Stantec** for the Terwillegar Park Footbridge; **Tetra Tech Canada Inc.** and **Stantec** for the Inuvik Tuktoyaktuk Highway, Northwest Territories, a project for which they also took home the Engineering a Better Canada Award. Additionally, the following firms took home Awards of Excellence in the water resources category: **Hatch** and **FHR Inc.** for their work on reducing life safety risks to the Kashechewan First Nation Community, near James Bay, ON; **Kerr Wood Leidal Associates Ltd.** for the Squamish integrated flood hazard management plan, BC; **Stantec** for the sanitary grit treatment and recovery facility, Edmonton, AB; and **WSP** for the Town of Ladysmith wastewater treatment plant upgrade, British Columbia. Also, the following firms won in the natural resources, mining, industry and energy category: **Hatch** for the Chaudière Falls Hydroelectric Redevelopment Project, located on the Ottawa River in Ontario; and **WSP** for the Vancouver International flywheel energy storage and airfield critical power system project in Richmond, BC, which also took home the Tree for Life Award for that project. **Dillon Consulting Limited** took home an Award of Excellence in the special projects category for their area risk assessment for ship-source spills Ottawa-based project in Ontario. The following firms were recognized with Awards of Excellence in the project management category: **Hatch** for the Gahcho Kué Diamond Mine, Northwest Territories; and **WSP** for the Vancouver Convention Centre West sustainability consulting and LEED Platinum project management, British Columbia. The following firms won in the international category: **Hatch** and **Manitoba Hydro International** for their project enhancing dam safety in Katmandu, Nepal, which also took home an Ambassador Award for the same project; **McElhanney Consulting Services Ltd.** for the Veer Kunwar Singh Bridge near Chhapra, Bihar, India—the world's longest

extradosed bridge, at 4.35 kilometres in length, reducing the commute to cross the Ganges by 180 km—and took home an Ambassador Award for the same project.

The 2018 Schulich Leaders have been announced, the recipients of whom will receive Canada's most prestigious STEM award. Of the 50 recipients, 25 will receive $100,000 to pursue an engineering degree, and 25 will receive $80,000 to pursue a degree in science, technology or mathematics. Among this year's winners are the following Ontario engineering students: **David Gu,** University of Waterloo, software engineering; **Markus Kunej,** University of Toronto, engineering science; **Emelyn Kupinski,** McMaster University, engineering; **Sophia Ludovice,** Queen's University, engineering; **Atif Mahmud,** University of Waterloo, software engineering; **Peter Matthews,** Queen's University, engineering; **Angelica Paynter,** University of Ottawa, software engineering; **Nikola Petrevski,** McMaster University, engineering; **Eli Scott,** University of Toronto, engineering science; **Jack Wawrow,** York University, engineering; and **Tony Xu,** Western University, engineering.

The Ontario Professional Engineers Foundation for Education has announced the 2018 cohort of scholarship and award recipients. The foundation provides scholarship funding, recognizes engineering students who have demonstrated academic and leadership excellence, encourages students to pursue licensure and connects them with key resources to help them establish careers in the profession. A full list of award recipients is available at engineersfoundation.ca/list-of-recipients.

University of Toronto materials science and engineering PhD candidate **Phil De Luna** was named to the *Forbes* 30 Under 30 list. DeLuna, who is working to transform waste carbon into valuable chemicals, was cited in the energy category. The *Forbes* 30 Under 30 is an annual compendium featuring 600 young visionaries in 20 different industries.

York University Lassonde School of Engineering graduate students **Zhongpan Wu** and **Karim Hammad** have been recognized for their groundbreaking work in the field of DNA sequencing. The pair won two industry awards for their work, including the Best Live Demo award at the IEEE International Midwest Symposium on Circuits and Systems and the Industry Collaboration Award at the TEXPO/Innovation 360 Symposium.

CALL FOR ENTRIES

Nominations for the 2019 Canada's Safest Employers awards open February 4. The deadline to apply is May 24. If you are operating a safe and successful organization in Canada, they would like to hear from you. For more information, visit www.safestemployers.com/nomination.

