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May/June 2021
Volume 61, No. 3

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Destigmatizing accessibility in the built environment

In March, the Rick Hansen Foundation in Richmond, B.C., hosted its Accessibility Professionals Network (APN) conference as a virtual event. Topics included economic inclusion, corporate diversity and—of specific relevance to consulting engineers—universal design to ensure accessibility in the built environment.

There were sessions focusing on accessible homes, post-secondary institutions, workplaces, commercial real estate, stadiums and arenas, but of particular interest was a panel discussion that addressed ongoing efforts to harmonize national standards.

"We will have success when we no longer think of accessibility as an add-on," said Philip Rizcallah, P.Eng., CEO of Accessibility Standards Canada, a federal government organization launched in July 2019, which is working with the Canadian Standards Association (CSA) to update CSA B651, Accessible design in the built environment, and to update the National Building Code of Canada. "Everywhere should be accessible to everyone."

"We need to align building code requirements to accessibility standards," echoed Alison Novak, a scientist with Toronto's University Health Network's (UHN's) Knowledge, Innovation, Talent and Everywhere (KITE) Research Institute, which gathers biomechanical data on how individuals move through spaces. "Why do physical barriers still exist in public spaces? We can reduce the stigma of design features being considered 'only' accessible."

She cited such examples as ensuring sufficient space for the turning radius of wheelchairs and other mobility devices.

"I've worked for 30 years to keep the little blue man-in-wheelchair sticker out of Vancouver International Airport," added Brad McCannell, vice-president of access and inclusion for the Rick Hansen Foundation. "The endgame is equal access, where you can go anywhere without thinking about it. That little blue sticker works against universal design."

McCannell and his colleagues have developed the Rick Hansen Foundation Accessibility Certification (RCAF) Program as a rating system for buildings. While it aims to establish a 'common language' for accessibility, he points to the need for a broader professional approach.

"Codes, by nature, are stable and the construction industry needs that," he said. "We have to address the gap between the current code and the real needs of the community."

"The next step will be understanding what is truly universal in a built environment," Novak said.

"We need to know where gaps exist, educate the public, destigmatize disability and foster collaboration between groups that haven't traditionally worked together," said moderator Lui Greco, Calgary-based manager of regulatory affairs for the Canadian National Institute for the Blind (CNIB), as he summed up the session.

To achieve positive results right from the design stage, that collaboration will benefit from the presence of Canada's consulting engineers.

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FOR PROFESSIONAL ENGINEERS IN PRIVATE PRACTICE
CANADIAN CONSULTING engineer

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National job board launches for Canada's construction sectors

Annex Business Media, publisher of *Canadian Consulting Engineer* and other business magazines for the construction sector, has launched an industry-specific job portal designed to make both recruiting and job searching more focused and efficient: Construction JobSite.

The portal is powered by seven of Canada's leading construction media brands:

- Canadian Consulting Engineer
- Canadian Contractor
- Crane & Hoist Canada
- Electrical Business
- HPAC
- On-Site
- Rock to Road

Together, these omni-channel brands reach 468,000 industry professionals. This reach is further amplified by 76,000 CASL-compliant emails, 150,000 monthly qualified unique site visitors, social media (LinkedIn, Twitter, Facebook and Instagram) and audience extension as required.

"As we exit the COVID-19 pandemic, the need for qualified talent in this sector will be greater than ever," explains Scott Jamieson, Annex's chief operating officer (COO). "A recent BuildForce study forecasts the sector will need to recruit 309,000 workers to replace retirees between now and the end of the decade. Traditional, general-purpose job boards will not be sufficient for recruiting the right talent at that scale. We believe a vertical, focused approach will be more efficient and cost-effective. Our multi-platform reach creates the perfect opportunity to launch and then grow among an audience of new industry entries."

Annex has partnered with the recruiting specialists at Construction-Gigs to ensure a simple user experience and client success.

"Partnering with Annex and its construction media brands is an exciting opportunity," says Construction-Gigs' CEO, Duncan Brown. "We bring the platform and knowledge of the recruiting space and what we need to do to be successful matchmakers. They deliver a massive audience to start, plus experience in building new audiences."

For further details, visit: www.construction-jobsite.ca.

Paul Fast awarded Institution of Structural Engineers 2021 Gold Medal

The Institution of Structural Engineers has chosen Paul Fast, founder of Vancouver-based structural engineering firm Fast + Epp, as the winner of its 2021 Gold Medal.

Since its inception in 1922, the Gold Medal has been awarded for exceptional contributions to the advancement of structural engineering. In a May 27 news release, the London, U.K.-based Institution of Structural Engineers said the 2021 medal was being awarded in recognition of Fast's "world leadership in the design of architecturally expressive structures that incorporate unconventional use of materials, including hybrids of wood, steel and concrete."

"This is truly a very special recognition by the Institution of Structural Engineers," Fast said. "It is also most humbling when considering the pedigree and talent of previous award winners. I have had the wonderful privilege of embarking on many adventures with clients and architects alike that opened the door wide for ambitious design exploration. Collaboration with our Fast + Epp staff has also been most rewarding and filled with abundant design enjoyment and much laughter."

Photo: CNW Group/Fast + Epp

SNC-Lavalin achieves Certified Building Commissioning Firm designation

SNC-Lavalin has been designated a Certified Building Commissioning Firm by the Association of Energy Engineers (AEE).

"As a global engineering organization, one of the ways we can combat climate change is to help create the energy transition to a low-carbon society. We are committed to improving energy efficiency across our corporate and project activities," stated Sébastien Mousseau, senior vice-president, power, grid and industrial solutions, SNC-Lavalin. "This certification shows our current and future clients we

have high professional standards and will continue to help them create sustainable, safe and healthy working environments."

"A recognized best practice, building commissioning is becoming the preferred process for delivering facilities that reduce energy consumption while maximizing environmental health and occupational safety," SNC-Lavalin stated in a recent press release. "From healthcare facilities and pharmaceutical labs, to industrial, institutional, commercial and residential buildings, modern structures include a variety of sophisticated systems. Building commissioning includes verifying and documenting that all of the commissioned systems and assemblies are planned, designed, installed, tested, operated and maintained to meet the owner's requirements. From predesign to occupancy and operations, the process is a holistic, quality assurance-based approach that encompasses planning, delivery, verification and risk management."

According to SNC-Lavalin, the firm employs the commissioning process used for a variety of building systems in accordance with several industry standards, such as CSA Z320 Building Commissioning Standards, ASHRAE Guideline 0–2005 The Commissioning Process, ASHRAE 202-2018 Commissioning Process for Buildings and Systems, LEED v4 Energy & Atmosphere, ISPE Baseline Guide Vol. 5, and others.

Pipe supplier Ipex opens two new Canadian distribution centres

The new distribution centres (DC) in Winnipeg and in Dartmouth, N.S., are described by Ipex officials as being modern, larger buildings, replacing two smaller locations in both regions.

The Winnipeg DC is a new build and significantly increases both warehousing and on-site yard space, and the Dartmouth DC has almost doubled in size and now also provides yard space for additional storage.

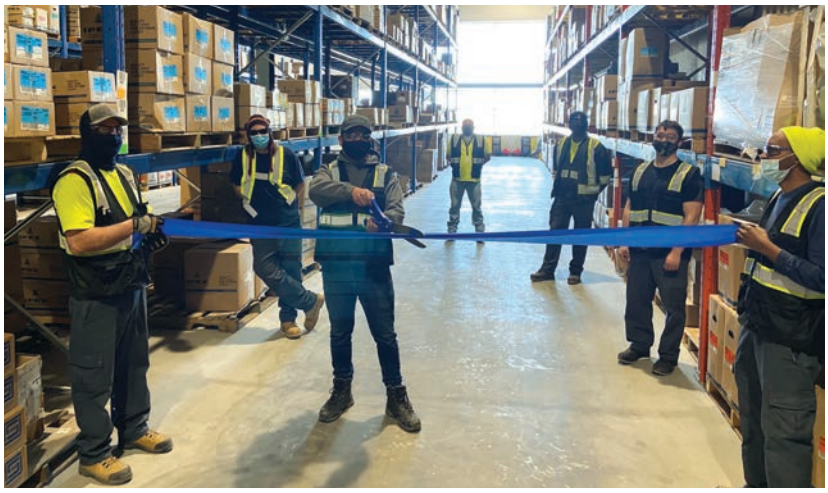

Photo: IPEX

"Expanding our warehousing capabilities is integral to our customer-first culture," Ipex president and COO Travis Lutes recently stated. "It's a priority for us to continue to deliver an exceptional experience for our customers, and we do this by ensuring our customers can get what they need from us when they need it so they can get their jobs done."

Lutes also said that, later this year, Ipex will continue to expand its warehousing capabilities, with focus on the southern and western U.S.

Stantec to provide design services for three healthcare projects

Stantec has recently been awarded three significant healthcare projects in Canada. The company will provide design services for the Cariboo Memorial Hospital in British Columbia, Prince Albert Victoria Hospital in northern Saskatchewan, and Weeneebayko Area Health Authority in northern Ontario.

These projects include inpatient and emergency care, helping to expand access to vital services to better meet the health needs of their respective communities.

