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May 2019
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Cover: The city of Montreal's net zero Parcours Gouin Trail reception pavilion.
Photo credit: Boyer Média
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Modular building, efficient interchanges, wastewater plant upgrades and more.

on topic

CONVERSATIONS

Destined to Engineer. Q&A with Catherine Karakatsanis, P.Eng., COO at Morrison Hershfield and recipient of the 2019 Gold Medal from Engineers Canada. 30

Longer term thinking

Living in Ontario, on April 1 when the federal carbon tax kicked in the price of gasoline at the pumps jumped around four cents/litre (as it did in Saskatchewan, Manitoba and New Brunswick), a noticeable change, but not an entire deterrent from commuters like myself giving up the drive.

Overall, this pricing of carbon, which is set to increase annually, is intended to awaken every citizen to the cost of our non-stop polluting ways, and eventually it should impact our behaviour and ultimately reduce our national levels of greenhouse gas (GHG) emissions.

While this economic driver may one day lead to some commuters trading in their internal combustion engines for electric models, the impacts may be more acutely felt among significant building owners, where the annual costs of inefficient heating and cooling systems could make a real difference on their bottom lines. According to some figures, Canada's built environment contributes 17% of our national GHG emissions.

To drive home the point that building to a zero carbon standard is not only a sustainable environmental action but also a financially prudent decision, the Canada Green Building Council (CaGBC) released its *Making The Case for Building to Zero Carbon* document earlier this year.

The CaGBC commissioned WSP to study the financial viability of constructing zero carbon buildings (ZCBs) of different types in communities across the country.

On a national level, the report found that on average a ZCB will require an 8% capital cost premium, but over a 25-year life cycle it will provide a positive 1% financial return.

I'm not sure if that is enough of an incentive alone to get developers excited about making their next project zero carbon, but the argument exists that lowered operating costs, combined with current financial incentives and the squeeze of increased carbon pollution pricing over the next decade could offset costs even more.

The report also notes that: "Buildings not built to be ZCBs will require major investments in retrofits of mechanical equipment, ventilation systems and building envelopes (walls, roofs, and windows) by 2050 to meet Canada's targets." So it seems like a matter of either do it now, or pay more later.

This makes a great point for longer-term thinking, and also raises the prospect of addressing all of the existing building stock that will need to be brought up to code in the years to come.

In a recent article, Mark Hutchinson, vice president at CaGBC writes: "There are also important financial benefits that were not quantified in the study, such as greater value to tenants, future-proofing against higher costs for utilities and carbon pollution, greater resiliency against future weather events, and avoiding costly future retrofits."

So in the end, the current carbon tax is serving as a subtle nudge to every citizen to consider changing out ways, and where today's money is being invested, it's definitely worth taking a look at the longer-term costs of not taking action now—both the financial costs and the harm climate change will deliver to our future generations.



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Photo: Consulting Engineers of Ontario



Willis Chipman Award winning firm: John G. Cooke and Associates (l-r) Mary Cooke, C.Tech.; John Cooke, P.Eng.; Chris Vopni, P.Eng.; Lisa Nicol, P.Eng.; along with Christine Hill, P.Eng. (Chair of CEO).

AWARDS
OCEA Gala Shines

Consulting Engineers of Ontario hosted its 17th annual Ontario Consulting Engineering Awards (OCEA) Gala at Copper Creek Golf Club in Kleinburg, Ont. on Friday, April 26th.

The top prize of the evening, the Willis Chipman Award, was presented to John G. Cooke and Associates for the Government Conference Centre rehabilitation project in Ottawa.

Ten other awards were presented over the course of the evening. The Awards of Excellence were presented to firms based on company size: (1-50 employees) AIA Engineers; (51-100 employees) Blackwell; (101-350 employees) Parsons; (351+ employees) Hatch.

Awards of Merit were presented in project categories: (Building Engineering & Science) Adjeleian Allen Rubeli; (Environment) Robinson Consultants; (Project Management) DST Consulting Engineers; (Studies & Research) Stantec; (Transit) AECOM; and (Transportation Structural) WSP.

A new People's Choice award was presented to Robinson Consultants for its Northwest Arm Trunk sewer rehabilitation project.

ACEC-New Brunswick Celebration

The 22nd annual ACEC-NB Engineer-

ing Excellence Awards gala was held Wednesday, May 1st at the Fredericton Convention Centre. From the 18 submissions this year, the Pinnacle Award, presented to the top-ranked entry, went to MCW Maricor for its University of New Brunswick (UNB) Kinesiology Building project at the Fredericton campus.

Four other Awards of Excellence were presented. The winning firms included: Roy Consultants for their design of a biogas collection and power generation project; MCW Maricor again for an electric vehicle fast charging network; EXP Services for the route 15 — Harrisville Blvd. Dogbone Interchange project; and Wood Environment & Infrastructure Solutions for the City of Saint John Safe Clean Drinking Water Project.

Also recognized at the gala event was Paul Belyea, recipient of the ACEC-NB President's award for his lifetime contributions to the advancement of the consulting engineering profession in New Brunswick, and the ACEC-NB Young Professional's award was presented to Julie DiCicco of Dillon.

ACEC-BC 30th Annual Awards

The Association of Consulting Engineering Companies British Columbia (ACEC-BC), celebrated the 30th Annual Awards for Engineering Excellence on Saturday, April 6th at the Westin

COMPANIES

New leader for Arup Canada

Craig Forrest is now Canada Group Leader for Arup, working out of the Toronto office and overseeing Montreal. Forrest



Craig Forrest

brings over 24 years of experience. He's working closely with Andrew McAlpine, the previous Canada Leader, who remains a principal with the firm.

Melissa Burton, a Toronto native, also joins Arup's Toronto office as an associate principal. A



Melissa Burton

global leader in wind engineering and climate consulting, most recently Burton has been with Arup's advanced technology and research team in New York.

Crowe leads Stantec Atlantic

Stantec has named Peter Crowe as the regional leader for Atlantic Canada.



Peter Crowe

With the company for over 22 years, Crowe previously led the geotechnical group in Central and Atlantic regions. He is now managing the operations in Dartmouth, Sydney, Fredericton, Moncton, Charlottetown, Saint John and St. John's.



Photo: ACEC-BC

The ACEC-BC Meritorious Achievement Award for lifetime contributions awarded to John Sherstobitoff, P.Eng., Ausenco Engineering.

Bayshore Hotel in Vancouver.

Awards of Excellence and Awards of Merit were handed out in seven categories with the top prize, the Lieutenant Governor's Award for Engineering Excellence, being awarded to WSP Canada for the firm's New Solutions for Safe

Water in Remote Communities project. WSP worked collaboratively with RES'EAU-WaterNET, a research and development network, to develop an organics removal technology for water treatment in small and remote communities that utilizes natural biological processes.

The other Awards of Excellence were presented to: (Buildings) Fast + Epp; (Municipal and Civil Infrastructure) McElhanney; (Transportation & Bridges) COWI; (Energy & Industry) SNC-Lavalin; (Natural Resources & Habitat) ISL Engineering and Land Services; (Soft Engineering) WSP Canada; and (projects under \$25M) Morrison Hershfield.

Awards of Merit went to: Stantec, WSP, McElhanney, Knight Piésold, PBX Engineering, Tetra Tech, and Dillon Consulting.

The Meritorious Achievement Award for lifetime contributions to engineering, the industry and the community, was awarded to John Sherstobitoff, P.Eng., Ausenco Engineering Canada.