Hydro One and Indspire—an Indigenous national charity that invests in education—have announced a substantial new bursary program to support Indigenous post-secondary students studying electrical and mechanical engineering, including apprenticeships, skilled trades and technicians. Recipients can also pursue paid work placements with Hydro One. Applications can be completed online at indspire.ca and must be received by February 1, August 1 and November 1 each year.

Engineers Canada offers two types of scholarships with nearing deadlines. The Engineers Canada-Manulife scholarship program includes three scholarships of $12,500 each annually to provide financial assistance to engineers returning to university for further study or research in an engineering field. To be eligible for the scholarships program, candidates must be registered as a licensed engineer with one of the 12 regulators for the duration of their academic year. The application deadline is March 1 for both scholarships. Visit engineerscanada.ca for more details. e

Hatch and FHR Inc. are a Canadian Consulting Engineering Awards winner for the project for reducing life safety risks to the Kashechewan First Nation Community, near James Bay, Ontario.

RJC Engineers is a Canadian Consulting Engineering Awards winner for the Shane Homes YMCA at Rocky Ridge, Calgary, Alberta.

WSP is a Canadian Consulting Engineering Awards winner for the Vancouver Convention Centre West sustainability consulting and LEED Platinum project management in British Columbia.

SIX ONTARIO PROFESSIONAL ENGINEERS FILL CITY COUNCIL SEATS

By Howard Brown

The Ontario municipal elections in October 2018 saw 14 known professional engineers running for office. Six P.Engs, including two former PEO presidents, won seats on their local councils. They are:

- George Comrie, P.Eng., FEC, who won re-election for a second term as councillor in Whitestone. He finished first out of seven candidates with 733 votes. At PEO, he served two terms as president, in 2004–2005 and 2016–2017;
- Andrew Dowie, P.Eng., in Tecumseh Ward 1 and Bill Altenhof, P.Eng., in Tecumseh Ward 2, who were both acclaimed;
- Diane Freeman, P.Eng., FEC, PEO president for 2010–2011, who was re-elected for a fourth term on Waterloo City Council in Ward 4. She finished first with 2461 votes—1467 more than her opponent;
- Ron Starr, P.Eng., who was re-elected in Mississauga as city councillor for Ward 6. He finished first out of 11 candidates with 4859 votes—347 more than his opponent, accounting for 36.2 per cent of the total votes; and
- Ian McDougall, P.Eng., who was elected Ward 1 councillor in Scugog. He finished first out of four candidates with 681 votes—426 more than his opponent, accounting for 42.67 per cent of the total votes.

Across Ontario, other professional engineers who ran in the elections include: Mike Bell, P.Eng., for Hamilton City Council in Ward 12 (Ancaster); Steve Black, P.Eng., for re-election as mayor in Timmins; Thomas Chong, P.Eng., for York Region District School Board in Wards 3, 5 and 6 (Richmond Hill); Elie Diab, P.Eng., for Mississauga City Council in Ward 6; Wayne Hancock, P.Eng., for mayor of Minden Hills Township; Andrew Herbst, P.Eng., for Toronto City Council in Ward 18 (Willowdale); Michel LaBonte, P.Eng., for Upper Canada School Board Trustee in Ward 5 (Brockville and Maynard); and José Vera, P.Eng., for Toronto City Council in Ward 4 (Parkdale-High Park). Congratulations are in order for all 14 engineers who stepped up to run and contribute to public service.

A FIRST-TIME P.ENG. CITY COUNCILLOR

Engineering Dimensions had a chance to interview Ian McDougall, P.Eng., the only engineer to be elected on his or her first run for office. McDougall outlined what made him successful, why it is important for engineers to run and the issues that he will be facing in the next four years.

McDougall was elected as the Ward 1 councillor in the Town of Scugog. His victory is a notable one: He distributed only one piece of literature, knocked on every single door in his ward, and executed his entire campaign on only $2,700.

At only 46 years old and the father of four girls, McDougall heads up his own engineering firm in Whitby, where he works with large industrial, agricultural and residential clients. He also runs a 15-acre farm where, as per his brochure, he "takes care of his chickens."