The collaboration of Stantec and Graham Construction is providing design and construction services for the Cariboo Memorial Hospital Redevelopment Project in Williams Lake, B.C. The $217.75-million expansion will be delivered via a progressive design-build model. Stantec's integrated design team is providing architecture, interiors, structural, mechanical, electrical, information management/information technology, civil, landscape, acoustics, heliport, geomatics, and sustainability consulting services for the project, which is expected to complete construction in 2025.

For the Prince Albert Victoria Hospital project, Stantec will be responsible for technical advisory work and lead the design of the expansion and renewal. The project value exceeds $300 million and will include a new acute care tower, the replacement of the existing mental health space and renovations to the current facility. Stantec is providing architecture, structural, civil, mechanical, electrical, information management/information technology, landscape, heliport, signage, wayfinding sustainability and energy modeling, clinical planning, community engagement, and commissioning for the project which, is expected to open in 2025.

The Weeneebayko Area Health Authority project will involve the construction of a new hospital in Moosonee, Ont. to replace the existing Weeneebayko General Hospital on Moose Factory Island. Stantec is providing architecture, clinical planning, interior design, buildings engineering, landscape architecture, civil and transportation engineering, sustainable design, commissioning, and PDC (planning, design, and compliance) services for the project.

Engineers Canada publishes GBA+ analysis of national engineering licensure assistance and employer awareness programs

The report makes three recommendations for Engineers Canada in its efforts to achieve greater equity, diversity, and inclusion. A newly released Engineers Canada report presents a gender-based analysis (GBA+) of national engineering licensure assistance (LAP) and employer awareness programs (EAP), and makes three recommendations for Engineers Canada in its efforts to achieve greater equity, diversity, and inclusion in the engineering profession.

Engineers Canada hired PRA Inc. to analyze the current national licensure assistance programming and employer awareness programming provided by the 12 provincial and territorial engineering regulators using a GBA+ lens. GBA+ is defined by the federal government as "an analytical process used to assess how diverse groups of women, men, and gender diverse people may experience policies, programs and initiatives."

"As Canada has a strong demand for engineering, both presently and in the future, LAP and EAP are critical in promoting engineering licensure and present the opportunity to simultaneously support increased diversity and inclusivity within the profession," Engineers Canada officials said in a statement. "For such programs to be effective and for them to support the 30 by 30 initiative, it is important that measures within these programs exist to address the barriers facing women and other underrepresented groups."

The report summarizes a number of these challenges that underrepresented groups may face along their pathway to licensure, from being an undergraduate engineering student, to an engineer-in-training (EIT), to a newly licensed engineer. It also summarizes the challenges faced by demographic groups, including women, Indigenous persons, and foreign-trained engineers.

Read the full report on Engineers Canada's website at: engineerscanada.ca.

Danny Chui appointed Engineers Canada president

Industry association Engineers Canada has appointed Danny Chui, FEC, P.Eng., as president for the 2021–2022 term.

Prior to retiring, Chui worked for over 30 years in the capacity of manager, Capital Works Department with the Board of Governors of Exhibition Place, City of Toronto. He was responsible for the planning, budgeting, programming, implementing, managing, and administrating the Board of Governors of Exhibition Place annual Capital Works Program and undertaking major construction support and advisory functions.

Chui served on PEO Council for seven terms, elected by members as West Central Regional Councillor.

Engineers Canada also welcomes Kathy Baig, MBA, FIC, to the role of president-elect. Baig is a Board Director from Quebec and has served the Ordre des ingénieurs du Québec (OIQ) as president since 2016. In that role she has steered OIQ through two strategic planning cycles and helped restore confidence in the profession in Quebec in the wake of the Charbonneau Commission.

Surrey, B.C. becomes first Canadian city to commit to building for Accessibility

Surrey, B.C. is the first city in Canada to commit to building to a Gold level using Rick Hansen Foundation Accessibility Certification (RHFAC) for all future civic facilities.

PEOPLE

BrainBox AI

Nicolas Bossé

BrainBox AI has appointed **Nicolas Bossé** as chief energy transition officer. Bossé will spearhead the Montreal-based firm's expansion in the global energy markets. He brings with him over two decades of experience in the energy sector, including developing expertise in the global energy market, regulatory frameworks, and the Canadian renewable energy sector.

IBI Group

Kevin Bebenek

Toronto-headquartered consulting engineering firm IBI Group has promoted **Kevin Bebenek**, former regional director of IBI's Canada East operations, to global director of the firm's intelligence sector. Bebenek previously oversaw IBI's largest operating region with over 1,350 employees across nine offices, and led the region to exceed its business plan every year since 2016. Bebenek will assume his new role on July 1, and will succeed Derek Sims, who held the role since 2013.

The Ontario Society of Professional Engineers

The Ontario Society of Professional Engineers (OSPE) has appointed board member **Mark Frayne**, P.Eng., to the position of president and Chair. The appointment was confirmed on May 8, at OSPE's annual general meeting. He will also be overseeing the development

This announcement was made during National AccessAbility Week 2021, which took place from May 30 to June 5.

"By taking this step, we are making a commitment to ensure that people of all ages and abilities can fully participate in everyday life in Surrey," said Mayor Doug McCallum in a news release. "We are proud to be the first city in Canada to make this proclamation, and we thank the Rick Hansen Foundation for their partnership and support as we press forward to design all future civic facilities in a way that will be accessible for everyone."

Rick Hansen Foundation Accessibility Certification (RHFAC) rates the level of meaningful accessibility of buildings and sites, based on the holistic user experience of people with varying disabilities affecting their mobility, vision and hearing. Surrey was one of the first Canadian municipalities to receive an RHFAC Gold rating and now has 43 rated civic facilities, including 29 that have been certified, and five that have achieved Gold. To-date, over 1,300 sites across Canada have been rated through the program.

To receive an RHFAC Gold rating, sites must receive a minimum of 80 per cent on their rating scorecard, the primary entrance must be accessible, audio-visual alarms, safety warning features, and assistive listening and communication enhancement technology must be present where applicable. A feasibility study conducted by HCMA Architecture + Design (HCMA) showed only a 1% average increase in construction cost (or 0.4 per cent for office buildings) to achieve RHFAC Gold compared to National or Ontario building code when thoughtful planning and design is applied upfront.

New Skilled Trades Ontario to replace Ontario College of Trades

The Ontario government has announced that a new Crown agency to be known as Skilled Trades Ontario will replace the Ontario College of Trades (OCOT).

In a May 6 statement, Minister of Labour, Training and Skills Development Monte McNaughton said the government would move swiftly with the Skilled Trades Act, implementing a new system that would be more efficient and easier to navigate.

McNaughton said he was implementing the first phase of recommendations of an advisory committee, the Skilled Trades Panel, that includes Michael Sherrard as chair and industry representatives Jason Ottey, Melanie Winter, Shaun Scott, and Melissa Young.

The new Skilled Trades Ontario will be one streamlined destination, the minister said, with tradespeople obtaining their certification from the agency.

Skilled Trades Ontario will take input from the industry and will be responsible for the promotion, research and development of new apprenticeship training and curriculum standards, the minister said. It will provide a simplified pathway for apprentice registration, issuance of certificates and renewals and equivalency assessments.

The government announced it was winding down OCOT in October 2018. The Skilled Trades Panel was appointed to recommend its replacement last year.

"This is an exciting day for the skilled trades in Ontario," said McNaughton. "We have a looming crisis with one in three journeypersons over the age of 55 today, and the average age of an apprentice is 30. This crisis has to be dealt with. Everything that I'm doing as minister and what we're all doing, I believe, collectively, as a province, is to ensure that we're ending the stigma around the trades to get more young people to see these careers as meaningful."

The Skilled Trades Panel is currently consulting on the second phase of its mandate, which will focus on classification and training in the trades.

PEOPLE CONTINUED

Mark Frayne

of the organization's new strategic plan, to be released in the spring of 2022. Frayne currently serves as the Chair of the Professional Advisory Committee for Project Management at Cambrian College, in Sudbury, Ont.

Haag Canada

Patrick Foisey

Haag Canada has named **Patrick Foisey** as senior building envelope expert and damage appraiser. Foisey will focus on forensic investigations and pre/post loss property appraisals, with a specialization in roofing.

Arup

Arup has named a series of new associates. At the firm's Montreal office, **Remi Drouot**, civil engineering and planning; **Charles Ormsby**, civil engineering; and **Helene Tischer**, structural engineering. At the company's Toronto office, **Keatan Howard**, BIM design leader for Arup's buildings group in Canada; **Aarshabh Misra**, aviation planning; **Anthony Seddon**, quality assurance and risk management; **Heather Stewart**, geotechnical and tunnel engineering; **Edmund (Siu) Wong**, energy and sustainability consulting; and **Yen Wu**, bridge and civil structures.

CHAIR'S MESSAGE

National Infrastructure Assessment

One of the most rewarding facets of a career in consulting engineering is that it impacts so many aspects of our quality of life. One way we make our input felt is through infrastructure – the physical assets that allow us to fulfil the social, economic and environmental goals of our communities, our regions and our country. While it is the planning, design and delivery of projects that receives the most recognition, consulting engineering firms offer an incredible range of engineering and other professional services – including strategic advice that allow infrastructure projects to happen – and the experience and expertise we bring to the table is truly world class. Our industry now has a unique and unprecedented opportunity to constructively influence federal government policy and investment in infrastructure for several decades to come through a once-in-a-generation project launched by the federal government.