The Young Professional Award was given to David Ellis, P.Eng., of McElhanney Consulting Services. And the 2019 Client of the Year Award was presented to the City of Kelowna.

20th ACEC Manitoba Gala

The 20th annual ACEC Manitoba Awards of Excellence Gala was held on

April 9th at the Metropolitan Entertainment Centre in Winnipeg. This year's top Award, the Keystone, was presented to the team of Teshmont Consultants and Stantec for the Bipole III High Voltage Direct Current (HVDC) project for Manitoba Hydro which adds 2,000 megawatts of hydroelectric power capacity to the provincial grid.

Other firms winning Awards of Excellence included: AECOM Canada, Hatch, KGS Group, MCW/AGE Power Consultants, Tetra Tech Canada, and WSP Canada.

Awards of Merit were presented to: AECOM Canada, JR Cousin Consultants, KGS Group and Morrison Hershfield (joint project), SMS Engineering, and Stantec.

This year's Rising Star Award was presented to Tyson Ehnes, P.Eng. of



Photo: ACEC-MB

The Keystone Award-winning team at the 2019 ACEC Manitoba Awards of Excellence.

AECOM Canada.

Richard Tebinka, P.Eng., manager of WSP's Manitoba Transportation team received the Engineering Action Award, and the 2019 Lifetime Achievement Award was presented to Bruce Wilton, P.Eng., who served as president of ACEC-MB in 2011.



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LETTER TO THE EDITOR

Re: Smart Cities?

The series of articles on smart cities was disappointing, once again touting the perceived benefits and glossing over problems.



First, to correct a reference to the Industrial Revolution: people did not flock to cities because they were attracted by them.

They were pushed by over-population, competition and the Enclosures Acts (1773 to 1882, which privatized the common pasture lands). The cities were dirty and cramped, and the working conditions dangerous and exhausting. Hardly inspiring.

Some of the known problems with smart cities will be privacy, security and loss of resiliency. Firstly, we are losing privacy at an astonishing rate, in part because our privacy laws are ineffective. When was the last time a CEO or deputy minister went to jail or even lost his job for a data breach? Usually privacy complaints are dismissed or the offender is told to improve their practices. Privacy is important to people whether they realize it or not (most do not); not only are there problems such as identity theft, but big data allows groups to influence people in subtle ways. While this can theoretically be used to nudge people to better behaviour, in reality all too often it is used to exploit a weakness against them. In Europe privacy is taken more seriously, as many have lived under totalitarian regimes. Even there the protection is likely inadequate.

Security is a mixed bag. Smart cities can both enhance and undermine security. It tends to be enhanced for some street crimes, but undermined in others, including putting all our eggs in one basket—banking, control of utilities, etc., which makes us vulnerable to cyber-attacks from criminals and foreign governments. Cyber-

crime is exploding as opportunities increase with minimal risk of prosecution. Governments are stealing technical and personal information for their own uses, and preparing for cyber warfare, which first occurred in the Russo-Georgian war in 2008. So why are we making it easier by putting everything on-line?

As to resiliency, you do not make things more resilient by making them more complex and interconnected. Loss of power or the internet, not to mention a cyber-attack, can cause chaos, and for what advantage? One of the articles mentioned a 10% energy savings in buildings. Greater savings can be realized in a variety of ways, including reducing the excessive amounts of glazing on most buildings, which works with or without power. As to users, many no longer have the skills to function well without smart systems. They are lost when their phones go down.

Technologies should not be adopted (partially or fully) just because they exist, but only if the benefits clearly outweigh the costs; too often hype, convenience and profit for a few win out over practical and security considerations.

Yours truly,

Ralph Watts, P.Eng., P.E.

BCIT North Campus project wins Envision Gold Award



The North Campus Infrastructure Project at the British Columbia Institute of Technology (BCIT) in Burnaby, has received the Envision Gold award for sustainable infrastructure.

BCIT worked in collaboration with Stantec, PCL Constructors Westcoast, R.F. Binnie & Associates, and PFS Studio on the \$46.9 million project.

Smith + Andersen appointments

Listed among a series of recent appointments, Smith + Andersen announces Dugan Doherty, P.Eng., is now an associate principal. Joining S+A in 2013, Doherty is a leader with the electrical team working out of the Vancouver office.



Dugan Doherty

New senior associates include: Glen Beaudoin, P.Eng. (Calgary); Lewis Clarke, P.Eng. (Calgary); Eric Stevens, P.Eng. (Calgary); Simon Graham, P.Eng. (Toronto); Mike Mitani, P.Eng. (Ottawa); Chris Durocher, P.L.(Eng.) (Calgary). And a new associate is Ryan Smith, P.L. (Eng.) (Calgary).

LRI Engineering expands into Quebec

Toronto-based fire protection engineering firm LRI Engineering Inc. (LRI), with offices in Toronto and Ottawa, is expanding into Quebec with a new branch office at the Laval headquarters of their partners, forensic engineering specialists, CEP-Sintra.

Founded in 1986, LRI specializes in fire protection, building and fire code consulting, and emergency planning services. Branch manager for the new Quebec location is Jean-Nicholas Bader.

"We see ourselves as a national brand and have a long history working throughout Canada. The new branch really helps solidify this," says Eric Esselink, CEO of LRI.



CHAIR'S MESSAGE

ACEC supports collaboration among First Nations and Industry



To affect positive change for our industry, ACEC engages with key stakeholders and influencers; our relationship with the First Nation's Major Projects Coalition (FNMPC) is one new exciting example of this.

The FNMPC first engaged with ACEC in 2017 at our national leadership conference when they participated on a panel discussing the development of a National Corridor. Since then, the FNMPC has presented to the ACEC Board on two separate occasions and actively participated in the 2018 conference. This past March, myself, ACEC President & CEO John Gamble and representatives of other ACEC member firms were among 120 participants from Industry and First Nations to attend the FNMPC's second annual Industry Engagement Day. Attendees examined how economic participation by First Nations in major projects could be facilitated; how environmental considerations can be examined

within a new framework; and how traditional First Nation approaches can add value in advancing major project development.

Through ongoing discussions between the two organizations, it is apparent to ACEC leadership that the FNMPC has a constructive, pragmatic and entrepreneurial approach to delivering major projects and is providing their First Nation members with the capacity needed to financially participate in, and influence, major project outcomes. Our vision to positively affect the social, economic and environmental quality of life of Canadians needs broad engagement to forge ahead. We look forward to our continued relationship with the Coalition and its members as they support the development of major projects and seek the support and technical expertise of our membership to deliver them. To learn more about opportunities to work with the FNMPC please contact ACEC.

MICHAEL SNOW, P.ENG., ING., M.A.SC.
CHAIR, BOARD OF DIRECTORS, ACEC-CANADA

MESSAGE DU PRÉSIDENT DU CONSEIL

L'AFGC favorise la collaboration entre les Premières Nations et l'industrie

Pour susciter des changements positifs au sein de notre industrie, l'AFGC crée des liens avec des intervenants et des influenceurs clés. Les liens que nous sommes en train de tisser avec la First Nation's Major Projects Coalition (FNMPC) en est un exemple des plus intéressants.