On his success, McDougall notes that it is his engineering background that makes him the ideal candidate. "My strength is my engineering background in the sense that engineering teaches you strong problem-solving skills," he says. "As engineers, we learn to go around mountains and not through them."

McDougall stresses the need for engineers in public office. With a "lack of STEM-educated professionals present in the government, how can we make decisions that are going to be sustainable and smart?" he asks.

McDougall also has a genuine concern for the environment. His first item of business as councillor will be to "consider the environmental sustainability of the township, as it is critical for me to support our greenbelt."

Before the election, McDougall was involved at the regional level with Durham Region's Active Transportation Committee, Vision Zero and the Cycling Coalition. He is an outdoors person: He cycles, hikes, swims, boats, runs, boards and skis.

When he joined the Durham Region committee, he took on a leadership role and urged the committee to create an official trails definition, saying "I am an engineer; we need an official definition."

Lindsey Park, MPP (Durham), parliamentary assistant to the attorney general was on his team for a local cycling event. In fact, she publicly congratulated him for his successful election at PEO's 12th annual Queen's Park reception on October 24 (see p. 9).

To inspire and implement change, "it is important to understand the drivers behind governance," McDougall says. He summarizes it in a simple message that can also be used to describe his aspirations and driving force as councillor of Ward 1 in Scugog: "We'll get it done." **e**

Howard Brown is president of Brown & Cohen Communications & Public Affairs Inc., and PEO's government relations consultant.

COUNCIL APPROVES MAJOR CUTS TO DRAFT 2019 OPERATING BUDGET

By Nicole Axworthy

521ST MEETING, NOVEMBER 16, 2018

At its November 2018 meeting, Council approved the draft 2019 operating budget after incorporating major cost-saving and revenue-generating measures. The draft budget was presented to Council by the Finance Committee with a $2.5 million deficit before Council discretionary spend items and a deficit of $5.1 million after Council discretionary expenses. The main reasons for the deficit are:

- There have been no membership fee increases since 2008, and revenues from the growth in the number of licence holders, applications, examinations etc., have not been adequate to keep pace with operating expenditures, which have increased over 17 per cent since 2009 due to inflation;
- The modest increase in membership revenue over the past several years has not kept pace with costs for operations; and
- There has been an increase in the scope and breadth of PEO operations. Several new initiatives have become part of regular operations over the course of the past several years, such as the Practice Evaluation and Knowledge (PEAK) program, which was introduced in 2017 but became part of regular operations in 2018. A higher spend is also expected on initiatives such as the Public Information Campaign and activities related to the 2018–2020 Strategic Plan.

To address the shortfall in 2019, areas for potential cost savings were identified by the Finance Committee. Council spent a significant portion of its November meeting discussing and voting on specific ways to reduce the deficit, resulting in the elimination of several PEO activities entirely, including PEO's annual Queen's Park Day reception, Education Conference, Education Committee meetings, regional viewing meetings for all-candidates webcasts for Council elections and Engineering Innovation Forum event funding. Council also approved eliminating alcohol and reducing the food catering budget by 10 per cent for meetings at PEO headquarters. Council approved suspending the Governance Working Group Phase 1 and Emerging Discipline Task Force for one year and reducing budgets by 10 per cent for major conferences, such as the Annual General Meeting, Chapter Leaders Conference, Volunteer Leaders Conference, Committee Chairs Workshop and PEO Student Conference, and for chapters, northern and western regional offices, several non-statutory and non-board committees and task forces, and programs such as the Student Membership Program, Licensure Assistance Program, National Engineering Month and chapter scholarships. Council also approved implementing a $10 convenience fee for all credit-card transactions, increasing application, engineering intern and exam fees by 20 per cent and charging fees for Academic Requirements Committee interviews. The combined actions are expected to reduce the 2019 operating budget deficit to $860,000, which will be funded by PEO's operating reserve.

