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Cover: Custom passive house in Canmore, Alta.; photo courtesy Natalie Leonard.
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CONVERSATION
Bringing Passive Houses Into the Mainstream: Halifax-based Natalie Leonard, P.Eng., has pioneered a mix of custom and stock designs. **10**

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Positioning Women for Success: Marg Latham, P.Eng., CMC, has become the first consulting engineer to chair the WinSETT Centre. **24**

Looking forward

Hello! I am excited to join *Canadian Consulting Engineer* as editor starting with this issue. It's the end of a year, rather than the beginning of a new one, but the timing has proven fortuitous.

For one thing, I came on board in time to attend the Association of Consulting Engineering Companies (ACEC) Canada's annual national leadership conference in Ottawa in October. The recent federal election—which meant there was no Parliament Hill Day this year for advocacy—set the tone for an often-political discussion of the state of the industry, the current business climate, financing for major projects and uncertainty surrounding Canada's energy and natural resource sectors. I was proud to help hand out the annual Canadian Consulting Engineering Awards.

Some of the same topics came up at October's Passive House Canada Conference, which drew roughly equal numbers of engineers and architects to the University of Toronto (U of T) Scarborough campus. For one thing, a tough business climate has directly affected the campus' attempts to build North America's largest Passive House (PH) building to house its students, as tariffs on steel and aluminum forced the original concept back to the drawing board. Despite any such setbacks, PH knowledge is in high demand, as construction engineers encounter more situations where their clients want or need a tighter building envelope and greater energy efficiency.

"PH is something you can learn, just like the mechanical system for a hospital," said Deborah Moelis, a certified PH designer with Handel Architects, one of the firms working on the U of T residence.

Beyond new construction, meanwhile, the less-rigorous 'EnerPHit' standard can be applied to retrofits of existing buildings. In Hamilton, for example, Reinbold Engineering Group and Entuitive are helping turn the 18-storey Ken Soble Tower public housing facility into one of the largest EnerPHit-certified projects in the world. (And while this magazine doesn't usually cover single-family residential construction, do check out our discussion with a pioneering PH homebuilder on p. 10, as some of the issues she raises are likely relevant to you.)

I also managed to stop by a packed CanBIM event this fall, which illustrated how important building information modelling (BIM) software and workflows have become to a wide array of professionals, from PCL Construction prefabricating rooms for a new hospital to Mattamy Homes pilot-testing greater integration of disciplines like electrical work and HVAC installation.

"We saved 1,820 hours with a process that was 30% to 50% faster than traditional computer-aided design (CAD)," said Jad Jouliji, co-founder of BIMstudio, which worked with Mattamy on the project.

Such examples are helping point the way ahead. With that in mind, I look forward to working with you in 2020!

Peter Saunders

FOR PROFESSIONAL ENGINEERS IN PRIVATE PRACTICE

CANADIAN CONSULTING engineer

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Photo courtesy FIDIC

Pictured left to right are FIDIC CEO Nelson Ogunshakin, ACEC-Canada's Christina Locmelis, Kerr Wood Leidal's David Roche and Stantec's Walter Orr.

AWARDS

FIDIC honours Canadian firms

The International Federation of Consulting Engineers (FIDIC) hosted its 2019 Awards Ceremony & Gala in Mexico City on Sept. 9. It turned out to be a rewarding evening for the Canadian consulting engineering industry, as the Association of Consulting Engineering Companies—Canada (ACEC-Canada) and three member firms—Kerr Wood Leidal Associates, Stantec and Tetra Tech Canada—were all honoured with awards.

Attracting some 800 leaders from engineering companies around the world each year, the FIDIC Annual Conference, which includes the Awards Gala, is a platform for global colleagues to discuss the challenges facing the future of the industry.

The FIDIC Project Awards promote the use of international best practices and resources to achieve high-quality projects that help develop economies and communities around the world.

Kerr Wood Leidal of Burnaby, B.C., was recognized with an Award of Merit for its Squamish Integrated Flood Hazard Management Plan project, a three-year study assessing and mitigating an extensive range of overlapping flood hazards. This project was also a recipient of an Award of Excellence at the 2018 Canadian Consulting Engineering (CCE) Awards.

Vancouver-area Stantec and Tetra Tech Canada offices, meanwhile, were honoured with a FIDIC Award of Special Merit for the Inuvik Tuktoyaktuk Highway (ITH) project, which is both (a) the first Canadian highway constructed on continuous permafrost and (b) the final link connecting Canada's highway network from coast-to-coast-to-coast. This project was also recognized with the Engineering a Better Canada Award at the 2018 CCE Awards, for best showcasing how engineering enhances the social, economic or cultural quality of life of Canadians.

This year, FIDIC introduced the Member Association (MA) Excellence Awards category to recognize the achievements and successes of its international member associations. ACEC-Canada took home the Award for the 'best advancement of a cause, advocacy campaign or event' for its #20DaysOfExcellence campaign.

This annual campaign, which takes place following the CCE Awards each October, showcases the 20 CCE Award of Excellence-winning projects, selected for their innovation, complexity and social and economic benefits.

COMPANIES

NORR rebrands, creates centres of excellence

NORR Architects and Engineers has launched new corporate branding to represent its current strategic direction, align its 750 professionals across 14 market sectors, support its new 'centres of excellence' in Canada, the U.S., the U.K. and the U.A.E. and, according to president and CEO Brian Gerstmar, harness the brand equity of the firm's 81-year history.

"We have re-envisioned our approach to maximize the potential of our diversified practice," Gertsmar explains. "We know engineers or architects specializing in one building typology and being able to fully design today's multi-purpose projects is not realistic. These projects require a team of designers specializing in their respective fields, but working together to integrate functional, requirements into a single vision."

In addition to a new logo, the company's redesigned website highlights projects by market sector.

"Just over 70 years ago, NORR reinvented itself as an integrated firm, consisting of both architects and engineers," Gerstmar adds. "This philosophy still holds true today, but we have gone one step further by leveraging our expertise across all of our offices."

FNX-INNOV merges with AXOR Experts-Conseils

Montreal-based engineering firms FNX-INNOV and AXOR Experts-Conseils announced a merger on Oct. 31, creating a single company set to operate under the FNX-INNOV banner.

The merger brings together nearly 1,000 employees and a portfolio of multidisciplinary services across several sectors and regions. In particular, the integrated firm is expected to be a major player in Quebec and the rest of Eastern Canada and to target the industrial, water treatment and mining sectors, among others.

JLR acquires PES

J.L. Richards & Associates (JLR), which provides engineering, architecture, planning and project management services from seven offices across Ontario, has acquired Porcupine Engineering Services (PES), a multidisciplinary firm based in Timmins.

The acquisition is intended to diversify JLR's servers for clients in the mining, industrial, forestry and energy sectors, particularly in northern Ontario. Founded in 2004, PES has specialized expertise in brownfield mining.

With the deal, PES partners Mario Colantonio, Frank O'Donnell and Brian Emblin, along with their entire team, will be integrated into JLR's existing industrial and mining group.

CODES

B.C.'s Step Code helps drive $3.3-billion energy-efficiency market

Photo courtesy Efficiency Canada

A recent Vancouver Economic Commission (VEC) study suggests communities across British Columbia that are using the new BC Energy Step Code—which allows them to require builders to exceed minimum legal requirements for energy efficiency—are helping drive a $3.3-billion market for high-efficiency construction products.