La Coalition a eu des échanges avec l'AFGC pour la première fois en 2017 lors de notre congrès national du leadership, lorsque ses représentants ont participé à une discussion d'experts sur le développement d'un corridor national. Depuis, à deux reprises, la Coalition a fait des présentations devant le conseil d'administration et a participé activement au congrès de 2018. En mars dernier, le président et chef de la direction de l'AFGC, John Gamble, d'autres représentants de firmes membres, et moi-même étions au nombre des 120 participants à la deuxième journée annuelle de mobilisation de l'industrie, organisée par la Coalition. Les participants ont examiné comment faciliter la participation économique des Premières Nations aux projets d'envergure; comment examiner les considérations environnementales à la lumière d'un nouveau cadre;

et en quoi l'approche traditionnelle des Premières Nations pourrait représenter une valeur ajoutée pour faire avancer les grands projets de développement.

Nos deux organismes échangent régulièrement et il est évident pour les dirigeants de l'AFGC que la Coalition s'est dotée d'une approche constructive, pragmatique et entrepreneuriale en matière d'exécution de projets d'envergure et qu'elle offre à ses membres la capacité nécessaire pour participer financièrement aux grands projets et pour exercer une influence à cet égard. Pour concrétiser notre vision, c'est-à-dire avoir un effet positif sur la qualité de vie sociale, économique et environnementale des Canadiens, il faut tisser des liens avec le plus grand nombre de parties intéressées. Nous sommes heureux de cultiver nos relations avec la Coalition et avec ses membres, qui appuient le développement de projets d'envergure et cherchent l'appui et l'expertise technique de nos membres pour les exécuter. Pour en apprendre davantage veuillez contacter l'AFGC.

MICHAEL SNOW, P.ENG., ING., M.S.C.A.
PRÉSIDENT, CONSEIL D'ADMINISTRATION, AFG-CANADA

IN DISCUSSION

with

ACEC

Why did you want to be CEO of the CIB?

I was attracted to the CIB because of its mandate to get the public sector working differently with private sector and institutional investors. We need more infrastructure in Canada. Some of that new infrastructure would benefit from greater private sector expertise. We have a sophisticated infrastructure industry in Canada, ranging from consulting engineers to construction, finance, legal professionals and skilled trades. We also have large pools of private and institutional capital with substantial infrastructure investment expertise. Bringing these groups together with public partners to build new infrastructure is an exciting opportunity.

What progress have you made in the last six months?

This is a new organization. Like any good infrastructure project, it's impor-



Pierre Lavallée, President & CEO, Canada Infrastructure Bank (CIB).

In Discussion with ACEC is a series of informal conversations with Federal Government decision makers who have an impact on the consulting engineering sector.

During these interviews, ACEC-Canada President and CEO John Gamble delves into the government's policies and programs to gain a first-hand understanding of its long-term vision on the issues and challenges that touch the sector. The following is a brief Q&A with Pierre Lavallée, President & CEO of the Canada Infrastructure Bank (CIB).

tant to have a good foundation in the organization. I'm fortunate to have a strong Board of Directors. They provide great advice and guidance. We have been building our capabilities by hiring experienced people in all areas, and that will mean we can help governments get their infrastructure projects built.

It has been a whirlwind of activity meeting with public sector sponsors, industry and investment leaders about the role of the CIB. As you know, we are a new financing tool for building new infrastructure, and while we want to attract private and institutional investment, we also require projects to be in the public interest.

We have been very pleased by the number and quality of investment proposals that have come forward from governments and businesses. As of Jan. 1, 2019, we had held almost 200 investment-related meetings, reviewed 97 projects, and are actively engaged in due diligence on approximately 10 projects. The projects that we focus on are large and complex, have lots of risks, and take time to develop. Our job is to be very thorough in assessing projects, both in terms of the public interest and their commercial viability.

We made a \$1.28 billion commit-

ment to the Réseau Express Métropolitain (REM) transit project last summer. In that case, after extensive due diligence we restructured what was originally a government contribution into a 15-year loan, and risk-sharing with the private sector investor.

How is the CIB engaging with governments as well as the private sector?

CIB is a partnership organization. We don't own or build infrastructure, but we invest along with those who do – especially public sector sponsors who want to engage private sector and institutional investors.

To date, my team has engaged with public sector leaders by meeting with provincial and territorial ministers responsible for infrastructure. Bilateral discussions will continue with all jurisdictions regarding their project priorities and potential partnerships with the CIB. Outreach with municipal leaders is ongoing in order to understand future investments in large and complex infrastructure projects where the CIB can participate. Further engagement with Indigenous partners will also be important in order to enable new partnerships that result in better infrastructure.



What sectors and regions are priorities for you?

We have three priority sectors: public transit, trade & transportation, and green infrastructure. We plan to invest at least \$5 billion in each of these areas.

In public transit, we aim to be involved earlier in projects to encourage the use of models with an increased proportion of private-sector capital, including both debt and equity. Similarly, in the trade and transportation sector, we see strong investment opportunities in a variety of projects and green infrastructure offers opportunities that could include water and wastewater treatment, energy and electricity systems and more.

We do not have specific regional or geographic allocations, targets or quotas. We assess projects on their own merits and are open to projects from across the country. When assessing potential projects located in rural and northern communities, we will consider the specific challenges of developing infrastructure in these regions.

Budget 2019 indicated that “in partnership with the Government, the Canada Infrastructure Bank is examining opportunities to apply its innovative financing tools to stimulate private sector investment in high-speed internet infrastructure in unserved and underserved communities.” It also confirmed that the CIB is “well positioned to work with jurisdictions, including northern communities, to plan and finance projects that improve access within Canada to affordable, reliable and clean elec-

tricity in the most effective way. This includes projects that improve inter-connections between provincial electricity grids.”

How does the CIB partner with private and institutional investors regarding new infrastructure?

Our investment strategy is to target, as surgically as we can, gaps in the financial structure of infrastructure projects. These gaps could be flexibility of terms and conditions or risk profile, or returns, or likely a combination of all three elements. We are explicitly targeting the space between where traditional government funding ends and where purely commercial financing begins.

Since our mandate includes attracting private capital, we provide financial support to a project on concessional terms, below market or on another subordinated basis. If a project could achieve market-level investment returns, then it does not need our involvement and should be entirely financed by the private sector.

When the CIB invests, the expectation is that private sector investors and developers will have a significant responsibility for assuming risks in projects. We aim to move the Canadian infrastructure market towards increased risk transfer to private partners over the asset lifecycle, and the expansion of usage and/or revenue risk transfer, where appropriate, as a feature of the projects we support. We want to align incentives and allocate specific risks to the parties best able to

manage them.

What is the outlook for the CIB as a ‘centre of expertise’? What could that mean for consulting engineers?

We know there are many experts in industry, like consulting engineers, who are critical to making projects happen.

We will work closely with governments and agencies who are the owners of public assets. The CIB is responsible for investing \$35 billion in new infrastructure that is in the public interest. Our role will be to invest and that will lead to opportunities for the consulting services, construction and design industries to plan, develop, deliver and maintain new infrastructure. Consistent with the way that consulting engineers look at assets, the CIB will look at our investments with a full lifecycle view. We also offer advice to public-sector owners on project development and work to expand best practices in infrastructure, which will continue to inform investment decisions in the future.

More broadly, CIB and consulting engineers could look for ways to assist each other as we develop knowledge and best practices, including the development and sharing of data and information. We are well aligned on the goal of using solid evidence to make smart decisions on infrastructure investments.

To view more of our In Discussion with ACEC series, please visit www.acec.ca/indiscussion.