At its November meeting, Council approved the 2019 capital budget of $1.68 million, which comprises information technology, facilities and capital improvements to PEO headquarters. Capital improvements planned for 40 Sheppard West include leasehold improvements, which are renovation incentives provided to potential tenants for signing leases for vacant space on the building's second, fourth and eighth floors; and common area maintenance costs such as security upgrades and replacement of the generator, heat pumps, exterior windows and parking garage grates. Significant IT expenditures include upgrading the Aptify database system. The planned facilities expenditure for 2019 include configuring workstations to accommodate staff seating arrangements, new office furniture and replacing aging audiovisual equipment.

BORROWING RESOLUTION

Council carried a motion to renew PEO's borrowing policy, which includes an operating line of credit and corporate credit cards with Scotiabank, until January 31, 2020. Council approved an operating overdraft for an amount not to exceed $250,000 and use of corporate credit cards with an aggregate limit not to exceed $120,000. Council was told PEO has an adequate cash flow to meet its business requirements on a regular basis, and the draft facility is only for contingency purposes. Corporate credit cards provide convenience to senior volunteers and senior staff for PEO business expenditures. The credit card balances are paid off every month.

NON-BUDGETED EXPENDITURES POLICY

Council approved revising PEO's Finance Policy to indicate that "a two-thirds majority vote is required to pass an item that either 1) exceeds $300,000 beyond the approved capital and operating budget for that fiscal year, or 2) causes an item previously approved outside of the approved capital and operating budget in that fiscal year to exceed $300,000." Considering that PEO is currently facing an operating budget deficit, this change will ensure more diligence will be placed in obtaining needed feedback from Council members on new projects that require significant expenditures and that have not been incorporated in the annual budget. **e**

PEO should shed all non-regulatory activities

Franco DiGiovanni, LEL,
Mississauga, ON

I am a relatively new engineering practitioner, having received my LEL in August 2017; however, I have been practising in my area of expertise (air quality regulatory issues) in Ontario for almost 20 years and have been involved in several professional organizations along the way (Environmental Business Network, ONEIA, AWMA-OS, etc.). Having gone through the process and having been involved with PEO (and recently joining OSPE) for about a year, I now see the value of such a professional licensing system.

However, after coming into PEO and OSPE with a fresh pair of eyes, I've noted some oddities I'd like to comment on and humbly put forth some suggestions:

1. For an organization whose sole purpose is regulating the profession, it seems rather odd that PEO is involved in so many non-regulatory activities. For example, although I view the local chapter system as valuable, why is this not being organized by OSPE rather than PEO? Local chapters provide valuable activities, but they are not regulatory in nature.
2. It seems to me that PEO should shed all non-regulatory activities. Hopefully, that would free up resources to devote to core regulatory activities. For example, the complaints and investigation process is extremely slow—likely due to a lack of resources there. There also seems to be a lack of proactive enforcement by PEO. Where are the staff that actively go out and conduct inspections to ensure that engineering is not being practised without a licence? Freed-up resources may also allow PEO to engage more professional staff for certain duties rather than rely on volunteers, who may not always be readily available, for example, when interviewing new licence applicants. In this vein, and in my own field, I think PEO should argue that air/noise assessments for Land Use Compatibility Assessments (under the *Planning Act*) and for Environmental Assessments (under the *Environmental Assessment Act*) ought to be defined as engineering, and that such assessments should require a licensed practitioner's signature and seal.
3. With all non-regulatory activities shifted to OSPE, there would be much more impetus for engineers to join OSPE. This, through increased membership fees, would also provide OSPE the resources to manage all new activities (e.g. local chapter organization). Perhaps OSPE membership should be mandatory for all engineers?
4. With PEO focused on its regulatory mandate, there can be no accusations leveled at PEO due to conflicts of interest; governing engineering versus promoting engineering. Agriculture Canada went through a similar exercise in the late 1990s, when the regulatory activities were separated into CFIA after claims of conflict of interest levelled against Agriculture Canada at the time.

I submit these observations and suggestions not to criticize, but because I see two good organizations that can be made better, perhaps into great organizations. To that end I am willing to put my shoulder to wheel and lend assistance in any such efforts.

How will Pikangikum thrive in the long term?