On March 16, the Minister of Infrastructure and Communities initiated Canada's first ever consultation process on infrastructure. The National Infrastructure Assessment will help identify Canada's evolving needs and priorities in the built environment and undertake evidence-based, long-term planning toward a net-zero emissions future. By continuing to link investments with outcomes, a National Infrastructure Assessment can guide infrastructure policies and programs to ensure they contribute to a strong and equitable recovery that creates good jobs, grows the economy and builds cleaner, more inclusive communities for all Canadians. To help with the creation of this Assessment, the government has invited the public, Indigenous peoples, provinces, territories, municipalities, and stakeholders to share their vision for this Assessment on three main priorities:

- Assessing Canada's infrastructure needs and establishing a long-term vision;
- Improving coordination among infrastructure owners and funders; and
- Determining the best ways to fund and finance infrastructure.

These priorities are outlined in a paper published with the announcement of the consultation titled, *Building the Canada We Want in 2050: Engagement Paper on the National Infrastructure Assessment.*

ACEC-Canada has been acknowledged by the Minister as a key stakeholder that can help shape this important exercise. We have had several (virtual) face-to-face meetings with the Minister and her advisors, to exchange preliminary ideas on how to create and then leverage the Assessment such that the government will be investing in the type of infrastructure that grows our economy, strengthens and connects our communities and protects our environment. As the country looks ahead to rebuild from the impacts of the pandemic, Canadians need to know that well-designed and well-executed infrastructure can generate a strong return on investment, as demonstrated in numerous studies linking infrastructure investments and economic performance.

The National Infrastructure Assessment and the current initial consultation process are both excellent opportunities for ACEC-Canada to provide industry expertise and input on long-term infrastructure needs and priorities. ACEC-Canada's consultation brief will include clear recommendations around the mandate, structure and governance for the Assessment. If implemented, these recommendations would ensure the Assessment is developed based on expert advice and is used, as it is envisioned, as a non-political, data-driven resource and tool to inform Canada's infrastructure policy and investment for many years to come.

ACEC-Canada further believes the Assessment will need to take an in-depth inventory of the current state of infrastructure, establish a long-term vision as to where we would need to be, and then develop a clear road map to achieve that vision. The inventory, vision and roadmap stages should each be regularly reviewed and updated to reflect current realities, evolving technology and changing societal priorities. Most importantly, we believe the National Infrastructure Assessment needs to measure progress.

The federal government has stated that next steps will be determined following the June consultation. These would include forming an independent advisory body, setting out the processes for obtaining expert advice, ongoing public engagement and producing interim studies and reports to inform infrastructure policy and investment. It is critical that our industry plays a key role in the Assessment's development and ongoing work. That is why ACEC-Canada intends to continue to contribute to the process and ensure that the knowledge, experience and expertise of the consulting engineering sector is fully and properly leveraged in shaping Canada's strategic long-term vision for infrastructure. Our sector can make a substantive contribution to our country's recovery and its future and ACEC-Canada will ensure we are at the table to support this nation building endeavor.

ANTHONY KARAKATSANIS, P.ENG.
CHAIR, BOARD OF DIRECTORS, ACEC-CANADA

ACEC - CANADA IN ACTION

tiger_barb / iStock / Getty Images Plus/Getty Images

Ensuring the voice of the consulting engineering sector is loud and strong

One of our core activities as the national voice of the consulting engineering industry is to advocate for a public policy and business climate that creates opportunity and prosperity for the sector and its clients in all sectors. We achieve this by maintaining ongoing relationships with federal government departments that impact our industry and undertaking activities that showcase the depth and breadth of knowledge consulting engineering firms bring to the improvement of the social, economic, and environmental quality of life of Canadians and people across the globe.

Over the past months, there has been significant government relations activity by the ACEC-Canada team. We share this high-level overview of our advocacy efforts in action.

Building for Recovery coalition

Timely and effective infrastructure investments continue to be advocated by ACEC-Canada and its construction sector partners in the *Building for Recovery* coalition. The coalition, initially launched in fall 2020 has been actively engaging government throughout the first quarter of 2021. Alongside the Canadian Construction Association, Associated Equipment Distributors, and the National Trade Contractors Coalition of Canada, *Building for Recovery* is focused on the shared message that infrastructure is key to Canada's economic recovery and that all levels of government must work together to expedite investments in a timely manner that ensure Canada builds for recovery.

The coalition's recent activities garnered attention from Infrastructure Canada. Meetings took place with the Minister's Office and an Assistant Deputy Minister to discuss data and reporting of committed infrastructure funding and projects approvals. The discussions proved to be a positive step toward establishing stronger relationships with the department and Minister's office and further reinforcing our industry as an important stakeholder. These discussions also helped secure an invitation for ACEC-Canada to participate in a roundtable discussion hosted by the Minister on the National Infrastructure Assessment, which is discussed later in this article.

The coalition also wrote to the Minister to recommend that the acceleration of infrastructure funding could be achieved through a rapid response stream for all types of projects introduced under the *Investing in Canada* plan. This approach would include streamlined requirements and expedited approvals to help to get projects started earlier and money flowing into the economy as soon as possible. The coalition cited the Universal Broadband Fund's rapid response stream as an example of an effective and expedited program. To ensure that *Building for Recovery's* message reached a broader political and public audience, the coalition also drafted an op-ed and placed an advertisement on our work that appeared in the April 14th issue of *The Hill Times*, an Ottawa publication widely read by Members of Parliament, political staff, and bureaucrats. The op-ed highlighted *Building for Recovery's* topline message that investing in infrastructure will help Canada can emerge from the COVID-19 pandemic stronger than before and be ready to tackle the societal and environmental challenges of the future. In the op-ed, the coalition also reiterated the ask made to Minister McKenna to introduce a rapid funding stream for all projects under the Investing in Canada Plan to help fuel Canada's economic recovery from the pandemic and deliver infrastructure investments quicker.

ACEC-Canada and the partners continue to promote *Building for Recovery* on social media while engaging directly with government. The coalition is also meeting regularly to ensure that the pressure and momentum of this advocacy continues as the federal government continues to develop plans for post pandemic economic recovery.

The Federal Budget

On April 19, the Minister of Finance tabled the government's first budget in two years. In the months leading up to this long-anticipated budget, ACEC-Canada ensured its pre-budget recommendations from August 2020 were front and centre with members

of the Finance Committee. The team met with several committee members to brief them on the importance of prioritizing investments that enable economic prosperity, productivity, and a stable recovery. We also participated in a new pre-budget consultation process with Finance Canada which occurred in addition to the usual parliamentary pre-budget consultation process. In the rapidly changing environment of the pandemic, this additional budget consultation process allowed us to revise and update the submission that was made to the Finance Committee in August of 2020. In this updated submission, three key recommendations were emphasized:

- Prioritizing investments that will close the infrastructure deficit and enable economic prosperity, productivity, and a stable recovery.
- Adopting best practices that achieve sustainability, innovation, and life cycle savings from infrastructure investments; and
- Reinstating and reenergizing the *National Guide to Sustainable Municipal Infrastructure.*

Budget 2021 provided the government's roadmap to economic recovery post-crisis and a plan to build a stronger and greener economy. Themes recurring throughout the budget included support for the hardest-hit sectors, investments in green energy, and support for those who have been disproportionately impacted by COVID-19. ACEC-Canada looks forward to continuing to work with government to shape their initiatives while also advocating for balanced infrastructure spending between transformational projects and core infrastructure for the economic recovery ahead.

National Infrastructure Assessment

On March 16, the Minister of Infrastructure announced a consultation process on the first National Infrastructure Assessment. Part of the federal government's climate plan and highlighted as a priority in her mandate letter, the assessment will inform strategic infrastructure policies and investments for the next 30 years.

ACEC-Canada's President and CEO John Gamble participated in a roundtable discussion with the Minister in late April to discuss the Assessment and the ongoing consultation process. The opportunity to participate in this discussion demonstrated how ACEC-Canada is already being viewed as a key stakeholder in this initiative, while allowing us to share some of our initial feedback.

The initial consultation process, which is focused on setting up the Assessment for success before creating the Assessment itself, has been a key focus of our government relations activities over the past few months as we prepare a submission on behalf our industry. ACEC-Canada is looking forward to being involved in future stages of developing the National Infrastructure Assessment.

Testimony to the Standing Committee on Transportation, Infrastructure and Communities

On April 27, ACEC-Canada President and CEO John Gamble appeared as a witness and subject matter expert before the House of Commons' Standing Committee on Transportation, Infrastructure and Communities for the committee's study on how targeted infrastructure investments can influence social economic and environmental outcomes and improve the lives of Canadians – particularly underserved Canadians in vulnerable communities. This appearance offered ACEC-Canada the opportunity to highlight the following key recommendations to the committee on targeted infrastructure investment:

Strike a balanced approach between investing in core "nuts and bolts" infrastructure and more transformative projects to generate the economic capacity to invest in the transformative projects.