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2019 FEDERAL BUDGET HIGHLIGHTS

What engineering firms need to know about the March 19, 2019 announcements

By Bhavin Oza, senior tax manager, RSM Canada

- » **Succession planning.** Proposals are being developed to accommodate inter-generational transfers of privately owned businesses while still protecting the integrity and fairness of the tax system.
- » **Audits to be ramped up.** Additional funding for audits of high-net-worth individuals and their businesses could see privately owned businesses face additional audit-related costs.
- » **International tax planning under continuous review.** Inappropriate shifting of profits to foreign jurisdictions remains a concern.

- » **Updates to Scientific Research and Experimental Development (SR&ED) Tax Credit.** Eliminated the taxable income threshold for accessing the higher SR&ED investment tax credit of 35 per cent for Canadian-controlled private corporations.
- » **Curtailments to the stock option deduction.** Limited deduction being contemplated, where the fair market value of the optioned shares are greater than \$200,000 for employees of mature, long-established firms. Further details will be released in the summer of 2019 and will apply on a go-forward basis at that time.



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NET ZERO SHOWCASE

By Doug Picklyk

The Parcours Gouin Trail reception pavilion, the City of Montreal's first net zero energy building.

Above: The multipurpose event space on the upper floor opens to a terrace on the east side, shaded by trees.

Parcours Gouin is a network of parks linked by a 15-km bike path along the banks of the Rivière des Prairies in the borough of Ahuntsic-Cartierville on the northwest edge of the Island of Montreal. With a desire to attract more people to the parks, the City of Montreal agreed to build its first city-owned net zero energy building in the park. The Parcours Gouin reception pavilion, a two-level structure serves as a rest stop and destination for park visitors and as an eco-responsible showcase for local residents.



An independent structure was built to provide optimal positioning of the photovoltaic panels and offer shelter to park visitors when required.

The building includes a small café on the ground level, along with washrooms and a seasonal sports equipment rental counter around the back. The upper level includes an office area and a multipurpose event space with a terrace and an expansive view of the river.

Started in the fall of 2014, Stantec's integrated consulting engineering teams worked in conjunction with the architect, Montreal-based BBBL

Architectes, on the \$4.1 million project. The teams were tasked with targeting LEED Gold objectives as well as the net zero energy goal, and the project was to be completed by the summer of 2017, marking Montreal's 375th anniversary.

"Integration with the architecture team and the energy simulation group was beneficial for the mechanical team," says Alexandre Jean, ing., a mechanical designer with Stantec who



The café windows open to a patio. The north-facing space is shaded by the overhang of the upper floor and offers river views to visitors.

worked on the project from the early design phase.

"For example, we optimized the position of the windows on the envelope. We have large windows on north facade. So the architect was happy with the better river views, and for us there was no penalty for the cooling of the building.

"And we were able to agree on smaller windows—the minimum that was required—on the west and south sides, where we were able to position the mechanical rooms."

The building required a high-performance thermal envelope, so the effective R-values of the walls are R35 and the roof is R45, and all of the windows are triple-pane.

HVAC

Much of the mechanical efficiency is courtesy of a geothermal system, explains Jean. The heating and cooling is driven by energy efficient heat pumps supplied by three 150-metre deep geothermal wells drilled near the pavilion (producing 3 kW of energy for each electric kW consumed).

There are four geothermal heat pumps. Two are water-to-water for the radiant floor heating, and the air conditioning is delivered with water-to-air heat pumps—one dedicated to the office space and one for the multipurpose room, both rooms located on the upper floor.

The ground floor is not air conditioned, but large windows on the north-facing café can be opened for natural cooling.

The ventilation system uses energy-

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recovery fans, capturing heat exhausted from the building and transferring it to the incoming cold outdoor air using a plate heat exchanger that recovers sensible and latent energy.

For greater efficiency, sensors monitor CO₂ concentration in the office space and multi-purpose room and control the ventilation to ensure the right amount of outdoor air is supplied to the spaces only as required.

Optimized controls

Part of the mandate included taking steps to minimize maintenance cost requirements. All of the mechanical equipment is connected to a centralized control system for optimized startup sequences, schedules of operation and integration with motion detectors to make sure no equipment is working if it is not required.

A solar water heater located on a green roof on the south-facing terrace preheats the domestic hot water, and there is a standard electric water heater inside for back up. In addition, low-flow fixtures help to reduce water consumption by 30% compared with standard devices.

Energy demand

With all of the design choices used to reduce energy consumption as much as possible, the energy simulation needed to estimate the annual energy draw of the building.

The two-level steel structure includes an elevator for accessibility

purposes only, and the plug-load of the café also needed to be considered.

“This was a challenge during design, because for an accurate energy simulation we needed to know what was going to be used in the café,” says Jean.

Ultimately the design team provided guidelines for the appliances to be used in order to achieve the building’s goals.

The energy simulation determined the annual draw to be 35,200 kWh, or 66% less than a reference building, with proposed energy savings of up to \$8,538 annually.

To achieve net-zero energy the installation of 120 photovoltaic (PV) panels would be required to produce on average 37,700 kWh annually.

Integrating that volume of PV on the roof of the building was a challenge, so as an alternative the installation was placed on a structure independent of the building, allowing optimal south-facing positioning and improved ventilation of the PVs to optimize their performance. The additional structure also provides a shaded space to shelter visitors from summer sun and rain showers.

Eco-friendly

Other elements of the building intended to reduce its ecological footprint include the selection of sustainable and local materials, and low-energy lighting. There is also a rainwater collection tank that collects water from the terrace for use in watering plants on the landscaped grounds.

Award-winning

Since its inauguration, the non-profit organization GUEPE (United Group of Naturalist Educators and Environmental Professionals) has been mandated to manage activities at the park.

The three-year project provides a valid example of a small-scale net-zero building open to public access and used to demonstrate and educate citizens about energy-saving technologies and possibilities and demonstrate the feasibility of constructing this type of building.

A display screen located on the main floor, tied to the mechanical control system, enables visitors to follow the building’s energy consumption and production.

“It’s been a very popular site, and it’s surprising to see how many people stop there,” says Stantec’s Jean, who has participated in educational conferences for the public at the building. “Every time I’ve been there it has been packed with people, and they are very interested in the building.”

In addition to its popularity, the building has also been the recipient of the INOVA Prize awarded by the Institute of Urban Development Institute of Quebec in 2017, and last year it claimed the Visionary Award, the top prize, at the Quebec Association of Consulting Engineering firms (AFG) Grand Prix event.

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Parcours Gouin reception pavilion, Montreal

Owner:	City of Montreal
Architect:	BBBL Architectes
Mechanical/electrical/structural/civil:	Stantec
Contractor:	Anjalec construction
Landscape architect:	Groupe Rousseau Lefebvre

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- High discharge air temperature (DAT > RAT).
- Outdoor air volume incorrect.
- Cannot maintain discharge air temperature setpoint (100% CCV).
- 100% cooling coil valve (cannot control increased load).

Outdoor air volume incorrect. ✕

SELECT ALL

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- Verify that the mixed air temperature sensor input is in Auto.
- Check the return air temperature sensor.
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SIGHT SEEING

New study conducted at downtown Toronto office tower reveals wellness benefits of natural daylight and outdoor views.

One University in Toronto, owned and managed by Oxford Properties.

Can an access to daylight and clear sight lines from your workspace in an office tower improve your health and boost company morale? According to the results of a new study, commissioned by View, manufacturers of electrochromic windows, the answer is yes.

The California-based company that makes smart windows has released the results of a study conducted at an Oxford Properties' office tower located at 1 University Avenue in downtown Toronto.

A group of employees at Canada Lands Company, a federal Crown corporation, were surveyed regarding their work-related health and performance before and after the team moved offices within the same building.