Specifically, the VEC study says the policy is expected to help create 925 manufacturing jobs and 770 ongoing installation jobs throughout the province.

"We're seeing a real surge in exceptionally energy-efficient buildings," says Luke Dolan (pictured), owner of Capital Home Energy and the provincial director of the Canadian Association of Consulting Energy Advisors (CACEA), which is working with builders to ensure projects can meet the new code's requirements cost-effectively. "As more communities start requiring higher efficiency in new construction, we're expecting to see many more energy advisors, among other positions."

The code reflects a provincial goal for all new buildings to achieve very high levels of efficiency performance by 2032. To date, 24 communities have adopted the regulation, collectively representing more than 70% of all residential construction activity in the province.

PUBLIC PROGRAMS

Ontario launches USP framework for infrastructure

Ontario's government is launching a new framework for receiving and evaluating infrastructure proposals from the private sector. It will address unsolicited proposals (USPs) that were not requested through an existing procurement.

The framework marks the first-ever formal process for submitting USPs to the Ontario government. The goal is to consistently and fairly consider private-sector ideas with the potential to improve public infrastructure and related services.

"It provides a clear path for industry to share proposals we might otherwise not have developed on our own," explains Laurie Scott, the province's minister of infrastructure.

"These types of programs have been successfully used in other jurisdictions to accelerate the delivery of important new infrastructure," says Shariq Alvi, managing director of global infrastructure and power for CIBC Capital Markets.

Ontario's program is reportedly open for all infrastructure proposals, including those for transit lines and stations, highways, health-care facilities, housing, energy generation and storage projects and 'digital infrastructure' like broadband and cellular network expansions. The government says it will focus on those that align with its own priorities, provide the greatest benefits to Ontarians, are technically and commercially feasible and provide the greatest value for any investment of public funding.

"The proposed process encourages beneficial public outcomes in a clear and transparent manner," says Michael Schatz, global managing director of infrastructure for Hatch.

BUILDINGS

Toronto's SickKids breaks ground on new patient support centre

Downtown Toronto's Hospital for Sick

Photo courtesy SickKids

Children (SickKids) and its associated charitable foundation recently held an official groundbreaking ceremony for their new 22-storey Patient Support Centre (PSC).

The ceremony followed eight months of demolition. The site for the PSC was formerly occupied by SickKids' Elizabeth McMaster Building, an eight-storey laboratory and administrative facility built in 1987.

The project team for the PSC includes:

- Construction manager: PCL Constructors Canada.
- Architect: B+H Architects.
- Structural Consultant: Entuitive.
- Electrical Consultant: Mulvey & Banani.
- Mechanical Consultant: The Mitchell Partnership.
- Demolition: Priestly Demolition.

Construction of the PSC is part of SickKids' campus redevelopment effort, Project Horizon, which will reportedly involve renewing or renovating virtually all clinical care and support areas of the hospital over approximately 10 years.

The PSC will house the SickKids Learning Institute, a simulation centre, workspaces for the hospital's management, professionals and support staff and collaboration spaces for all staff from across the campus.

The next phase of the project, the Peter Gilgan Family Patient Care Tower, will house critical care and inpatient units, a blood and marrow transplant and cellular therapy unit, specialized operating theatres, diagnostic imaging facilities and an expanded emergency department. Finally, renovations to other areas of the existing campus will support new and existing outpatient clinics.

BUILDINGS

Halifax's Tribute Tower, built to resist progressive collapse, earns LEED Silver

The Royal Canadian Navy's (RCN's) new Tribute Tower project for Stadacona at Canadian Forces Base (CFB) Halifax received Leadership in Energy and Environmental Design (LEED) Silver certification earlier this year.

The project, which combines 12 storeys of accommodations with three levels of dining and messing facilities for RCN junior ranks personnel, achieved the certification in May through the Canada Green Building Council's (CaGBC's) LEED Canada NC 2009 Green Building Rating System. The designation has come to represent a minimum design target for many federal government buildings where construction is valued at $10 million or more.

In this project's case, RCN awarded a $65-million construction contract to a design-build joint-venture partnership between SNC-Lavalin Construction and Aecon Atlantic. SNC-Lavalin also collaborated with Protection Engineering Consultants (PEC) to meet the U.S. Unified Facility Criteria (UFC) 4-023-03 standard, *Design of Buildings to Resist Progressive Collapse*. In fact, Tribute Tower is the first structure in Canada to be built to this standard.

When Aecon Atlantic—a subsidiary operation—was sold, both firms sold their interest in the project to Pomerleau, which completed construction. As the designer of record, however, SNC-Lavalin remained involved until project completion, with its Halifax office leading a team of mechanical, electrical and structural engineers with specialized experience. This team involved Toronto-based Sigmund Soudack & Associates, while architecture and LEED consulting services were provided by Halifax-based Architecture49.

BUILDINGS

ASHRAE prepares new net-zero HQ

The American Society of Heating, Refrigerating and Air-Conditioning Engineers' (ASHRAE's) board is undertaking a US$15.7-million renovation of a building that will become its new global headquarters (HQ), with the goal of achieving—and showcasing—net-zero energy efficiency.

The 69,000-sf 1970s-era commercial office building is located at 180 Technology Parkway in Peachtree Corners, Ga., approximately 10 miles north of the current HQ in Atlanta. To upgrade the building to net-zero operations, which may be substantiated through certification programs, ASHRAE is hoping to reduce its energy consumption to below 22 kbtu/sf/year, with a limit of maximum daytime plug load to 0.5 W/sf. The organization seeks to exceed its own standards where possible, including: 90.1-2016, *Energy Standard for Buildings Except Low-rise Residential Buildings*; 62.1-2016, *Ventilation for Acceptable Indoor Air Quality*; and 55-2017, *Thermal Environmental Conditions for Human Occupancy*.

McLennan Design (MD), Houser Walker Architecture and Integral Group are tasked with the renovations.

ASHRAE expects to relocate in October 2020. Its current HQ will then become part of a medical campus for Children's Healthcare of Atlanta.

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An 80,000 square foot seniors' residence with 146 units, Ken Soble Tower was built in 1967 and is the oldest property in CityHousing Hamilton's portfolio.

After weighing their options – selling, rebuilding, capital repair and rehabilitation or retrofitting – the municipality decided to retrofit.

With incentives and technical assistance from Enbridge Gas' Commercial Savings by Design program, the tower got a modernized ventilation system, high-efficiency heating and cooling and eliminated thermal bridging at balconies, among other improvements.

When complete in 2020, the tower will be one of the most ambitious transformations in Canada, setting a new standard for sustainable senior living.

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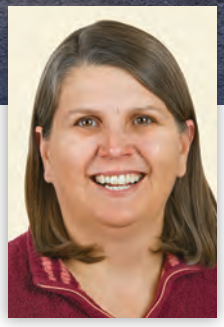
BRINGING PASSIVE HOUSES INTO THE MAINSTREAM



While Natalie Leonard describes a regional 'culture' of passive houses in both Nova Scotia and British Columbia, she also designed this one in Canmore, Alta.