Provide infrastructure programs that are agile and varied that reflect the diverse needs and priorities of communities across Canada

Ensure that eligibility criteria and "policy lenses" are flexible and scalable so that project screening is appropriate and proportional to both the size and nature of the project.

Allow communities to apply for, and secure funding for multiple projects over several years based on asset

management plans that outline their strategic infrastructure goals and local needs, rather than having them constantly re-apply on a project-by-project basis; and

Support community capacity building by reinstating and updating the *National Guide to Sustainable Municipal Infrastructure*, also known as *InfraGuide*, as highlighted in ACEC-Canada's pre-budget submission.

The Next Federal Election

In a minority Parliament context, the possibility of a federal election continues to be present. The likelihood of an election in 2021 remains high, given that the lifespan of minority governments in Canada are 18 months, on average. Following the last federal election in September 2019, this brings the current government right to this average point. With more Canadians being vaccinated every day, the likelihood of a federal election in late summer or early fall is high. Over the past months, there have been signs that the parties are preparing for an election with candidate nominations and the movement of key political staffers into high profile party roles. In addition, the Liberals have recently included amendments to the Canada Elections Act in Bill-30, the omnibus bill to implement certain measures of the budget tabled in April. These changes to the Canada Elections Act are aimed at facilitating a federal election while the pandemic is still ongoing. The inclusion of these amendments in Bill C-30, which is likely to be passed before the summer recess, indicates that the Liberals want the option of calling an election before they return from their summer recess.

Our team has already begun developing a strategy including key messaging, grassroots engagement, hosting a forum on infrastructure policy, engagement with other industry partners, and analysis of the party platforms, debates, and election results. The strategy will continue to be refined over the course of the summer to ensure all government relations tactics and messaging are in place for the next federal election.

What's Next?

The ACEC-Canada team plans to build on the momentum of the past months. While the House of Commons is scheduled to recess on June 24, the business of government will continue through the summer. Once our National Infrastructure Assessment submission is completed, we will leverage our communications and stakeholder relationships to socialize our recommendations. As Members of Parliament turn their attention to constituent issues while in their ridings, the coming months will be an excellent opportunity to ramp up our Parliamentary Partners Program. This grass roots government relations strategy empowers employees of member firms to discuss the issues faced by our industry with their local representative, strengthen our advocacy key messaging, and showcase the important contribution their firm makes to the community. As we look towards a potential late summer or early fall federal election, building these local connections now will be important for our grassroots election engagement in the future.

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SOMETHING OLD AND SOMETHING NEW

Ottawa Public Library and Library and Archives Canada joint facility is designed with the future in mind

By Andrew Snook

If you have ever travelled to downtown Ottawa, there is a good chance you made your way to Parliament Hill and have taken in the beautiful, gothic-styled architecture that dominates the landscape, like The Fairmont Château Laurier (built in 1912) or the Federal Parliament Buildings, which house the Parliament of Canada (built in 1866).

While these buildings are certainly important landmarks in Canada's capital, another iconic building is about to begin construction that will offer an equal amount of personality to the city's landscape without the traditional gothic design: the new Ottawa Public Library and Library and Archives Canada (OPL-LAC) joint facility.

"A real goal on the part of the client group was to take a generational step forward that was not a gothic building," says Gary McCluskie, principal architect at Diamond Schmitt, the architecture firm designing the facility in a joint venture with KWC Architects. "It's an aesthetic much more representative of the landscape and escarpment."

The $196-million joint facility will offer a fresh, unique design with special consideration made to the city's surrounding natural landscape, including the Ottawa River. One of the most unique aspects to this project was the level of public consultation performed before and during the design stage. According to McCluskie, this project had more substantive public

Images: Renderings by Cicada Design, courtesy of Diamond Schmitt.

Rendering of Ottawa Public Library and Library and Archives Canada Joint Facility Interior Atrium.

consultation for the design of a federal building than any other before it.

"It was very impactful," he says, adding that the public consultation process began during site selection, a couple of years before Diamond Schmitt got involved with the design. "From the outset, it was outlined that we were going to do at least four points of contact over the course of the schematic design stage. This is the most consultative process we've ever participated in."

Although originally unsure of how this level of consultation would play out for completing the design stage, McCluskie says stakeholders for the OPL-LAC joint facility project came fully prepared with their visions.

"They entered the process knowing what they wanted to do. We were able to convey that to the public groups. It was very much a consensus building process," he says.

Diamond Schmitt offered online presentations in concurrence with the public consultations to gather as much feedback as possible.

"The frequency and depth of consultation was significant for us. A real innovation of this consultation process was being able to work with the different people at the table, really rolling up your sleeves and being able to work together on an idea. It was a much more engaged way of gathering feedback."

Common ground

While the Ottawa Public Library and Library and Archives Canada may have some similarities – the collection and sharing of printed media with the public, for example – the two facilities have some significantly different needs and identities.

"On the outset, they both wanted their identities to be communicated separately by the architecture," McCluskie explains. "We worked out an approach where they had their own spaces and also had shared spaces."

One key design feature is a large shared town hall space in the centre of the facility, where two L-shaped areas come together and form a massive shared space for the public. The concept was well received by both parties.

Although stakeholders from the Ottawa Public Library and Library and Archives Canada initially wanted part of the building's design to represent each facility's identity, a really interesting development took place over the course of the design consultations.

"Working together at the design table, the two institutions said, 'We don't want to be separate. We want the overall institution to be a single representation. That was one of the remarkable developments, working on the design and having the two partners come together," McCluskie says.

Key features

At its core, the Ottawa Public Library will still offer the traditional features that people have come to expect, such as printed materials, spaces to read and study, a children's library and a teen library. However, there will also be emerging next generation library

"They are the storehouse for millions of items, but the joint facility is where you'll be able to be in real close contact with key elements of their treasures," Gary McCluskie says.

Rendering of Ottawa Public Library Fiction and Non-Fiction Area

Rendering of Library and Archives Canada Reading Room

Images: Renderings by Cicada Design, courtesy of Diamond Schmitt.

spaces, such as design spaces, content creation spaces and recording studios.

"This is what libraries are now," McCluskie says.

Library and Archives Canada is also transforming the way the facility operates while maintaining secure areas for viewing artifacts and other archived materials.

"They are the storehouse for millions of items, but the joint facility is where you'll be able to be in real close contact with key elements of their treasures," McCluskie says.

In the common areas, there are a host of collaborative spaces, including an indoor space that can be used like a town square or as a venue for night events, book fairs or a wide variety of other types of social gatherings.

"There are multi-purpose rooms, a demonstration kitchen, a coffee bar, a rooftop community. The list of the kinds of spaces is incredible. It is just so broad," McCluskie says.

A net-zero facility

The OPL-LAC joint facility will be flush with green features once its construction is complete.

Originally designed to comply with the LEED Gold standard, the federal government went one step further by announcing the goal of net-zero carbon for the joint facility.

The announcement was made by Minister of Canadian Heritage Steven Guilbeault, and the Minister of Infrastructure and Communities, Catherine McKenna, on Feb. 8, 2021, along with City of Ottawa Mayor Jim Watson and Councillor Matthew Luloff, Chair of the Ottawa Public Library Board.

"There is great value in modern and greener cultural spaces such as the one we are building in the heart of our capital. Not only will this building showcase our collective history and heritage, it will also point the way to a more sustainable future where clean growth is the rule," Guilbeault stated during the February press conference.

One of the ways this ambitious goal is going to be achieved is through the use of a district energy system, one to two years after the facility is constructed.

"Once we're able to connect to the district energy source, that will be the final piece of that zero-carbon design," McCluskie says. "Many other features we developed or improved upon in both the exterior and interior provide for the implementation of the net-zero carbon strategies."

Funding from the Government of Canada will go towards upgrades to the building's envelope and insulation; triple-glazed windows; solar panels on the rooftop and embedded in the facade; additional sustainable materials; and an indoor green wall. These investments are expected to result in a 30-per-cent reduction in greenhouse gas intensity for the joint facility, representing the equivalent of approximately 170 fewer metric tons of CO_2 produced per year, or taking 37 passenger vehicles off the road.

Changing the humidity and temperate set points of the building were also incorporated into the design to reduce its energy load.

"We were able to make the case for slightly expanding the humidity range and temperature range, where possible," McCluskie says, adding that it's obviously not possible in areas with extreme humidity and temperature sensitivity, like in areas of Archives Canada where sensitive artifacts are stored. "This had a huge impact on reducing the energy usage of the building."

Pandemic preparation

One aspect of the joint facility's design not originally planned for was the event of a possible pandemic, as design started before the COVID-19 coronavirus pandemic took hold of the world.

Fortunately, there was significant detail put into the design related to accessibility for visitors that is also advantageous when coping with a pandemic.

In addition to having four points of access to enter the facility, as opposed to the traditional design of a library where there would be only one access point for the public, the elevators and stairs were placed strategically to improve accessibility and flow.

"For ease of access, the stairs and elevators are closely linked. Gone are the days of the building where elevators and stairs are at different points of the building," McCluskie says. "We couldn't have anticipated COVID-19 coming along, but one of the things we were able to point out, was with having two sets of stairs and elevators, one can be for going up and another for going down to separate directional flow – a sort of pandemic response being hardwired into the building."