The research findings were based on multiple in-person interviews and environmental observations of 17 subjects in the 36-person Canada Lands office. The results were reviewed and analyzed by professors Vivian Loftness of Carnegie Mellon and Joon-Ho Choi from the Univer-

sity of Southern California.

Canada Lands has been a tenant in the building for over a decade, and the only significant changes over the course of the study, which spanned seven months (March through August, 2018) was the group moved from the 12th floor to the 17th floor, and in the new space, instead of regular coated low-e glass with blinds, the windows were replaced with dynamic glass and no blinds.

With integrated intelligence, the electrochromic glass is set to tint when the sun's glare is strongest and remain clear at other times.

"What the researchers found is, prior to the move, if the glare was a problem early in the morning on the east side of the building, the occupants would pull the shades down or tilt the horizontal blinds ... and then they wouldn't open them in the afternoon or the evening,

So for most days of the year the blinds remain 50% to 100% closed," notes Brandon Tinianov, vice president of industry strategy at View and chair of the U.S. Green Building Council's advisory council.

"When you switch to dynamic glass, you manage the glare away in the mornings, and you open up that viewscape and give everyone back that view."

"There's a lot of data that shows that manual blinds are set in position and don't move about 94% of the time—manual blinds become fixed blinds in most situations," says Tinianov.

Exposing clear glass welcomes ambient light into a workspace, providing a richer daylight environment, and according to the study, the group at Canada Lands reported significant improvements in their mood and employee engagement, while also reporting reduc-

CANADA LANDS STUDY GROUP RESULTS:

78%

reduction in eye strain

80%

reduction in headaches

91%

less drowsiness

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**Savings
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Affordable
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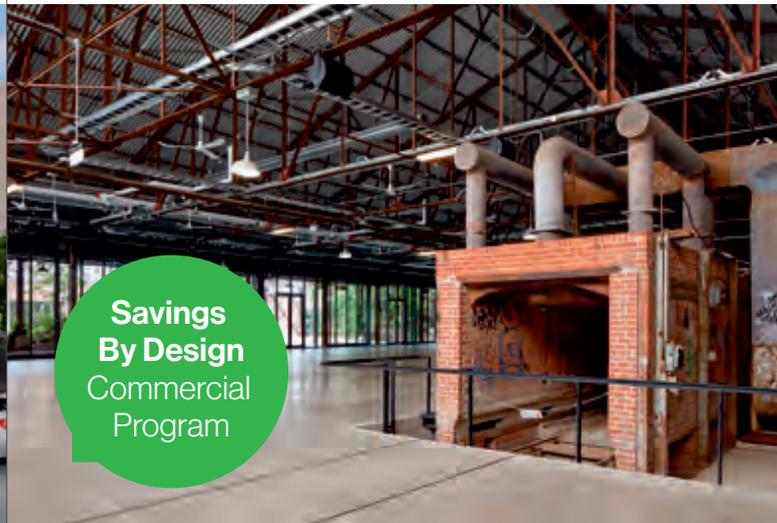
By participating in the **Enbridge Savings by Design** Workshop, we were able to discuss real costs of choices, both for construction and long-term operating. The overall building massing and layout was set by very complex program and siting restrictions, so the areas in which we benefited greatly were in rethinking storm water management on site, window type and performance, exterior wall assembly, and healthy materials.

The mechanical engineering part was also indispensable and so instructive; highlighting important and easy changes, discussing more complex upgrades, and understanding the long-term and performance impacts of our systems, both as climate change worsens and as building systems need replacement and upgrades.

The Enbridge charrette provided the perfect opportunity to make clear and informed choices that brought our project to the next level of energy, health and operating performance. It saved construction and operating costs and made for a healthier building.

— Chantal Cornu, LGA Architectural Partners

Evergreen Brick Works, KILN BUILDING AND CENTRE FOR FUTURE CITIES



**Savings
By Design**
Commercial
Program

In 2018, **Evergreen Brick Works** was in the midst of an ambitious effort to transform the historic Kiln Building – and make it carbon neutral by using the right energy at the right time. Early in the process, Enbridge led a **Savings by Design** workshop for the project. On a fast track project, this provided a tremendous opportunity for the integrated design team to reflect on the early trajectory set in the project, and obtain informed perspectives from invited experts on enhancing it.

The workshop also provided a spring board to brainstorm how the Kiln Building project could serve as a catalyst to transform the entire Brick Works campus to be carbon neutral, which has been a longstanding vision of Evergreen.

The Savings by Design workshop struck a great balance between both blue sky and detail level thinking. It was informative, fruitful, and an overall positive experience. We'd highly recommend Enbridge's Savings by Design workshop program for anyone thinking about making more sustainable buildings.

— Drew Adams, Associate, LGA Architectural Partners

Clockwise from right: Mid-day eastern view, clear glass; Open plan office and clear views; New Canada Lands offices with dynamic glass and no blinds.



tions in eyestrain, headaches, and drowsiness.

“Employee experience and wellness is a top priority for us and having the optimal amount of natural light in our new offices is a key enabler,” said John McBain, president and CEO for Canada Lands Company in a release announcing the study results. “As an additional benefit, it’s reduced HVAC demand by 28% and better maintained the set temperatures.”

Reductions in glare and heat gain lowered interior temperatures by up to 12 degrees F, saving between 21% and 32% of HVAC usage over similar floors in the building during the evaluation period.

“Access to natural light is one of the key drivers of tenant satisfaction, and this study provides encouraging data to support the customer benefits associated with the investment in dynamic glass,” said Eric Plesman, Head of Canada, Oxford Properties, the owner and manager of 1 University.

For Oxford Properties, the research provided data on whether the dynamic glass saves energy for the building, and through the Canada Lands employee feedback they could determine whether their tenants received benefits.

“One of the things we found is people started to recommend the building,” says Titianov.

“They went from a zero percent connection to nature to a 57% connection to nature. And their likelihood to promote the building went up 3-x, and their pride in their company went up 5-x. So those are the things that are much harder to achieve and design into your building than energy savings.”

Another building in the Toronto

area with View’s Dynamic Glass is the recently renovated Humber River Hospital, the first fully digital hospital in North America.

“Everybody is required to have enough light to perform their tasks, but what we’re finding is

that access to views, even more than daylight, changes people’s lives,” says Titianov.

“There’s been ample research on access to views shortening hospital stays, and reducing pain medication by up to 50%,” he adds.

In the hospital application, the glass is tied into the building management system, and View’s intelligent controls automatically tint the glass, but patients also have beside controls allowing them to override the windows to their own comfort settings or personal needs at any time.

For the Canada Lands group, the move to the 17th floor of the building opened up access to more daylight and views, but the group also lost some square footage as the building tapers as it goes up. According to Titianov, some private offices became open plan, and the average workstation size dropped by 26%. “You’d expect them to revolt, you wouldn’t expect overwhelmingly positive results, and you wouldn’t expect them to be five times more likely to say they have pride in their company and three times more likely to recommend that building.”

But in the end the company experienced better space utilization, improved company morale and the building is saving energy.

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SMART GLASS

Some factors to consider when evaluating electrochromic smart glass technologies:

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Look for the ASTM e2141 standard.

TINT COLOUR

Each electrochromic manufacturer has a unique aesthetic to consider.

TINT SPEED

Will determine how often the glass can stay in fully clear state and respond to unpredictable conditions.

FLEXIBLE IGU COMPOSITION

Can the glass accommodate different insulated glass unit (IGU) energy performance goals.