While stricter buildings codes, government incentives and environmental concerns are all making 'green building' a hot topic today, Halifax-based Natalie Leonard, P.Eng., became Canada's first certified Passive House (PH) consultant and builder a full decade ago. Since then, her company—Passive Design Solutions—has completed more than 100 projects that are net-zero-ready. Along the way, she has focused on making such homes more easily affordable for the mainstream market.

With that in mind, we recently spoke to Natalie about how her background as a civil engineer helped turn this international concept into a local reality.

How did you get into engineering in the first place?

My dad and my brother were civil engineers. Math and physics came relatively easily to me in school, so the field seemed like the right choice at the time.

However, when I graduated with my degree in 1984, there weren't a lot of openings in the industry. My only job offer came from the forestry industry, where I had no interest. So instead, I worked with my dad in general contracting for a few years, about half residential and half commercial.

It turned out I really liked residential construction. There was a lot of opportunity to be creative.

While studying at the University of Toronto (U of T), I worked as a project manager for a big residential builder, but they were too money-oriented and took shortcuts. I ended up moving away from construction, serving as a project manager in health-care technology—but as I never really had a passion for health care, I always kind of kept one toe in construction.

What drew you to green construction?

When I got the chance to travel in Asia, I saw how much simpler and less wasteful their construction methods were than ours back in Canada. That experience cemented my environmentalism.

Later, as I was addressing energy efficiency for one of my projects, I learned about the PH standard, which ensures a building requires very little energy for heating and cooling, making conventional furnaces and air-conditioning systems obsolete. This appealed to me in both environmentalist and practical terms.

I booked my airfare to Chicago to attend a first round of training in 2008. I finished my certification in 2009.

At first I did all of that out of personal interest, but then I decided to become a consultant and registered my own company. I built a 'spec' house in Halifax, sold it at list price and got things rolling from there. I started six houses in rapid succession.

My company grew into a team of professionals. At first, we did design-build, combining design, energy consulting and construction. Then we would just build the 'shell' of a

Photos: Natalie Leonard

Transforming Toronto's Skyline

Walters Group is excited to be a partner in building CIBC Square in Toronto. The development will integrate a 54-storey office tower with a one-acre elevated park above the Union Station rail corridor and pedestrian bridge to the Scotiabank Arena. This building, which will be engineered to LEED Platinum specifications, is Walters fourth LEED certified office tower.

Walters Group is a family-owned steel construction company that designs, fabricates, and constructs commercial and industrial projects throughout North America. Regardless of the industry, size or complexity, we always bring the same passion and commitment to every project we take on.

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house and other builders would fill in the details. Today, we are focused completely on the design work. We are small and extremely specialized.

I am also licensed to teach a PH builders' program in both Canada and the U.S. While the fundamentals of energy efficiency have been well-understood since 1990 or so, the PH standard takes construction to the extreme, to the point where you do not need a central furnace.

How do you address your clients' needs?

About half of our clients want a custom design, while the other half—ranging from young families to retirees—use the stock plans we have developed over the years.

Those seeking a custom design that incorporates energy efficiency from the start of the process are not so much concerned about reducing their energy bills, since they can afford to pay those, as they are about doing what's right for the planet. These designs are often site-driven, *i.e.* based on the grade of the landscape, where the doors need to be, etc.

For those who buy our stock plans, on the other hand, the main motivation is energy security. They want to control their home's operational costs.

This is a significant issue in Nova Scotia. Many older houses here are still heated by oil, their insurance rates are increasing and we only have limited access to natural gas. Meanwhile, Nova Scotia Power's electrical rates, already the highest in the country, are predicted to double or triple in the next 10 years.

Custom designs for Passive House projects can be driven by the particular site. This home, for example, sits on a lakefront.

Thankfully, with careful design, a provincial rebate program means we can build a passive house at the same cost to the buyer as a traditional house.

There are other benefits, too. Compared to older houses that experience massive air leakages and are always cold, a passive house's building envelope is comfortable and resilient during storms, with no risk of freezing dur-

Existing buildings can also be renovated to meet Passive House guidelines.

Passive Design Solutions specializes in residential construction, but has worked on some commercial projects, as well.

ing a power outage.

In summer, the envelope helps keep the heat out, but we can also use heat pumps as small-point sources for cooling. Most of our clients use no to very little air-conditioning.

In fact, we track our houses' energy consumption over the first year and compare it to a PH model. Our clients are only spending $700 to $1,000 annually on their energy bills. Many are going net-zero by adding solar panels. Some are taking their houses off the grid.

One of the best ways to help the environment and save money is to build the smallest house you can live in, but the irony is it is very difficult for a really tiny house—let's say, 500 square feet, with one bedroom—to meet the PH standard, since it has a very large surface area in relation to the amount of living space.

Where do you see the PH standard heading in Canada?

There's now a regional 'culture' of passive houses in both Nova Scotia and British Columbia, but to move the standard further into the mainstream, we need to be able to provide designs using locally available materials, with local support.

We also want to use more locally manufactured products, rather than import German-manufactured windows, air-sealing tapes and membranes, so we can save money and access them more readily. Canada should do better with heat recovery ventilators (HRVs), for example, some of which are being manufactured in Quebec but only sold in Europe! This is the market reality today because the National Building Code of Canada (NBC) does not dictate the efficiency of HRVs, but since municipal and provincial codes can be overlaid on the NBC, there are local opportunities to make PH more mainstream.

My background is mainly single-family residential, but we have also provided consulting for commercial offices and an apartment building. At that larger scale, the building envelope becomes less important, while the mechanical design becomes more important.

So, for that market, mechanical engineers should be the ones doing the energy modelling. Some of the younger ones I've met are aware of that opportunity.

This has all helped guide my decision to focus on bringing the PH standard to the mainstream residential market in Canada and the Northeastern U.S. Our client enquiries are increasing dramatically in response to public awareness about the climate crisis. After all, building a new home may be the biggest opportunity any individual has to reduce their carbon footprint and help in the fight against climate change. **CCE**

Seneca College's CITE WALKS THE TALK

By Peter Saunders

Last December, Belnor Engineering of Mississauga, Ont., installed what it calls Canada's first transparent photovoltaic (PV) solar window, at the newly built Centre for Innovation, Technology & Entrepreneurship (CITE) at Seneca College of Applied Arts and Technology's main Newnham Campus in nearby Toronto.

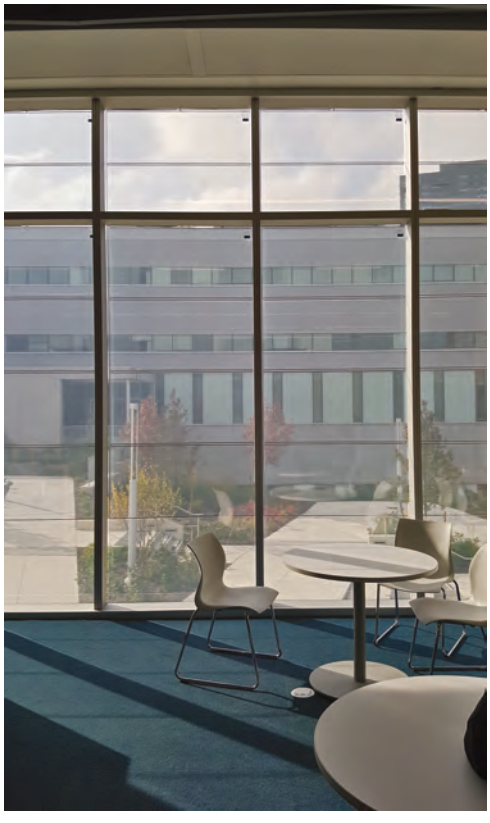


Photo by Peter Saunders

Building occupants can see clearly through the PV solar window.