Pedestrian modeling

Another way the modeling of pedestrian movements has been incorporated into the facility's design is through the use of MassMotion Software created by Arup, a global firm of designers, planners, engineers, architects, consultants and technical specialists that specialize in the built environment.

"This allows us to model pedestrian movements within

Rendering of Ottawa Public Library and Library and Archives Canada Joint Facility South View.

a digital space," says Matt Humphries, associate principal at Arup.

The software allows Arup to create a digital model of the building where they can program in digital people to act like real-life visitors. They can be given tasks they need to perform – such as drop off other patrons at the art gallery, for example – or be set free in a space and allowed to interact with each other to see what kind of scenarios develop to gather information related to pedestrian flow.

"We can use physical distancing as a parameter. We can take a peak volume of people during peak operations and figure out which operational changes are needed to operate safely – using queuing or different strategies in terms of signage," Humphries says. "There's a lot of pedestrian prediction. You make the change, you see where a bunch of people gather, and then move the people again. Mass Motion allows you to have options digitally."

Alongside the simulations, Arup identified staff and protocol considerations, drawing upon operational experience from implementing temporary measures in existing facilities.

Some of the key recommendations include:

- Dashboard displays near the entrances to welcome and orient visitors. In normal conditions, the displays would provide information about library services and events, and could be repurposed in a pandemic to show modified procedures, building cleaning status, and the remaining capacity in specific areas;
- People counting sensors to keep track of occupancy in specific areas;
- Elevator capacity limiting systems;
- Low- to no-touch door operation; and
- Increased wintertime relative humidity setpoints.

Another aspect of design Arup has been working on is related to the ventilation for the facility.

"High-intensity UV lights in ducts can be used to sterilize the air – indirect UV lights that would shine upwards of the field of view to sterilize the air above you," explains Svetan Veilov, associate, electrical discipline lead at Arup. "We've also recommended in rooms like elevators, where the elevators aren't occupied, to blast it with two minutes of high-dosage UV."

Arup has also recommended the use of MERV14 filters in the air handling units during times when it seems warranted. MERV14 are recommended by the American Society of Heating, Refrigerating and Air-Conditioning Engineers to limit the spread of infectious diseases in public assembly buildings, and is the Canadian standard for healthcare facilities except isolation rooms.

"MERV 14 has been impractical for a lot of buildings out there. It hasn't yielded the payback," Veilov says. "In the library, we've got the mechanical system ready with a pandemic mode. It will have MERV13 filters, but then if a pandemic happens and some kind of pathogen concerns exists, they essentially press a button and put MERV14 in the air handling units, and the system has the capacity go to higher power for the fans."

Arup believes that future planning for the design of buildings such as the new OPL-LAC joint facility will typically incorporate pandemic-related designs going forward.

"Definitely on the service side. What we're discovering is that benchmarks in the WELL Building Standard are more important than ever – maximizing natural ventilation, access to light, density of occupants, all that stuff is now the rulebook for being prepared for the pandemic," Veilov says.

"Post-pandemic we'll be building back better," Humphries adds. "The quick play of real estate dollars really doesn't make sense – the difference in costs for constructing a building prepared for this eventually versus something that's lowest cost. If you really take a longer view, and you take a look at places like colleges and universities, they can give you an asset that maintains its value."

The construction for the OPL-LAC joint facility is scheduled for completion in 2024. McCluskie is thrilled to be involved on this facility's design, as he believes the opportunity to be a part of this kind of project is typically once in a lifetime.

"This is the first new federal building in 30 years. These opportunities are really sort of generational," he says. "At the end of it, there will be a new aesthetic that has an identity that is specific to the landscape of Ottawa, Ontario and Canada." **CCE**

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Climate control for AUTOMOTIVE PLANTS

Improving efficiency and sustainability

Submitted by Sandra Abuwalla, Rittal Systems Ltd.

Automotive plants in Canada contend with extreme conditions. From a hot foundry to gearbox machining and plastic molding, temperatures can fluctuate dramatically, causing potential damage to the machinery, hardware, and technology used daily. As a result, it's imperative to implement climate control in order to keep the sensitive technology that powers production running.

Climate control for efficiency

Heat has profound effects on the technology housed within automotive plants. And it exists everywhere, from ambient temperature to proximity to power supplies. Even components rated to handle hot temperatures can degrade as heat load rises. In order to protect mission-critical technology and hardware, the thermal control system within automotive plants must mitigate heat-related risks. Consequences of high heat on equipment can include:

- Decreased power performance;
- Trip faults and fluctuations in circuits;
- Mean time between failure decrease;
- Component set point drift;
- Intermittent or catastrophic system failure;
- Voided component warranty;
- Factory downtime;
- Lost revenue;
- Delayed shipments;
- Customer dissatisfaction; and
- Component replacement costs.

Within the automotive industry in particular, a significant amount of energy is expended for controlling cabinet air conditioning. Reducing heat via ventilation and cooling systems is especially important because of the heat loss incurred in integrated electrical appliances.

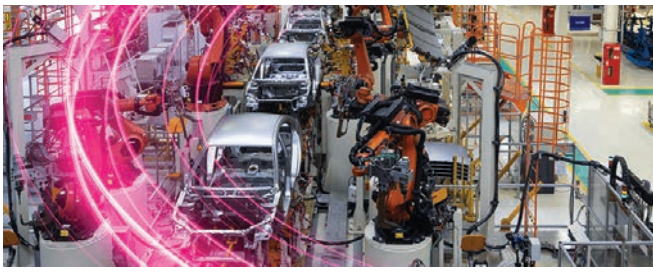
Climate control for sustainability

In addition to protecting your facility's valuable equipment, the right cooling system can also help automotive plants save energy, lowering costs

The Blue e+ series offers a Smart IoT interface that enables operating data to be shared both around the plant and to outside devices. Images courtesy of Rittal Systems Ltd.

while reducing carbon output. In North America, one-fifth of carbon emissions come from industry. And sustainability is important for a variety of reasons, from benefiting the environment to saving costs on the amount of energy being consumed.

Using sustainable products can help your facility provide cooling that automatically adjusts to ambient conditions while providing additional energy savings.



In addition to protecting your facility's valuable equipment, the right cooling system can also help automotive plants save energy, lowering costs while reducing carbon output.

UL 60335-2-40 compliance

Another reason why climate control within automotive plants is critical is to comply with safety standards. In November of 2022, UL/CSA 60335-2-40 will go into effect. UL is a global safety organization that is OSHA-approved to perform safety testing to uncover and prevent U.S. workplace safety hazards. The new requirement has been established to replace the UL Standard 1995 and CSA Standard C22.2 No. 236, which are scheduled to become obsolete on Nov. 16, 2022 and Nov. 30, 2022, respectively.

What does this mean for auto manufacturers? UL 60335-2-40 is an ANSI/SCC approved refrigerant detector standard that covers electrical heat pumps, air conditioners, and dehumidifiers. For each unit, the UL 60335-2-40:

- Requires refrigerant leak detection;
- Requires refrigerant charge limits to be based on the amount of hydrocarbons that can be used in a standard-sized room; and
- Requires appliances to not have any potential internal ignition sources, which mitigates the risk of fires caused by a leak.

Before the standard goes into effect next year, make sure that the enclosures and climate control efforts in your plant comply.

Automotive plants across Canada often contend with extreme conditions. Consequently, rising heat can damage and slowly degrade mission-critical technology and equipment, raising costs and increasing the carbon footprint within facilities. Implementing climate control enclosures and software can help your plant save money, become more sustainable, and comply with changing regulations. **CCE**

GOING OIL-FREE
with chiller compressors

There are a number of advantages for institutional facilities

By Eddie Rodriguez

One of the key operational challenges for universities, schools, hospitals and other institutional buildings is getting the best possible performance from the HVAC system's chiller over long hours while keeping maintenance costs to a minimum. Oil-free compressors can help meet this challenge.

Traditional compressors, such as screw-type, require oil for lubrication of their bearings, to support the movement of the rotor and to form a seal to prevent refrigerants from travelling in the wrong direction.

An oil-free compressor, on the other hand, can use magnetic bearings to create a field that allows the motor shaft to levitate and thus avoid metal-to-metal contact. This eliminates the need for oil as a lubricant and, for that matter, the entire oil management system for the chiller, including pumps, heaters, sumps and separators, let alone their costs of installation. Another result is less maintenance.