Konrad Brenner, P.Eng.,
Ramara, ON

Regarding "Pikangikum: A northern Ontario First Nations community in transition" by Adam Sidsworth (*Engineering Dimensions*, November/December 2018, p. 35): The physical improvements achieved in Pikangikum by the three engineers and described by Sidsworth are impressive and laudable. This work will improve the lives of the people in the village. What is missing in the article is a hint of how, in the long run, sufficient employment opportunities will be created to build an economically viable and socially healthy village.

LETTERS TO THE EDITOR are welcomed, but must be kept to no more than 500 words, and are subject to editing for length, clarity and style. Publication is at the editor's discretion; unsigned letters will not be published. The ideas expressed do not necessarily reflect the opinions and policies of the association, nor does the association assume responsibility for the opinions expressed. Emailed letters should be sent with "Letter to the editor" in the subject line. All letters pertaining to a current PEO issue are also forwarded to the appropriate committee for information. Address letters to naxworthy@peo.on.ca.

David Grant is a hero

Ross Turek, P.Eng.,
Whitby, ON

Retired Manitoba engineer David Grant, P.Eng. (Manitoba), is a national hero; however, readers would not know this from reading your report ("Retired Manitoba engineer faces disciplinary hearing over amber light comments," *Engineering Dimensions*, November/December 2018, p.14).

You omit that Winnipeg is the only city in the world to have a four-second static amber time policy, regardless of the speed limit, with the higher speed intersections producing 1100 per cent greater violation and collisions than the slower speed intersections, where four seconds is adequate. All other cities increase amber time with higher speed—due obviously to the laws of physics. Quote: "He believes a four-second amber light often is not enough time for a vehicle to completely clear the intersection before the light turns red." Don't you believe this? Region of Durham Engineering and the rest of the world gets this; see the YouTube video below:

Amber (Yellow) Light Durations in 80 km/h zones, Durham Region, Ontario: www.youtube.com/watch?v=8CK_ZcUtvE

Nothing could be of greater safety concern than intersecting traffic, yet our profession is dragging David Grant through hell? How does this look in the public eye? How does this showcase our profession? I would expect our profession would support this whistle blower, not trip him up. Shame.

The north represents opportunity to innovate

Peter Broad, P.Eng.,
London, ON

My thanks to Bob White, Irving LeBlanc, David Steeves, Tori-Lea White and other engineers who work in northern Ontario. It is always difficult to separate between who an engineer is and the work we do. The role of lauding engineers for prestigious effort lies within the bailiwick of OSPE. However, as a regulator, PEO's concern is with public protection and thus it has a duty to recognize areas of public deficiency and enhance efforts to eradicate such problems. Thus, my thanks also to associate editors Marika Bigongiari and Adam Sidsworth for highlighting the special challenges that are faced by those who divide the four seasons into almost winter, mid-winter, deep-winter and black-fly season.

Northern Ontario is certainly a region where engineering challenges prevail. Twenty-nine southern PEO chapters are crammed into just 12 per cent of this province, while just seven chapters share the remaining 88 per cent, though the north does have five of Ontario's 20 universities, including the only francophone centre d'enseignement supérieur.

Internet access is limited in over three dozen northern communities living without hydro, and our famed Trans-Canada Highway is blocked far more frequently than I-90, so practising engineering presents its own challenges.

Rail reaches further north than the paved highway and provides a link to Ontario's only saltwater port, Moosonee. Ice roads require one metre (40 inches) of ice, so climate change may make the north even more remote, rather than bringing accessibility.

Sudbury's landscape was once considered a suitable training ground for lunar explorers, but environmental awareness and revegetation is what they now offer. Despite harsh weather, the north innovates!

That small dot between the cliffs of the Sleeping Giant—that graces the cover of *Engineering Dimensions'* November/December 2018 issue and was voted number one of seven Canadian wonders—is Silver Islet, where mining began in 1845. Ojibway legend claims that it was this discovery by white men that caused the Giant Nanabijou to be turned into stone.

North America's Great Depression was ended by engineers and mega-projects. This opportunity still exists. Perhaps more southern chapters and communities should twin with northerners and help provide fundamental engineering services and gain further insights to this remarkable area.

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