The 47.4-m^2 (510-sf) curtain wall is part of the building's southwest-facing façade. It comprises 18 PV glass panels, incorporating Onyx Solar's amorphous silicon (a-Si) technology, and provides 20% transparency, so building occupants can see through the thermally and acoustically insulated glass units (IGUs) as though they were merely shaded to filter out infrared (IR) and ultraviolet (UV) radiation—which they also do.

Approved by UL Canada and Ontario's Electrical Safety Authority (ESA), the feature window will generate clean, free electricity to help offset some of the facility's operational costs. That said, these amounts of electricity will be relatively small: 1.2 kW DC, 15 kW AC, with the peak estimated at 1.3 kW DC.

"It was expensive," explains Angelo Miranda, Seneca's director of major capital projects, "but we wanted to showcase this technology and what it can do."

By way of comparison, CITE's more traditional rooftop PV panels will generate an estimated 164 kW DC, 133.3 kW AC. This is forecast to save Seneca $17,000 each year on its electric bills.

Perhaps fittingly, both installations will help the college 'walk the talk' for the new 25,455-m^2 (274,000-sf) building's cohort of students in applied science and engineering technology programs, which span civil, mechanical and environmental engineering, among other disciplines. That is to say, CITE can actively demonstrate new technologies in the very industries for which its students are being prepared.

"I'm excited for all the ideas and partnerships that will develop here and benefit our students and the community," said Ranjan Bhattacharya, dean of the faculty of applied science and engineering technology, when CITE held its official grand opening in September 2019.

Uniting departments

The five-storey building—with three storeys of academic spaces and two for administrative offices—is the largest construction project in Seneca's history. As such, it is also a major component of the college's vision for its immediate and long-term future.

Students started arriving in January 2019, followed by a 'soft opening' in February, but many more of them, along with staff, will be relocated throughout 2020 to benefit from closer collaboration and interdepartmental synergies.

By way of example, Seneca recently closed its Jane Street campus in the city's west end and moved its tool-and-die, computer numerical control (CNC), mould making and other

Photo courtesy Seneca

metal machining systems to CITE, where they are now part of the advanced machining program. The building's many specialized labs also feature robotics, mechatronics, motors and process control.

Open ceilings let students view the building's own workings, including HVAC and electrical systems, complemented by acoustic baffles and carpeting to reduce echoes. Collaboration spaces that bring students and entrepreneurs together feature raised floors and movable furniture to accommodate not just today's, but also tomorrow's, data cabling and wiring. Wi-Fi is ubiquitous via overhead access points, except in an information and communications technology (ICT) lab where special Wi-Fi-blocking tapes and paints were be used to prevent signal entry, since the students there learn about hacking a training server to improve data security measures.

"Five of our specialized ICT labs need their own internal networks to support hundreds of cable drops," explains Hooman Aboutalebi, Seneca's manager of design and construction for major capital projects.

The administrative floors are still under construction. They will be occupied in 2020 when employees are relocated from Seneca's Markham campus. This will mark the first time all of the college's administrative departments will be united in one location.

Invoking Indigenous culture

Given the college is named after one of North America's five Iroquois tribes, it is also fitting that CITE features many Indigenous elements.

At the grand opening, artist Joseph Sagaj introduced guests to his signature piece, 'Circle of Indigenous Knowledge,' a terrazzo medallion inset in the floor of the building's main lobby and serving as its central meeting point.

"The footprints of the clans of the animals and birds incorporated into the medallion serve as a metaphor to invite people to walk with us in the circle of life and unity," he explained. "I wanted to make it inclusive for everyone."

Constructed by Franklin Terrazzo, the medallion measures 10 m (32.8 ft) across and features a turtle in its centre—referencing Turtle Island, which to many Indigenous peoples represents the North American continent. It won the Project of the Year award for 2019 from the Terrazzo, Tile and Marble Association of Canada (TTMAC).

Just outside the lobby, the western front entrance features a four-storey tall graphic by Bruce Mau Design, recreating the signature page and map from the 1787 Toronto Purchase land deal between the Mississaugas of the New Credit and the British crown. At the opposite end, the eastern entrance wall displays a map of the universe, representing technological progress since the treaty was signed. And between those entrances, 13 columns lining the building's front façade are emblazoned with the names of the 13 moons in the Indigenous lunar cycle.

The building's bulkheads display a bathymetric (similar to topographic, but for water) map of the bottom of Lake Ontario to represent the historic importance of the Great Lakes to the Seneca and other Indigenous peoples. At night, an LED fixture in the third-floor student lounge projects images of the aurora borealis onto an acrylic screen to highlight the importance of the Northern Lights to Indigenous culture and mythology.

The concept extends throughout the academic floors with eight graphic elements.

From completion to certification

Design and construction began in 2016 for the $100-million CITE, which was substantially completed by the end of 2018. Perkins + Will Architects Canada were the prime consultants for and designers of the building, while Smith + Anderson served as mechanical and electrical engineers, Read Jones Christoffersen (RJC) was the structural engineering consultant and WSP was the civil engineering consultant.

Seneca is now seeking LEED Gold certification for CITE, based on such elements as LED illumination, a demand-controlled HVAC system (which uses much less energy than a traditional system), naturalized landscaping (which collects and recirculates rainwater for irrigation and reduces the need for energy-consuming maintenance) and, of course, the two solar energy installations. CCE

Tips for Calling New Prospects

By Nicole Attias

With emails, texts, online marketing channels and social media, many professionals today are becoming more detached from each other—and this is not a good thing for those who are more 'reserved.' Adding a live voice to the mix when communicating with new people is not only effective, but also refreshing.

Rejection is the main barrier or roadblock for procrastination in picking up the phone to reach out to new prospects. One way to start is by leaving great voice messages, as most CFOs and CEOs will be too busy to pick up their phone anyway.

Leaving clear, concise voice messages will yield next steps and the answers you seek. Maybe you want to get in the door with an important decision-maker. Maybe you want to close your next deal. How you speak and what you say both matter.

It is amazing how many professionals lack basic etiquette. Most do not view picking up the phone as enjoyable.

It is best to keep your pitch to no more than a few lines or simply ask a few questions. Be yourself when you pick up the phone and see where it takes you.

1. Do your research and know your message

What do you want to convey with your message? Who do you want to meet and how will you leave a lasting impression? Start by researching the decision maker to whom you are reaching out.

This way, you can mention their specific accomplishments and knowledge, including any points about which you would like to learn more. Showing interest in this way is a great way to start a conversation and can build an instant connection. People love to talk about themselves!

This strategy will allow you to customize your message before you pick up the phone. Knowing how to approach the right decision maker will yield faster results. And your goal should always be to arrange a first meeting.

2. Build rapport

Another key step after picking up the phone is to turn a cold call into a warm one. This takes time, but by facing the fear of rejection, you will go a long way.