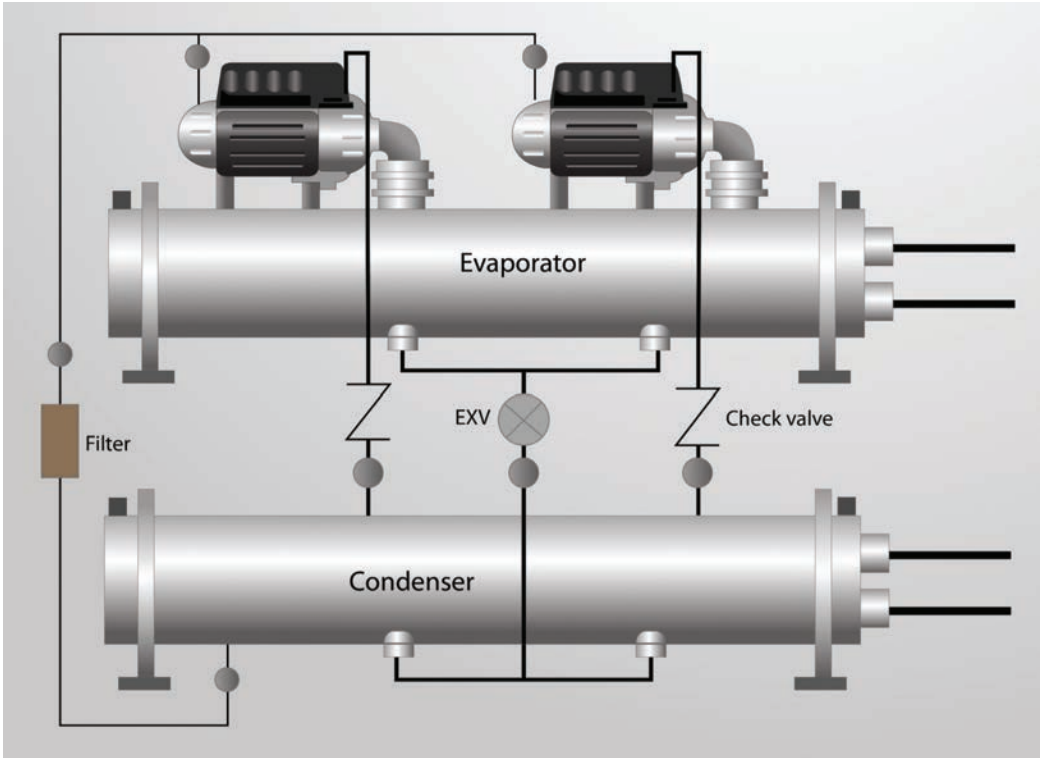
Initially, oil-free compressors' operating range limited them to air- or water-cooled chiller applications. More recently, however, technological advancements have extended their use to higher-lift applications, including air-cooled chillers in hot ambient climates, heat pumps, heat recovery, low-temperature processes and thermal storage systems.

A simplified design can avoid frequent maintenance.

Degrading performance

Removing oil from the chiller system has a number of benefits. Over time, oil deposits in the chiller's heat exchangers will create an insulating barrier on their tubes, significantly degrading the chiller's efficiency and capacity. Indeed, ASHRAE studies have found the majority of traditional, oiled chillers installed in the field are 'overcharged' with oil, resulting in poorer performance than indicated in their original ratings.

The performance advantages achieved through the elimination of oil from the chiller system can also be maintained throughout the life of the compressor. Since there is no oil to inhibit performance and no mechanical wear for internal components, the compressor's performance



can remain unchanged for its entire operating life.

In 2018, such benefits were validated when a research project initiated by Smardt Chiller Group and Danfoss compared the performance of three oil-free compressors that had been in operation for more than 10 years. Laboratory test results showed no significant reduction of efficiency or capacity compared to when they were originally shipped from a factory.

"The results of the analysis clearly demonstrated oil-free compressors maintain consistent performance through their entire operating life," says Vince Canino, Smardt's CEO. "All too often, customers fail to enjoy energy savings because of the effects oil can have on compressors and chillers. And because many of them do not invest in measuring and monitoring devices to calculate chiller capacity and efficiency at every minute of operation, they really don't know what they have 10 years later."

ASHRAE studies have found most traditional chillers installed in the field are 'overcharged' with oil, resulting in poorer performance than indicated in their original ratings.

Metal-to-metal contact

As mentioned, traditional compressors incur mechanical wear through metal-to-metal contact. This not only hurts performance, but also increases noise levels by up to 8 dBA compared to an oil-free compressor of similar size.

An aging chiller at one Canadian public-sector facility, for example, was operating above 90 dB, which made communications near the system extremely difficult. A water-cooled chiller with oil-free compressors was brought in to replace the older chiller, reducing sound levels so communication would be possible while the chiller was operating.

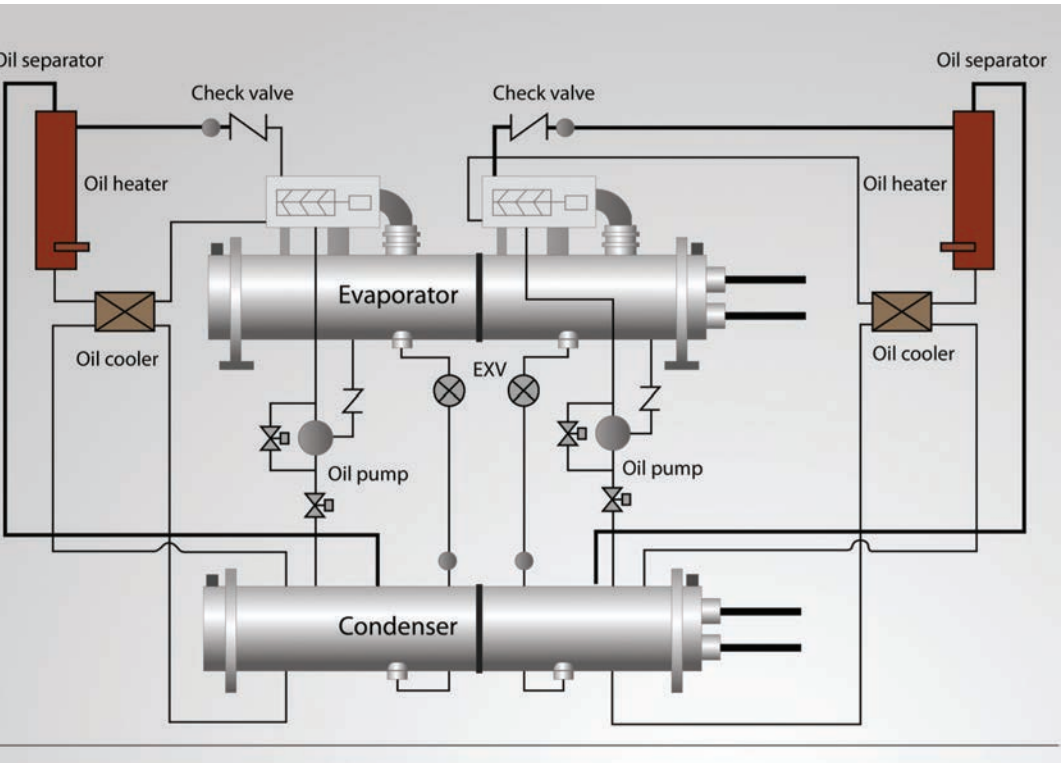
Simplified design

Less-obvious benefits of oil-free compressor technology are enjoyed in terms of maintenance. Removing oil from the system allows for a simplified chiller design, with significantly fewer mechanical parts, and avoids such frequent maintenance tasks as analyzing the oil for contaminants and changing filters.

A typical oil management system adds significant design complexity. It includes such components as an oil separator (which separates the oil from the refrigerant), oil cooler (which reduces the temperature of the oil, since hot oil loses some of its lubrication properties), oil heater (which boils off the refrigerant from the oil to prevent dilution) and an oil pump (which circulates the oil through the system). The costs associated with inspecting and maintaining such a system can add up to thousands of dollars each year—and tens of thousands over the life of the chiller.

"With oil-free chillers, we jokingly say our technicians show up with a screwdriver and a laptop, not a tool cart," says Smardt's Canino. "Further, they do not require the costly, major maintenance that typically occurs with oil-based systems in year 10, when they have to overhaul the compressors." CCE

Eddie Rodriguez is strategic marketing manager for Danfoss Turbocor. He has 27 years' experience in HVAC.



An oil management system adds complexity to chiller design. Images courtesy of Danfoss Turbocor.

The FIDIC international standard form contracts: the Red Book

By Gerry Argento and Yann-Julien Chouinard

The use of a standard form of contract by which the parties' obligations and rights are predetermined can present several advantages. Standardized industry contracts generally provide for an equitable distribution of risk between the client and the contractor, offer familiarity to the parties, and, where permitted, may simplify the contract negotiation process.

In Canada, the standard forms of contract developed by the Canadian Construction Documents Committee (CCDC) are widely used and construction industry stakeholders are well aware of the respective duties and obligations of the parties to these contracts.

Internationally, the most predominately used standard form contracts are those published by the International Federation of Consulting Engineers ("FIDIC").

Established in 1913 by three national associations of consulting engineers, FIDIC now has members in more than 100 countries around the world and its mission is to promote and implement the strategic goals of the consulting engineering industry.

The three most well-known forms of contract from FIDIC are the FIDIC Conditions of Contract for Construction ("Red Book") which is used on projects that follow and design-bid-build procurement model, i.e. where the contractor is to carry out the work in accordance with a design already developed by the client; the FIDIC Conditions of Contract for Plant and Design-Build (Yellow Book) for projects where the contractor designs and carries out the works in accordance with the client's requirements; and the FIDIC Conditions of Contract for EPC/Turnkey Projects (Silver Book).