CONTROL SYSTEM

Consider the wiring topology and the number of network connections required.

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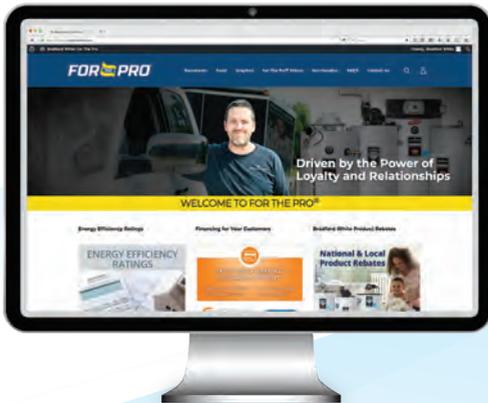
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Left: The River Parkway Interim Energy Centre. Below: An Oval Village Energy Transfer Station.



DISTRICT ENERGY SOLUTION

Delivering sustainable and resilient heating and hot water to an evolving community in B.C.

By FVB Energy

Located on the bank of the Fraser River, Richmond Oval Village is an emerging community in Richmond, B.C. anchored by the Richmond Olympic Oval, an indoor multi-sports arena originally built for the 2010 Winter Olympics. The landmark site represents the area's ideals of an active, sustainable, lifestyle.

In-line with the community's sustainability and resilience objectives, the plan to develop a centralized district energy system within the local infrastructure was incorporated early in its planned development. FVB Energy Inc. was first contracted by the City of Richmond in 2008 to complete various feasibility studies when Oval Village was in its pre-planning phases.

The firm then designed and provided construction support services for the first district energy node and energy centre and has continued to provide design and construction services for subsequent expansions.

Moving Forward

In 2013 the City of Richmond created the Lulu Island Energy Company (LIEC) to implement and manage its district energy projects. In 2014, LIEC entered into a 30-year Concession agreement with Corix Utilities to design, construct, finance, operate, and maintain energy infrastructure in the Oval Village District Energy Utility (OVDEU) service area.

In 2014, FVB Energy updated the

concept for the project and assisted Corix with completing their pro-forma by preparing AACE Class 4 cost estimates for several options for the energy centre, energy transfer stations, distribution piping system, and operation and maintenance costs.

The deadline imposed by the first buildings to connect to the OVDEU left little margin for error in scheduling, design, construction, or budgeting. FVB was able to design and support construction for two separate interim plants (one containerized—the 8.0 MWt River Parkway Interim Energy Centre—and a 3.0 MWt plant in a pre-engineered building), 200 trench metres of distribution piping, and two energy transfer stations in only six months.

FVB worked closely with Corix and LIEC to integrate the design and construction of the system with the new local condo towers and phase 1 of a mid-rise residential building complex. Construction of the first phase was completed on time and on budget.

The firm has performed compatibility reviews on all buildings that reach the building permit stage in the service territory, and it has also performed the design and construction support for eight energy transfer stations and over 1,300 trench metres of

pipings (2,600m of piping).

At the full build-out OVDEU will service 6.4 million sq. ft. of mostly residential space with a 21-megawatt peak load.

Environmental Benefits

The driving forces behind the establishment of the OVDEU is to reduce greenhouse gas (GHG) emissions, and to date it's reducing emissions by an estimated 400 tons/year—equivalent to removing 85 cars off the road.

Once enough buildings are connected to the system, the next phase will be the construction of a major energy plant that will extract heat from the Gilbert Trunk sanitary force main sewer, further reducing GHG emissions by an estimated 80% or 9,000 tonnes of CO2 equivalent per year. The current natural gas boilers will remain for peak loads and backup.

By harvesting renewable energy through district energy systems, LIEC is supporting the City of Richmond's goal to lower GHG emissions and meet its community GHG targets of 33% below 2007 levels by 2020 and 80% by 2050.

Furthermore, the district energy system takes advantage of integrated mixed-use developments by energy-sharing opportunities between neighbouring facilities. The energy demand varies seasonally and from one type of a building to another (residential, commercial, industrial), and LIEC manages these changes and balances the supply among customers.

In addition, the system offers fuel flexibility. The OVDEU is adaptable to sustainable energy sources such as ground source heat, river water heat, sewer heat, solar and renewable energy technologies as they are developed.

And having a district energy system directly connected to buildings increases the resiliency of the neighbourhood, as the distribution piping is buried it is safe from most extreme weather events.

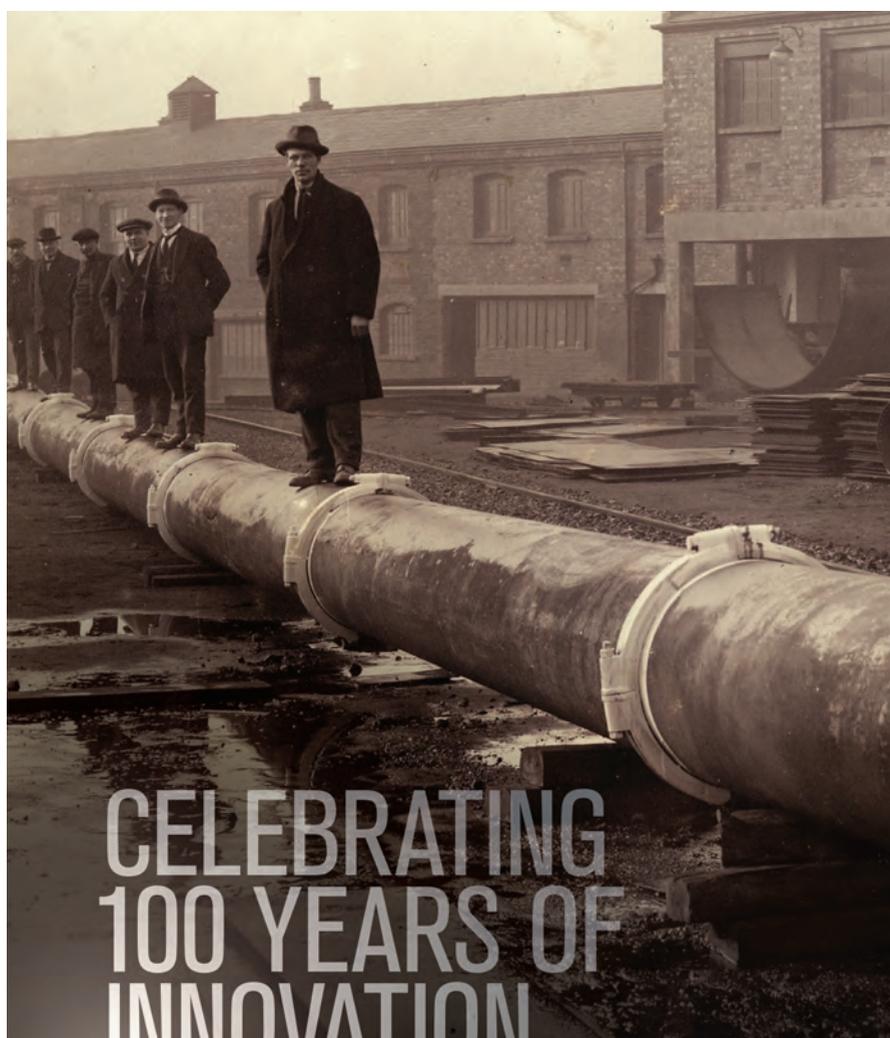
Community benefits

The OVDEU is owned by LIEC, creating revenue opportunities for the City of Richmond that will be reinvested back into the community.