Beyond mentioning accomplishments, you can build rapport with your prospect by following their timing. For example, if they say, "This isn't a good time, call me next week," then call them next week. If they say, "Call me in a few months," then call them in a few months. Your persistence over the long term will pay off, but it must be according to their timeline, not yours.

Then you can ask to meet to discuss the added value of your services. People usually appreciate the time you take with them, so long as listening is part of it. Details can be given face to face.

Further details can be discussed face-to-face.

Photos: ©Jacob Lund - stock.adobe.com

3. Accept the word 'no'

Most people avoid cold calling because of how many times they have to hear 'no' before they get to a 'yes,' but any response is better than no response—and the more times you hear 'no,' the closer you are to a 'yes.'

Track how many calls you make per day, week or month and, as mentioned, follow your prospects' timelines for appropriate followup calls. Being organized and detailed in these ways will yield results.

Combine patience and persistence. Cold calling can work wonders over time. By learning to weed out bad experiences, you can even start to predict possible outcomes, while learning how to handle the same objections that keep popping up again and again.

4. Maintain relationships

Once a deal is signed, maintain a good relationship. It takes time to build one, but only a few minutes to destroy.

Keeping clients happy is no different from keeping staff happy. Regular 'maintenance' is required so everything operates effectively.

Professionals interact differently when they feel cared for. If this care is missing, then a lack of commitment and enthusiasm will show in their everyday dealings. The last thing you want to do is lose customers because they feel undervalued; this can lead to a bad reputation for your business.

5. Understand the importance of the call

When salespeople are prospecting, they can be viewed as pushy, self-centred or money-hungry, so cold calling has been given a bad name and may be seen as a relic of the past. Yet, on the contrary, it remains one of the most effective ways to get in the door to meet new prospects and close new business.

'Playing the numbers game' involves rejection and frustration, but understanding this will help you get past the negative image of cold calling and achieve positive results. It is a game you play over the long haul, using all of your skills and capabilities. And you can still send emails and connect via social media, but the importance of the call cannot be ignored. CEOs and CFOs will appreciate your persistence; they were there once, too. CCE

Nicole Attias is a creative thinker with extensive business development experience, including cold calling and networking in commercial real estate. She also specializes in preparing business articles, presentations, public relations (PR) and sales coaching. For more information, contact her by phone at 416-831-0356.

The new terminal's irregular structure, with curved walls and roof, posed a number of challenges.

Photos courtesy SNC Lavalin

Expanding Jean-Lesage International Airport

By Stantec and SNC-Lavalin

Stantec and SNC-Lavalin both consulted on the recent expansion of Québec City Jean Lesage International Airport (YQB), which doubled the terminal's surface from 25,000 m^2 to 50,000 m^2 and added new boarding bridges, check-in and security clearance stations, luggage carousels and storage capacity, boutiques, dynamic displays and smartphone recharging stations, among other amenities.

Dubbed 'YQB 2018,' the project involved a $277-million investment to support the airport's continued growth, energy efficiency and sustainable redevelopment, while also focusing on the passenger experience, to better meet the requirements of international air traffic.

The BIM approach

Both Stantec and SNC-Lavalin integrated engineering and design by applying the building information modelling (BIM) approach through all phases of the project's life cycle, which was apparently a first for Quebec.

Stantec's team found the BIM approach helped identify planning anomalies, avoid on-site problems and accommodate a tight schedule. Among the technical challenges, for example, was developing an awning along the terminal's façade to protect travellers from inclement weather.

The resulting awning—a 7 x 80-m glass wall—was suspended as a cantilever structure from the roof, avoiding the installation of posts that could interfere with pedestrian traffic flow, and was engineered to withstand the effects of wind, ice and thermal and seismic stresses.

The new terminal's irregular structure, with curved walls and roof, also posed challenges. The inside spaces of the luggage carousels were used for bracings that also serve as mechanical shafts and conceal steel assemblies that transfer stresses from the roof.

BIM was also used to integrate the new terminal into the airport's existing architecture. Autodesk Revit software facilitated design co-ordination and, subsequently, contruction work, as contractors used the 3-D models for their own plans.

Improving energy management

SNC-Lavalin's team focused on the energy-efficiency goals, designing electrical and mechanical systems to minimize consumption. The existing buidling's heating systems had to be maintained at high temperatures during very cold weather, but the basic principle for the new terminal's design was low-temperature water heating and heat recovery.

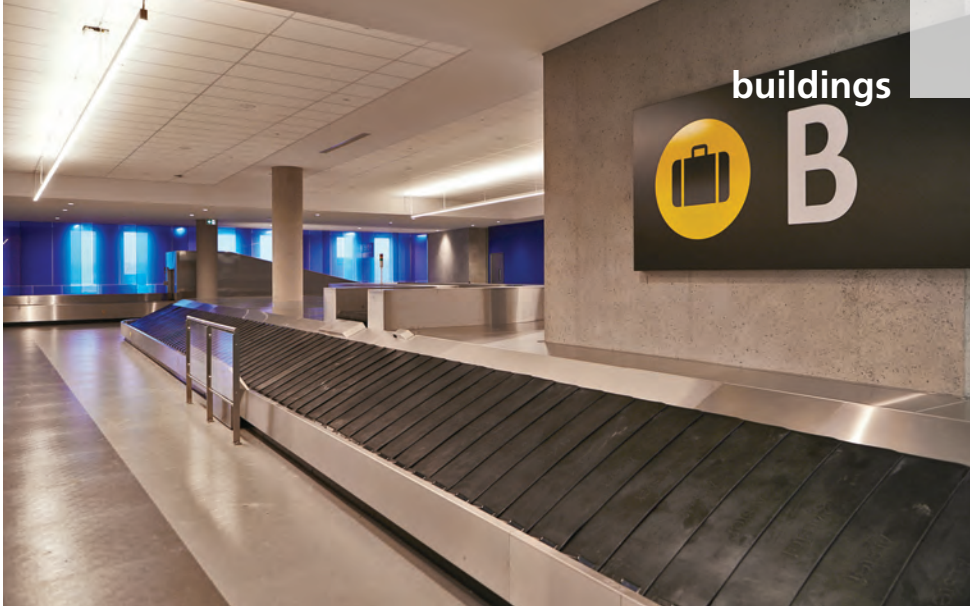
A new thermal plant—including a geothermal exchanger with 60 wells, each drilled to a depth opf 168 m—was installed to provide not only heating and cooling, but also an emergency power supply. A new mechanical room houses most ventilation systems, as well as heating and cooling pumps for secondary systems.

The engineers installed condensation boilers with dual return to the thermal power plant. These boilers feed a primary sytem that injects heat at a high temperature into the existing system and at a lower temperature into the new system. This allows for condensation in the new boilers, increases their efficiency and provides an opportunity to reduce the temperature in the existing system.

More than 43 km of radiant piping was installed under the floors of common areas, along with change-over diffusers along the perimeter to heat windows, prevent condensation and improve travellers' comfort. Two of these piping systems feed the existing and new systems.

Besides the condensation boilers, the main energy-efficiency measures included variable-frequency drives

Photo courtesy Stantec



Inside spaces of luggage carousels were used for bracings that also serve as mechanical shafts and conceal steel assemblies that transfer stresses from the roof.