This column endeavors to provide an overview of the duties of the Engineer under the general conditions of FIDIC Red Book (2017), and, to draw comparisons with the duties of the engineer (i.e. Consultant) under the Canadian CCDC-2 Stipulated Price Contract (2020), particularly as they relate to (1) the performance of the works by the Contractor; (2) claims for adjustments to the contract price or project schedule; and (3) qualification requirements.[1]

(1) with regards to the performance of the works

As it relates to the performance of the works, the Red Book and the CCDC-2 each provide that the Engineer/Consultant is responsible to administer the contract and is deemed to act on behalf of the client[2].

Both the Engineer and Consultant are called upon to interpret the requirements of the contractual documents relative to the performance of the works and to issue necessary clarification and instruction when necessary[3].

During the course of construction, the Engineer and Consultant are to review documents and drawings submitted by the Contractor[4]; to provide instructions to the Contractor for the proper execution of the work[5]; to examine and inspect the work carried out by the Contractor[6]; and to evaluate the work performed and issue payment certificates[7].

It is interesting to note that under the Red Book rules, the Engineer has a positive duty to warn the parties in advance of any known or anticipated circumstances that could adversely affect the progress of the project[8]. This proactive duty represents a distinction from the letter of the CCDC-2 provisions, which do not provide such duty on the Consultant (although it may be implied under applicable law).

(2) with regards to claims for adjustments in contract price or time extension

As it relates to claims that may arise during the course of a project, the FIDIC Red Book rules impose a duty of neutrality and impartiality on the Engineer. When presented with a claim, the Engineer is required to encourage discussion and consult with both parties.[9] If an agreement is not reached within the allotted time limit, the Red Book rules provide that the Engineer must rule fairly [10], and its decision must be made in accordance with the contract in light of all relevant circumstances[11].

Such a duty of neutrality and of impartiality is similarly set out in the CCDC-2 contract, which provides that the Consultant should not be biased towards the client or the Contrac-

1 In subsequent columns, the authors will address the duties of the Engineer under the general conditions of the FIDIC Yellow Book and Silver Book and draw comparisons with those incumbent upon the Consultant under the design-build contacts of the CCDC.

2 FIDIC Red Book (2017), Sub-Clause 3.2 and CCDC-2 clause GC 2.1.1,

tor when making interpretations and findings on claims. [12]

The determination made by the Engineer with respect to a claim is not final and either party may seek to bring the matter before the dispute avoidance/adjudication board in accordance with the dispute resolution provisions of the FIDIC Red Book. Similarly, under the CCDC-2 contract, the parties are afforded the right to submit their claim to mediation and ultimately to arbitration if they disagree with the Consultant's conclusions [13]

(3) with regards to qualification requirements

Under the provisions of the FIDIC Red Book, the Engineer appointed by the client can either be a natural person or a legal entity. In the case that the engineer is a legal person, it must designate a natural person to act on its behalf under the contemplated contract. This is similar to what is provided under the rules of the CCDC-2 contract. [14]

The provisions of the FIDIC Red Book, like those of the CCDC-2 contract, require the Engineer or Consultant to have suitable qualifications, experience and competence to carry out the duties provided in the contract.[15]

One particularity of the FIDIC Red Book is the requirement for the Engineer to be fluent in the ruling language of the contract[16]. Given the international vocation of its contracts, FIDIC does not define French or English to be the ruling language of the contract and therefore, it could necessary for the engineer to be fluent in another language.

In summary, the duties of the Engineer under the FIDIC Red Book are, in several respects, similar to those devolved to the Consultant under the CCDC-2 contract. However, consulting engineers should pay particular attention to their obligations and duties since the respective roles of the parties in the FIDIC contract, just like in CCDC-2 contract, must be analyzed according to the specifics of the project, all applicable contractual documentation including supplementary conditions, and in accordance with the governing law. **CCE**

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3 FIDIC Red Book (2017), Sub-Clause 1.5 and 3.7 and CCDC-2 clause GC 2.2.6

4 FIDIC Red Book (2017), Sub-Clause 4.4 and CCDC-2 clauses GC 2.2.13 and GC 2.2.17

5 `FIDIC Red Book (2017), Sub-Clause 3.5, 4.12 and CCDC-2 clause GC 2.2.12 and GC 6.4.2

6 `FIDIC Red Book (2017), Sub-Clause 7.3 and CCDC-2 clauses GC 2.2.2

7 FIDIC Red Book (2017), Sub-Clause 12.1, 12.3, 14.6 and 14.13 and CCDC-2 clauses GC 2.2.4, GC 5.3 and GC 5.5.

8 FIDIC Red Book (2017), Sub-Clause 8.4

9 FIDIC Red Book (2017), Sub-Clause 3.7.1

10 FIDIC Red Book (2017), Sub-Clause 13.3.1.

11 FIDIC Red Book (2017), Sub-Clause 3.7.2

12 CCDC-2 clause GC 2.2.8.

13 FIDIC Red Book (2017), Sub-Clause 3.7.5 and CCDC-2 clauses GC 6.6.6 and 8.2.1

14 FIDIC Red Book (2017), Sub-Clause 3.1

15 FIDIC Red Book (2017), Sub-Clause 3.2

16 FIDIC Red Book (2017), Sub-Clause 1.4, 3.1 and 3.4

Building biotechnologies

By Jinhong (Andrew) Kim

Aprogen Biologics, a biotechnology company in South Korea, planned to use an advanced bioreactor technology to expand their biopharmaceutical production capacity at its campus in Osong.

While planning the project, Aprogen selected SNC-Lavalin for EPCM services, due to having strong in-house expertise in biotechnology and global GMP regulations.

SNC-Lavalin's Canadian team took a leadership role in engineering in collaboration with SNC-Lavalin's Korean team and delivered the expansion project within time and budget, to allow Aprogen to fulfil local needs for autoimmune disease and cancer treatments and explore international needs.

Social and economic benefits

Aprogen Biologics is a Korean-based biotechnology company with state-of-the-art technologies in protein and antibody engineering that allow for the efficient production of drug products to treat autoimmune diseases and various types of cancer.

Aprogen planned to expand their production capacity to fulfil local needs as well as explore North America's needs for their new antibody-based treatments. This project covered the engineering and construction management for the biopharmaceutical manufacturing facility expansion, including two 2,000 L scale perfusion-based bioreactor lines and their purification process, filling and packaging facility, automated warehouse for ambient and cold storage, flammable storage buildings, and wastewater treatment facility expansion.

According to top trends in biopharmaceutical manufacturing, three major trends were implemented in this project to deliver a flexible and cost-effective facility with reduced capital investment and construction timelines: single-use systems, flexible facilities driven by modularity, and semi-continuous biomanufacturing.

As early as 2006, implementation of single use, sterile disposable systems in place of conventional reusable stainless-steel equipment began to impact facilities design and offer flexible solutions requiring less time-consuming, labour-intensive, expensive and energy-intensive cleaning and re-sterilization processes.

Standardization, rapid development, and reduced execution schedule are all current drivers to investigate modular delivery platforms for manufacturing assets that can be easily replicated in multiple locations. The standardized facility design developed in part by SNC-Lavalin for Aprogen's existing facility could be readily adopted for this expansion project. Modular units also gave increased flexibility in operation and simplification of manufacturing itself. Commercial application of continuous biomanufacturing through high-yield perfusion cell culture processing is still in early stages.

SNC-Lavalin's biopharmaceutical process engineers worked with Aprogen to scale-up their R&D perfusion process, allowing for smaller bioreactors (2,000 L) to be used to achieve double the product quantity possible

Project name: EPCM service for expansion of Suite 3 & 4 at Aprogen's campus in Osong, South Korea.

Location: Osongsaengmyeong 5-ro, Osong-eup, Heungdeok-gu Cheongju-si, Chungcheongbuk-do, South Korea.

Completed: 2019

Aprogen selected SNC-Lavalin for EPCM services.



SNC-Lavalin introduced the latest technologies to the client in Korea while ensuring compliance with regulations in Korea, and various laws and regulations in construction.

with four 5,000 L bioreactors, which greatly reduced capital and operational costs.

The cutting-edge design concept implemented by SNC-Lavalin during project execution greatly benefits public health as it further improved Aprogen's manufacturing efficiency for production of new cost-effective drug treatments to supply local and global markets and can allow Aprogen to sooner commercialize other new drug products in their pipeline.

This project was delivered with up-to-date technologies and new trends, some of which the industry is headed towards, and some of which were designed as "hybrid" solutions that are still fully supported by regulatory agencies including the FDA (U.S.), EMA (Europe), PMDA (Japan) and MFDS (Korea), and profoundly contribute to the public health and medical welfare.

Technology transfer

Process engineers from SNC-Lavalin's Toronto and Montreal offices – having a wide depth of GMP experience based on FDA, EMEA and Health Canada regulations – collaborated closely with SNC-Lavalin's local Korean engineers to deliver core biopharmaceutical manufacturing facility designs with technologies that both met the client's requirements and incorporated current trends in GMP that the client is not experienced with. SNC-Lavalin introduced the latest technologies to the client in Korea while ensuring compliance with regulations in Korea, and various laws and regulations in construction.