The system is fully funded from service fee revenue and has no impact on Richmond taxes. District Energy rates are set to be equal to or less than

the same level of service from conventional system energy costs.

The district energy infrastructure and energy plants provide tangible examples of local climate action that inspire community members to participate in preserving the environment, while enhancing the community's energy resilience. **CCE**



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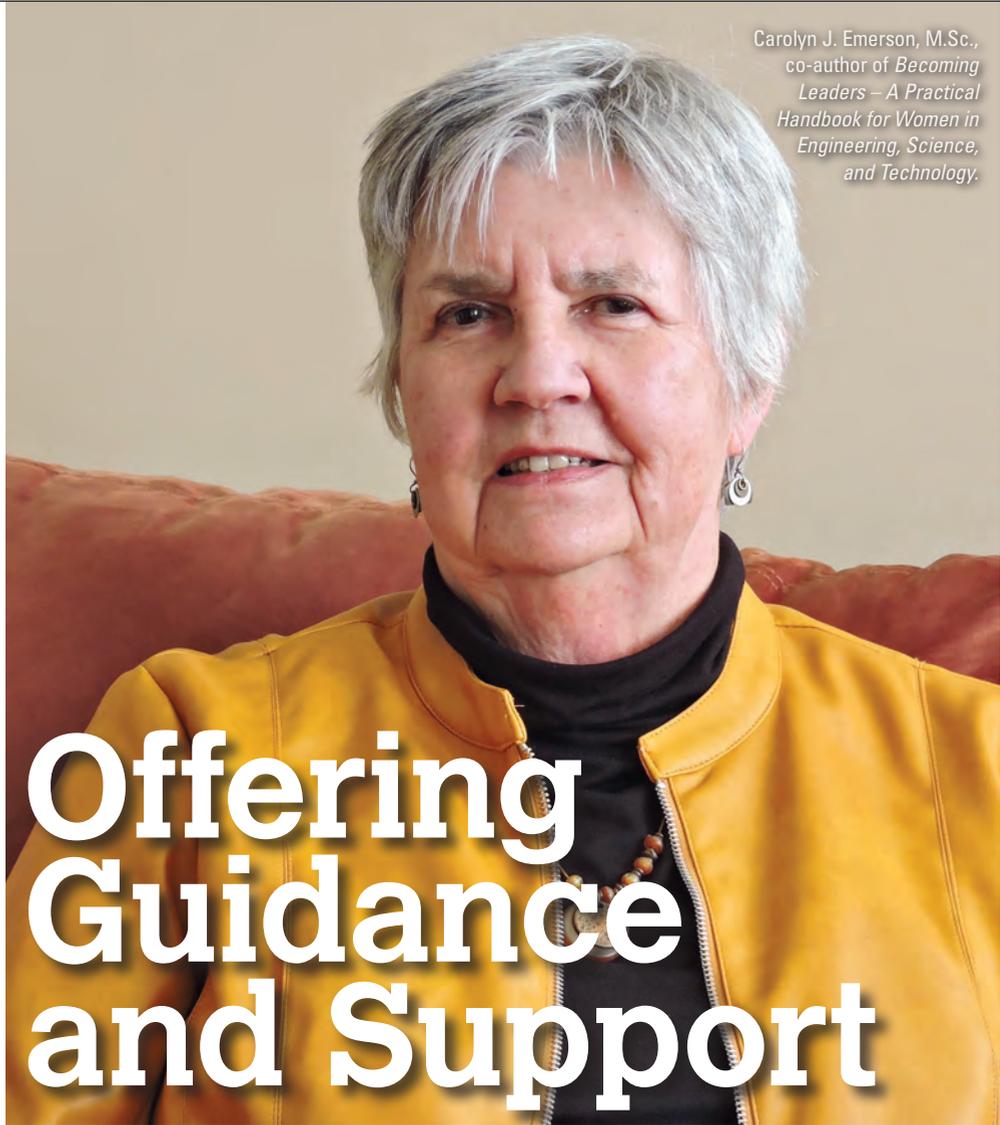
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Throughout 2019 *Canadian Consulting Engineer* explores the topic of diversity in the industry through a series of articles called Point of View; stories designed to get readers thinking about their profession, their day-to-day workplace and maybe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

Carolyn J. Emerson, M.Sc.,
co-author of *Becoming Leaders – A Practical Handbook for Women in Engineering, Science, and Technology.*



Offering Guidance and Support

Carolyn Emerson, a resident of St. John's, Nfld., enjoyed a 27 year career in university scientific research prior to working professionally on diversity initiatives in Canada and the United States, including with the Canadian Centre for Women in Science, Engineering, Trades and Technology (WinSETT Centre). She has also held leadership positions in community science and engineering promotion organizations. Emerson is the recipient of several awards for excellence, leadership, and public service including Honorary Membership in the Professional Engineers and Geoscientists of Newfoundland and Labrador (PEGNL). The second edition of the successful book she co-authored with F. Mary Williams, *Becoming Leaders – A Practical Handbook for Women in Engineering, Science, and Technology*, was published earlier this year

since publishing the first edition of *Becoming Leaders* in 2002?

Yes — many more organizations are recognizing the benefits of a diverse workforce, including on their leadership teams, to enable everyone to provide the best solutions and services. Companies are implementing actions (with accountability) to create respectful and inclusive workplaces.

***Becoming Leaders* has been successful in the U.S. and Canada. Are the experiences for women the same on both sides of the border?**

Overall the experiences of women in engineering and geoscience are very similar in both countries. Certainly our economies are strongly linked and companies work across borders. That said, in a general sense there are differences in our history and cultures — Canada is seen as a pluralistic society and the U.S. more of an individualistic one. As women assume more leadership roles, it will be interesting to

We appreciate the Walters Group for its support of the *Point of View* series of articles.



Have you seen changes in the corporate cultures of professional engineering companies

see any differences in how we approach issues and propose solutions.

What areas of the book required the most updating since 2002?

There were obvious updates in the data on women’s status in engineering from post-secondary institutions through workforce participation to leadership roles. More importantly, the research on the factors that affect women’s recruitment, retention and leadership in STEM has advanced a great deal.

For example, there is a greater understanding of how implicit bias affects who gets hired, heard, and promoted. There has been more research as well into the benefits of diversity (the business case) in today’s organizations, and more examples of effective practices that can aid individuals and companies in creating more inclusive and respectful workplaces. As a previous interviewee in this series of articles noted, the importance and evolution of a ‘safety culture’ has become the model for an emerging emphasis on a ‘diversity culture’.

How does an established company culture overcome a societal issue like implicit bias?

It is important to note first that we all hold implicit biases about each other as men and women in engineering, and these biases affect our evaluations about each other in a largely unconscious way.

For companies, the next step after learning about the effects of implicit bias is to review the organization’s current processes. As examples, ensure that hiring, advancement, and promotion criteria are clear, objective, and open. Make sure that selection boards are diverse, and for work-performance evaluations and promotion decisions, ensure that sufficient time and attention are devoted to each individual. The *Handbook* has a chapter focused on Diversity Management and Accountability to provide more information.

After the WinSETT Centre delivered an inclusive workplace workshop to leaders of a large international engineering consulting and services firm in Canada, individual managers reported that they now check the compensation for everyone in their unit, initiate focussed career-related discussions with their female employees, offer increased mentoring and skills development opportunities, and look more broadly throughout their teams to

recommend stretch assignments.