(VFDs) for all ventilation units and most pumps, fresh air intake based on oxygen detection, LED lighting with luminosity detectors in large, open areas and heat recovery from chillers and from waste air by using thermal wheels. In particular, SNC explains the project's extensive use of 'smart valves' with integrated flow meters is a first in Quebec.

Combined, these measures are expected to save $450,000 in operating expenses and 35,000 Gj of energy.

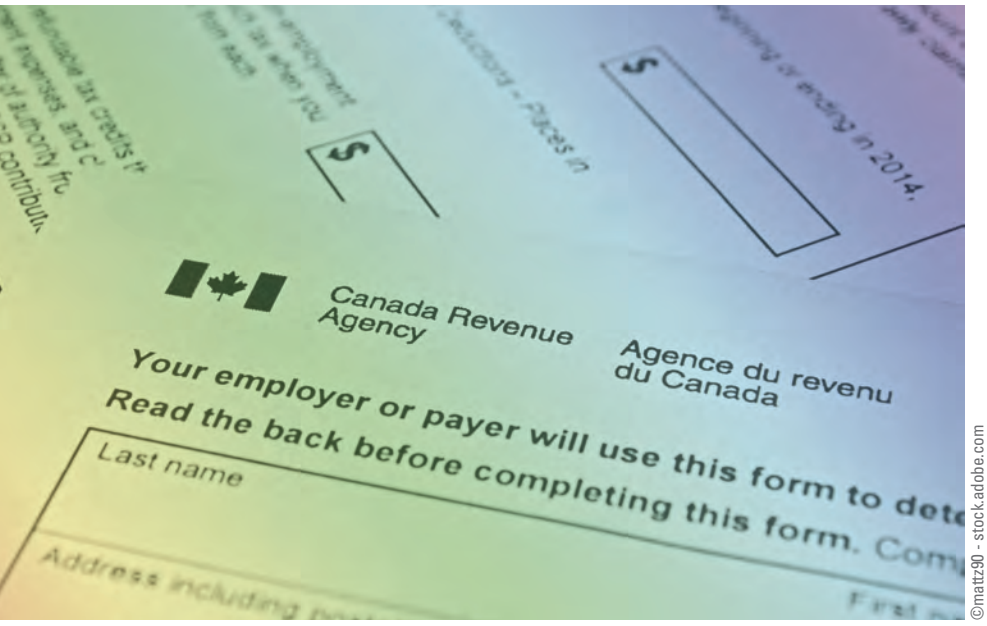
Welcoming the world

In February 2019, YQB showcased the results when it became the first Canadian venue ever to host Routes America, an international air transportation industry event. And now, the expanded terminal is ready to welcome an estimated 2 million passengers in 2020. **CCE**

With files from Stantec and SNC-Lavalin. For more details, visit www.stantec.com and www.snclavalin.com

TAX IMPLICATIONS OF INTERNATIONAL EMPLOYEE TRANSFERS

By Frank Casciaro, CPA, CGA



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Often, for consulting engineering firms, a highly specialized project or a growing service area might require additional support. Since training a new recruit can be both costly and time-consuming, firms may take advantage of their international networks by transferring a skilled and experienced employee to their country.

In Canada, it can be challenging to navigate the complex tax environment for international employee assignments. Your firm needs the freedom to be able to bring in the right skill sets without worrying about getting entangled in payroll and income tax issues. And you don't want the employee to be deterred from taking the job offer out of concern they will end up paying taxes in both their home country and Canada.

The following are some ideas about how you can help ensure a smoother transition for both the employee and the firm.

Resident or non-resident?

Canada has income tax treaties with various countries that provide provisions to clarify tax residency and income tax jurisdiction. These provisions help employees understand where they will be treated as a tax resident and how their income will be taxed in their home and host counties.

Canada also has social security totalization agreements with various countries. These let employees know which social security system they are obligated to pay into.

Let's consider the fictional examples of two engineers, Fatima and Jefferson, who are both U.S. citizens and working in U.S. offices when your firm offers to bring their skills to Canada for one year.

Jefferson decides to leave his family in the U.S. and rent a small apartment in Canada, but he goes home on most weekends and fully intends to return there to stay after his year is up.

Fatima, on the other hand, decides to make a more firm commitment to working and living in Canada. She gives up the lease on her apartment in the U.S., buys a home in Canada and gets involved in her new community.

Under Canada's domestic tax legislation, both Jefferson and Fatima would be considered tax residents of Canada, since they are in the country for more than 183 days in the calendar year. The Canada-U.S. tax treaty, however, can provide relief from double tax residency based on where an individual has stronger ties; this would affect how each of them would file their taxes in Canada, how their compensation and any other income would be taxed and how their situation would be reflected on their U.S. income tax return.

From a treaty point of view, Fatima would probably be considered a 'deemed resident' of Canada and thus subject

NON-CANADIAN FIRMS

There are also tax implications for non-Canadian firms sending their employees to work in Canada:

Corporate tax

For an organization based outside Canada that sends employees to work in Canada, even if it has no other presence in the country, it may be deemed to be carrying on business in Canada. Therefore, the employer may be required to file a return for and pay Canadian corporate tax on their net income earned here.

Sales tax

The employer could also be subject to Goods and Services Tax (GST) or Harmonized Sales Tax (HST). They may need to charge and collect the tax on revenues earned in Canada, file a GST/HST return and remit it.

LIFE IN THE FACE OF CANCER

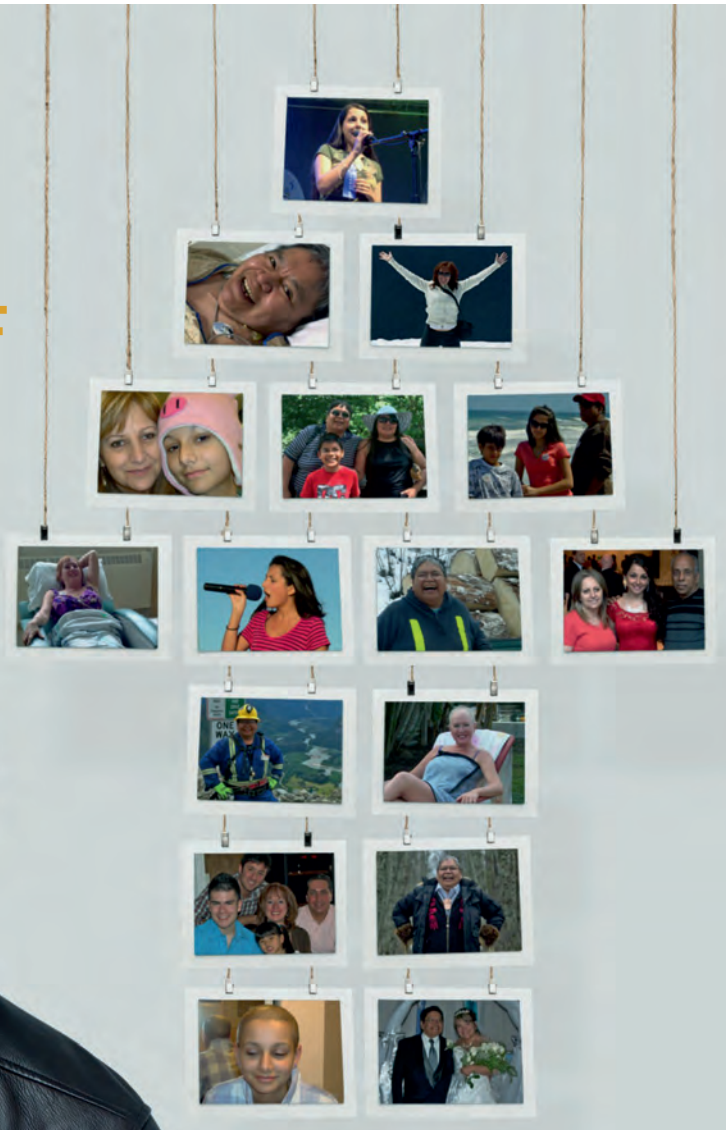

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Photo
ANDREW ECCLES

As Canada's consulting engineering firms expand their scope, they may need to transfer specialized employees from abroad.

to Canadian personal income tax on a worldwide basis. Jefferson, on the other hand, would probably be treated as a non-resident of Canada, so he would only pay Canadian personal income tax on his Canadian source income.