The design of the automated warehouse for GMP product storage, designed as rack building type to handle more than 4,000 cells, was a critical component of the project due to the strict temperature distribution requirements for ensuring product quality. Although local suppliers have expertise in automatic warehouse technologies, SNC-Lavalin offered expertise in the application of these technologies for GMP purposes. The SNC-Lavalin Canadian team used CFD to perform extensive simulations of air flow distribution to finalize an acceptable mechanical design prior to construction, which was later verified through cold mapping.

During construction, SNC-Lavalin supported selection of various materials and construction methods to ensure compliance with current standards, and procurement for process equipment. Technical reviews of design, specification and fabrication from multiple suppliers was also supported. Together with Korean engineers, all of the discipline leaders from Canada were greatly involved in each project execution phase to support the necessary consultancy for construction and equipment installation, supporting Aprogen in their plan to supply drug treatments to a broad, global market.

Environmental benefits

For this project, vibration sensors and monitoring meters were designed and installed on pumps, motors and other various locations, such as in motors for air handling units, so that real-time data can be collected, monitored and analyzed for potential application of next generation maintenance approaches such as predictive maintenance. This is cutting-edge technology that brings the client closer towards Industry 4.0 (or Pharma 4.0). The accumulated data can be analyzed to maximize the usage of each facility asset. Previous systems in the pharmaceutical industry only maintenance the facility asset based on a set usage time.

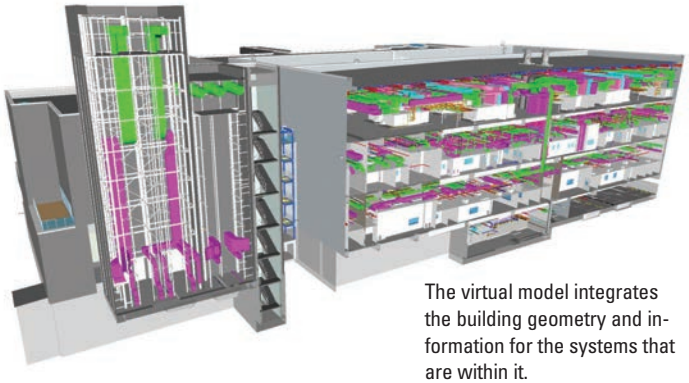
Biopharmaceutical manufacturing facilities traditionally use a significant amount of water for production, such as for buffer preparation and cleaning of vessels. Energy saving and water recycling were critical considerations during engineering.

A significant volume of water during purified water generation is normally wasted due to impurities; however, the design facilitated its collection and treatment to re-direct it for other uses in the other facilities such as R&D. This not only reduces the cost of water, but also conserves water and reduces the amount of wastewater generated.

Furthermore, energy and water requirements were substantially lowered by implementing single-use technologies, due to elimination of extensive cleaning and sterilization between each batch and the chemicals used in the process. Comprehensive environmental life cycle analysis studies have shown that single-use technologies, despite plastic waste generated, have less environmental impact compared to traditional stainless steel, as the majority of environmental impacts relate to energy and water consumption during their use.

Complexity

Building Information Modelling (BIM) is an innovation that transforms traditional project execution. It serves to integrate all the work processes related to the building lifecycle: planning, design, construction, commissioning, operations, and



The virtual model integrates the building geometry and information for the systems that are within it.

decommissioning. The BIM production system is a digital representation of the physical and technical characteristics of a building and all its systems prior to construction. The virtual model integrates the building geometry and information for the systems that are within it. This permits better coordination in the design phase, better transfer of information to the builders, and permits the owner to improve the management of its infrastructure. By nature, the BIM method involves gathering all relevant information regarding a project in a central database that allows all project participants to exchange information efficiently, significantly improves the coordination at all levels and allows for proactive project management.

By delivering the design in Autodesk RevIT (BIM software), the project benefited from improved coordination and improved conflict detection. There were 12,000 clashes we could identify and resolve, such as by rerouting ducts, which would otherwise only be identified during construction.

In competitive environments, this 3D design strategy works very well to minimize changes during construction. Minimized change orders is an important key to achieving project objectives and delivering on time and within budget. It helped to better co-ordinate disciplines with ease, maintain accuracy and move projects from design to fabrication to energy-efficient buildings.

Design, visualization, simulation and collaboration using BIM solutions provide greater clarity for all stakeholders across the project lifecycle.

Meeting the owner's needs

Our client's new facility must be fully compliant with the GMP requirements of various countries such as FDA (U.S.), EMA (Europe), PMDA (Japan) and MFDS (Korea) as they intend to supply their new biopharmaceutical drugs through this facility.

Time to market is essential for our client, and successful completion of design and construction for them to manufacture their clinical trial batches was of critical importance to their business plan.

Quality of construction is another success criteria to our client since their business partner will do pre-inspection once construction has been completed.

We received pre-inspection with multiple business partners of the client during the design and construction phase, including from Japan and U.S., and received their full acceptance. Successful pre-inspection is critical for allowing international companies to penetrate the U.S. market. Inspection failures can severely impact and delay projects.

During design, workshops were held both in Canada and Korea which allowed for the SNC-Lavalin Canadian team to meet with the client directly and efficiently. During construction, SNC-Lavalin's local Korean engineers were present on-site full-time.

SNC-Lavalin has also been commissioned by Aprogen to provide EPCM services for an additional two suites at their existing manufacturing site. The client is further benefiting from the standardized modular design implemented by SNC-Lavalin as part of this project since it can be easily replicated.

Delivering on time and within budget, the successful pre-inspections so far, and additional work from the client to support their further expansion plans, are all indicators of successful project delivery by SNC-Lavalin. CCE

Jinhong (Andrew) Kim, business development and project engineering director, Power, Grid and Industrial Solutions (PGIS) Infrastructure, SNC-Lavalin Korea LLC.

Specifier's Literature Review

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Addressing climate change with resilient buildings

The implications for consulting engineers are significant

Andrée Iffrig, sustainability strategist for Dialog in Calgary, has spent much of her time recently exploring and discussing Canada's need for more resilient buildings in the face of climate change and the resulting implications for consulting engineers and other professionals in the construction industry.

Andrée Iffrig

How do you define a 'resilient building'?

A resilient building maintains operational continuity. It never goes down. No matter what happens, it still has access to water, power and Internet connectivity. A resilient public building is likely multi-purpose, meeting the project program and providing shelter if a major climate event occurs.

Water seems to be a common denominator in many climate change events—storms, sea level rise, river flooding. A resilient building can get its feet wet and still function.

Resilient buildings become more important where vulnerable populations are involved, like hospitals or social housing. Such a building is so well-insulated, it stays cool and comfortable during a heat wave.

Do any current guidelines and codes align well with those goals?

Building to the existing code is like building for yesterday's weather. You can't build resiliently unless you're well-informed about the new climate and use future projections instead of historic data.

The National Research Council (NRC), responsible for Canada's building codes, readily acknowledges this deficit and is spending $42.5 million on research to inform a new model code for release in 2025, which will factor in climate change and resiliency. Based on studies of climate stresses and their effects in different parts of Canada, it will update requirements and standards for windows, exterior insulation, fire tests, air barriers, asphalt shingles, wind resistance, snow loads and flood resistance.

The 2020 National Building Code (NBC) will include updated wind design data. There are new guidelines for certifying the resiliency of roofs to extreme weather events. This year, there will be new specifications to optimize pavement concrete mixes to mitigate flooding and guidelines for climate resilience for existing stormwater systems. And stand-alone national guidelines are currently being developed with provisions for the design of buildings to address natural hazards, such as wildfires.

The Canadian Standards Association (CSA) has rewritten the previously optional CSA S478, *Guideline on Durability in Buildings*, as a standard, while CSA A123.26, *Climate Resilience of Low Slope Membrane Roofing Systems*, addresses wind-related risk.

How can we improve buildings to address hotter temperatures?

Passive House (PH) certification is one example. Any time we create a better building envelope, as part of reducing energy use, we improve resilience. The work in addressing hotter temperatures starts in early-stage design with massing and energy models, using parametric design software. This is the time to study the building's orientation and measures to reduce heat accumulation, especially in the summer months, when many Canadian cities will be subjected to a tripling in the number of very hot days (*i.e.* above 30 C) by 2050.

How can we build better for flooding?

One response to chronic flooding from high tides or rivers is not to build in those areas. Alternatively, we design buildings to get their feet wet, on a plinth or stilts, with no basement or with an unoccupied basement.

The University of Waterloo is studying buoyant foundations for existing structures. Major infrastructure will also be required, with new stormwater systems or barriers upstream to limit river flooding.

What role can Canada's consulting engineers play in planning for resilience?

Engineers are the new climate heroes, from conducting vulnerability assessments to building climate-worthy infrastructure. The best way to play their role is to integrate into design teams as early as possible. The biggest change I'd like to see is engineers becoming more successful in convincing laggard clients to build better. A building with a high-performance envelope is going to weather climate change much better—and less expensively—than one simply built to code. **CCE**

This interview is edited from The Better Buildings Podcast. To hear our full discussion with Andrée Iffrig or read the full-length article, visit www.canadianconsultingengineer.com.

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