Since they are both U.S. citizens, they would still be treated as U.S. tax residents, subject to U.S. personal tax on their worldwide income. However, the treaty also allows them to claim a foreign tax credit on their U.S. return for the Canadian tax paid, which alleviates double taxation (though it is important to note not all states follow the treaty).

Your firm, meanwhile, would likely still be required to make payroll deductions for both Fatima and Jefferson, just as it does for all Canadian-based employees on its staff.

A checklist for international employment

Here are items you should review before you bring international employees to work in Canada:

Payroll

Foreign employees may need to be set up on a Canadian payroll and thus be subject to Canadian payroll source deductions. The requirements apply regardless of the amount of time the foreign employee is physically working in Canada, but some of the payroll obligations may be reduced with the use of a waiver.

Income tax withholding and other payroll deductions

Canadian payroll source deductions include federal and provincial income tax, the Canada Pension Plan (CPP) and Employment Insurance (EI). As mentioned, some of these deductions may be reduced with the use of a waiver.

Provincial payroll registrations and costs

The employer may have to register with a particular province and pay additional provincial payroll costs, such as provincial health tax, workers compensation, etc. These programs and associated costs vary among provinces.

Individual income tax

The foreign employee may be subject to individual taxation on employment income they receive while working in Canada. Thus, they may be required to file a Canadian individual income tax return.

Tax number registrations

The employer and employee may have to apply for Canadian taxation account numbers to facilitate their compliance requirements.

Immigration

The foreign employee may require a work permit to be legally allowed to work in Canada.

Setting up a tax equalization policy

You may need to work with your firm's HR and accounting departments to develop a policy regarding bringing in employees from outside the country. This policy could involve providing incentives to encourage the employee to take an assignment in Canada and/or covering any additional tax expenses that employee may face.

The goal of such a policy is to keep the employee "whole," so they will experience no advantage or disadvantage by coming to Canada to work. This may also involve documenting exactly who pays what.

To prepare the policy, you may need the support of tax professionals who are familiar with cross-border employee situations, including those relating to local tax regulations.

And once the policy is in place, you will be in a much better position—whenever the need and opportunity arise—to tell your clients, "Yes, we can provide the specialized skills to complete your project." CCE

Frank Casciaro, CPA, CGA, is senior manager and tax lead for global employer services with RSM Canada. For more information, visit rsmcanada.com.

Specifier's Literature Review

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Throughout 2019 *Canadian Consulting Engineer* explores the topic of diversity in the industry through a series of articles called Point of View; stories designed to get readers thinking about their profession, their day-to-day workplace and maybe seeing their surroundings through a new lens.

Photos courtesy Marg Latham

In June, Marg Latham (front, fourth from left) congratulated Vancouver graduates of WinSETT's leadership program.

Positioning Women for SUCCESS

This year, Marg Latham, P.Eng, CMC, became the first consulting engineer to be named chair of the Canadian Centre for Women in Science, Engineering, Trades and Technology (WinSETT)—and only the second person to hold the position to date, succeeding founding chair Margaret-Ann Armour, a chemist and associate dean of diversity for the University of Alberta, who passed away in May.

We spoke with Latham about how the WinSETT Centre has evolved over time and her vision for its future.

Why and how did you pursue civil engineering as a career?

It might have seemed predestined. In high school, I was good at math, physics and chemistry. My brother, who entered engineering ahead of me, encouraged me to consider it. My chemistry teacher and a guidance counsellor also encouraged me.

However, when I went to a career day and spoke to a civil engineer, he indicated the industry was too 'rough and tough' and a woman would not be able to handle it! Back then, women were really not supported in choosing engineering as a career.

I grew up in a small town, Brockville, Ont., and not a lot of kids in my graduating year (1970) went on to university. I applied to the Universities of Toronto and Waterloo and ended up at Queen's in Kingston.

I had considered studying architecture instead, but I wasn't artistic enough. I could envision bridges and other infrastructure projects in practical terms, using math formulas, etc.

The first year of my degree was common to all disciplines in engineering. There were eight women in all the first-year class—and that was a lot back then—but in my second year, I was the only woman in a class of 45 in civil engineering. I didn't see a big uptake during my time at Queen's.

After coming out of university with my B.Sc. in civil engineering, I spent the first 20 years of my career in construction. Halfway through that period, I joined UMA Group, a consulting engineering firm that went on to be bought by AECOM in 2004. I worked on projects in

Ontario, Manitoba and British Columbia, moving to West Vancouver and eventually to North Saanich on Vancouver Island.

Over time, I moved out of construction and focused more on UMA's engineering operations. I stayed with their leadership team until 2009, then founded my own business, Aqua Libra Consulting, in 2010. I continue to provide management consulting, primarily for engineering organizations, with a focus on professional practice and quality management.

Tell us about the founding of WinSETT.

It evolved out of the Canadian Coalition of Women in Engineering, Science, Trades and Technology (CCWEST), following a series of focus groups that were held across the country, asking what we needed. I participated in one of those groups, around 2007.

WinSETT was officially launched at the CCWEST Conference in Winnipeg in 2010. It started small, offering one daylong workshop. Over the next decade, that grew to six workshops, all designed to give women tools to help them thrive in science, engineering, trades and technology workplaces and, at the same time, the group worked with researchers and industry partners to change those workplaces' culture, which was found to be one of the primary reasons women were leaving engineering.

When did you join and how did you take part?

Margaret-Ann reached out to me in 2012, asking if I would join the volunteer working board. I was delighted to. The board members were all across the country, 'meeting' every other month via conference call. In 2016, I volunteered to serve as vice-chair.

Margaret-Ann was an amazingly accomplished chemist, whose manual on disposing of toxic chemicals is still used in labs around the world today. Having founded Women in Scholarship, Engineering, Science and Technology (WISEST) at the University of Alberta in 1981, she was Canada's premier ambassador for women in science and engineering for nearly 40 years.

She worked tirelessly at WinSETT and understood women are more interested in the sciences when they can see they are making a difference. Hers are very big shoes to fill, but I have a phenomenal board and team behind me.

What is your vision for WinSETT's future?

The centre's vision is of a world where women to participate fully in science, engineering, trades and technology.

We need to continue to position women for success by (a) providing our leadership program, (b) influencing and improving our industries' workplace culture, to make it more respectful and inclusive, (c) serving as a national hub for information about women in these workplaces and (d) celebrating women in these fields, to provide role models for girls and young women making career choices.

While we are well-known among women in the field, we want to improve awareness across the consulting engineering industry in general. Also, one of our immediate goals is to revamp our website to make our information more publicly available. It is key to our strategy.

What message do you want to convey to that industry?

We know cultural change is hard to do, but we can help you create a more respectful environment for women professionals. Also, it has been shown that getting more women onto your board will help your organization become more innovative, make better, more ethical decisions and improve the bottom line! **CCE**

For more information, visit winsett.ca.

"Workplace culture was found to be one of the primary reasons women were leaving engineering."

Lianna Mah, vice-president (VP) of business development for Associated Engineering (AE), welcomed Latham for a workshop sponsored by Technical Safety BC.

UTILITIES

DSX software from Hexagon's Leica GeoSystems division has been bundled with Getac's F110 rugged tablet to help civil engineers, surveyors, utility companies and contractors detect, visualize and map buried utilities, in any terrain and weather conditions.

The software is designed to simplify how traditional ground-penetrating radar data is interpreted and exported, so even new users with limited experience can ensure safety for excavation works by reducing the risk of utility strikes.

The tablet's 11.6-in. LumiBond 2.0 screen reportedly offers full legibility in direct sunlight and various touch-interface modes for use in rain, with gloves or with a pen.

"We distribute our solutions worldwide, so the tablets need to be able to cope with any kind of climate and environmental conditions and withstand rough handling, including knocks and drops," explains Agata Fischer, Leica's business director for detection and services.

With that in mind, the F110 has been independently tested and certified to MIL-STD 810G, IP65 and MIL-STD-461F standards, which measure protection against drops of up to 1.2 m, shocks, spills, vibration, dust and liquids. It can reportedly operate in temperatures from -21 to 60 C and be stored in temperatures from -51 to 71 C.

ELECTRICAL

Fluke's 87V MAX True-rms digital multimeter (DMM), reportedly the company's most rugged model to date, is designed to take measurements and help troubleshoot electrical systems in industrial environments.

Building upon the earlier 87V DMM, the 87V MAX carries an Ingress Protection (IP) rating of 67, making it dustproof and waterproof, has been tested to withstand a 4-m (13-ft) drop and can operate in temperatures from -15 to 55 C (5 to 131 F) and humidity up to 95%. A removable holster doubles as test lead storage and a test probe holder for one-handed operation.

The 87V MAX also offers twice the battery life as the original 87V, at up to 800 hours. It comes with TL175 retractable test leads, AC175 alligator clips and an 80BK-A type-K temperature probe.

'Deep learning' to prevent bridges and tunnels from collapsing

Dynamic Infrastructure is implementing what it call's the world's first 'deep learning solution' that can obtain visual diagnoses of bridges, tunnels and elevated highways—offering live, cloud-based 3-D views—and provide automatic alerts when changes are detected in their maintenance and operation conditions, before issues can lead to large-scale failures such as a collapse (example pictured).

The startup is conducting projects with a variety of transportation infrastructure stakeholders around the world.

The company's artificial intelligence (AI) technology creates a 'medical record' for each asset, based on existing images captured through periodical condition inspections over years, including images from smartphones, drones and laser scanning. The technology compares the old and archived images to new ones to detect any issues, defects and anomalies. The diagnostics can be accessed via web browser and shared with other professionals involved in the asset's maintenance workflow.

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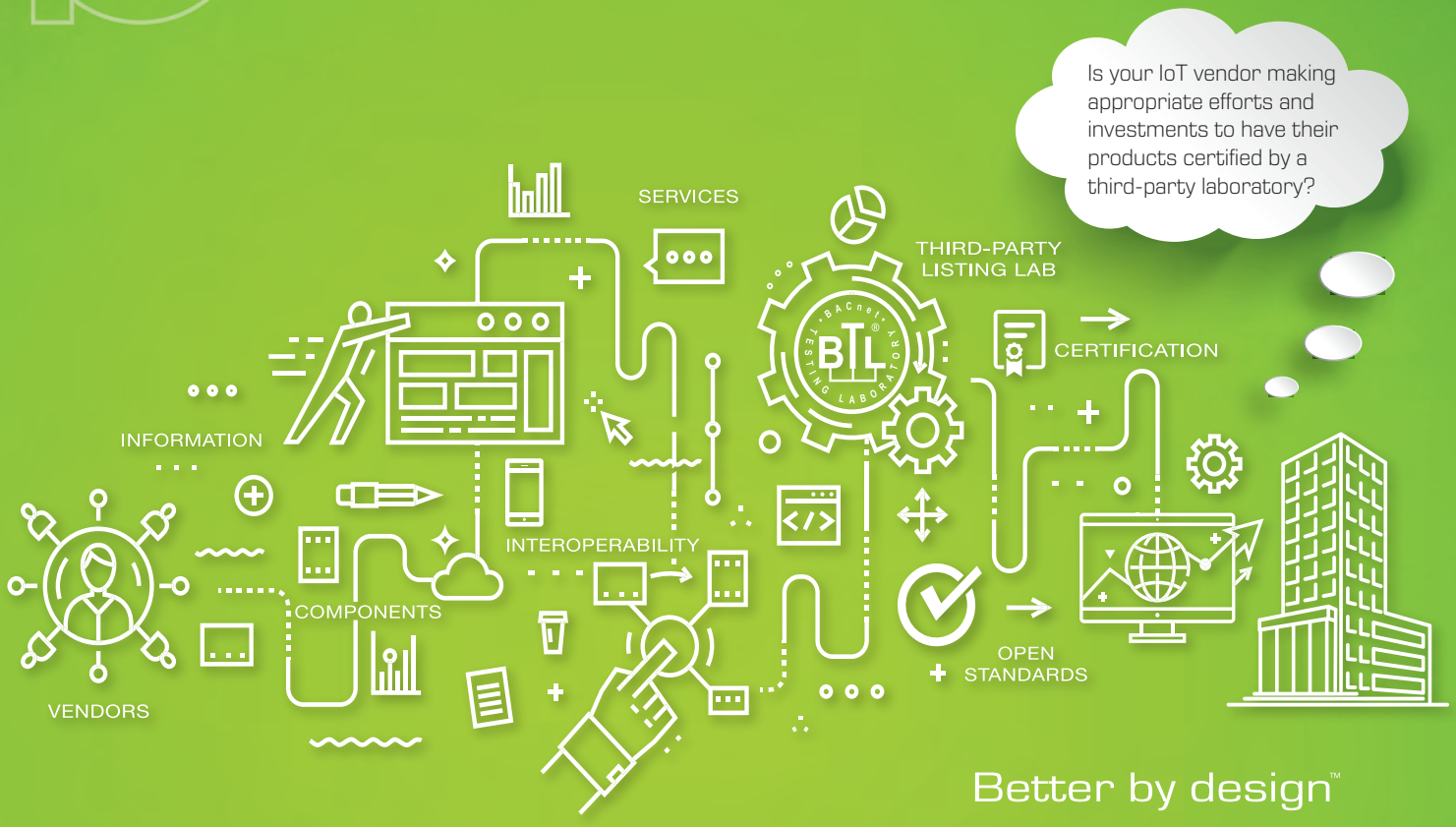

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