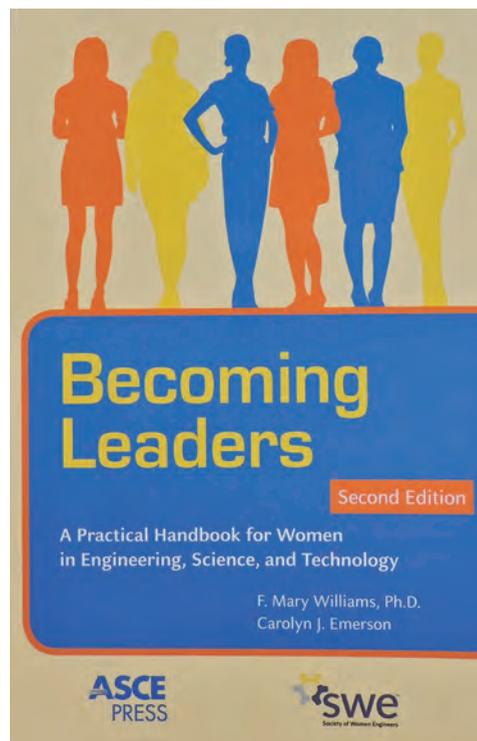
What key words of advice do you have for employers seeking to create a supportive environment for women?

A commitment to true inclusion (not just increasing numbers) needs to come from the senior leadership and be articulated as a business imperative with recognition of the benefits. The obvious aim is that women and men work collegially in an environment that values different experiences, perspectives, priorities, and solutions.

How would you sum up the work/life balance advice you share with female engineers and their employers?

Work/life balance is cited as an ‘issue’ for female engineers, and increasingly for men especially in younger generations. One chapter of the *Handbook* is devoted to this topic and offers the overarching strategies of park the guilt; define your balance (i.e. priorities), and share the load. That same chapter offers suggestions for employers ranging from offering alternative work conditions to family-friendly policies. The key thing is that there is clear support at all levels for such policies to be taken up. Organizations that support work/life balance are rewarded with

There is a greater understanding of how implicit bias affects who gets hired, heard, and promoted.



Becoming Leaders – A Practical Handbook for Women in Engineering, Science, and Technology Second Edition by F. Mary Williams and Carolyn J. Emerson is published by the ASCE Press and Society of Women Engineers. <https://ascelibrary.org/doi/book/10.1061/9780784415238>

We need women's experiences, perspectives, values and solutions at the tables where decisions are made.

employee retention, increased productivity and loyalty.

Do you see newer generations of women reacting differently in the workplace? Are they more bold? Do they still need the *Handbook*?

In my volunteer work with Women in Science and Engineering Newfoundland and Labrador, I am buoyed to be around many young women in university and entering the workplace and to feel their energy, optimism and confidence. It is still the case, however, that many female engineers find that within five to 10 years 'something doesn't feel right', and that they are not progressing as they had imagined. Others succeeded in their engineering undergraduate programs and then used that training and experience to take them in new directions, often where they could more readily see their potential contributions to society. The *Handbook* continues to offer useful advice for women at any stage of their career.

Can you share any significant feedback or stories readers have shared with you?

I continue hear how much value readers have found, whether it's the recognition of 'it's not just me', or the advice on a specific topic. Individuals have related that they felt more confident going into a job or media interview after reviewing those *Handbook* sections. Several readers commented that they sat down to read the first chapter and ended up going through the whole book. Others have bought copies for younger women they are mentoring. And we had a great chuckle when the teenaged daughter of a senior government official commented after reading the chapter written for the families of women in STEM — So true! You're writing about my Mom...Have you been following her?

Engineers Canada has its 30 by 30 initiative, seeking to have 30% of new registered engineers being women by 2030. How do you think that initiative will help women in engineering?

I think it is great to have an ambitious and potentially achievable goal with defined actions. I am happy to see that the associations across the country have signed on and I look forward to seeing the numbers increase more substantially. Thirty percent is a critical mass through which women are no longer seen as

an anomaly. Not only will women more readily find role models, mentors and sponsors, but the culture of the workplace and profession will change in ways to support women to succeed and lead.

Why is it important to have women leaders in engineering firms?

As the *Handbook* emphasizes, women benefit, organizations benefit, and society benefits from women's leadership. Engineering offers challenging and exciting careers from which women can benefit as they progress into leadership roles. Leadership by women in their own style affects other women, particularly younger women, who see there is a place for their talent too.

Organizations need women's leadership. With it, they become better places for women to work, succeed, and contribute. This diversity enhances the organization for both women and men. Organizations with greater numbers of women on their boards have also been shown to have greater financial returns, greater risk oversight and control, increased presence of codes of conduct and conflict of interest guidelines, and improved governance and stakeholder relations.

Finally, so many of the issues facing our society have a science and technology basis — from mitigating the effects of climate change, sustainable development of our natural resources to the efficient delivery of health care. We need women's experiences, perspectives, values and solutions at the tables where decisions are made.

The book has been a success, how does that make you feel, and what are you most proud of?

I do feel great pride in the success of *Becoming Leaders*. I had the great fortune to work with Dr. Mary Williams the senior author of the *Handbook* and the first Atlantic NSERC Chair for Women in Science and Engineering. The *Handbook* resonated so strongly because it was grounded in the lived experience of women engineers and scientists. *Becoming Leaders* has also inspired a series of workshops that the WinSETT Centre delivers across Canada and now in the U.S. Mary passed away in late 2015 and I am very pleased that this new edition maintains her 'voice' and vision and that her legacy continues to inspire women and organizations across Canada.

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The REHAU BIM library is now available on UNIFI allowing engineering firms to design with REHAU PEX plumbing and radiant heating/cooling content directly in Autodesk Revit models. Among the components in the REHAU BIM library are the RAUPEX crosslinked polyethylene (PEXa) pipe, EVERLOC+ polymer and lead-free brass compression-sleeve fittings and radiant distribution manifolds offered throughout the U.S. and Canada.

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Specifier's Literature Review



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Destined to Engineer

Adding to a long list of recognitions and awards, Catherine Karakatsanis, P.Eng., the chief operating officer at Morrison Hershfield, is year's recipient of the Gold Medal from Engineers Canada, acknowledging her lifetime of industry achievements.

Karakatsanis joined MH after graduating as a structural engineer and rose to the level of COO in 2012—overseeing the firm's operations across Canada, the U.S. and internationally. In addition, her volunteer service to the industry has been inspirational.

We contacted Catherine prior to the Engineers Canada Awards ceremony, being held May 23rd in Quebec City.

What led you into an engineering career?

I believe I was destined to be an engineer when I was placed in a special math program to study algebra in grade one—it was a foreshadowing of my future choice for a profession. I continued to love and excel in math growing up, and because some of my cousins were engineers, I was aware of the profession at a young age and early on appreciated what an important role engineering has in making our world a better place.

How has your role evolved over the years?

My role in the firm has certainly evolved, and not one I mapped out for myself. I thought I would spend my entire career doing structural engineering. Then the early nineties major recession set in, and I am grateful to Morrison Hershfield for the opportunities they presented that kept me employed. I had to branch out, and so I have worked in almost every area of our company. I was rewarded by becoming the first female partner since our firm was founded in 1946, the first female executive and board member, and now as COO I am responsible for

providing business leadership and overseeing 900 professionals.

Your volunteerism has included leading the OSPE, PEO and Engineers Canada—what has been the greatest benefit to you?

I cannot pick out one great benefit. I do think that my volunteer work has helped me professionally, in that it gave me the opportunity to learn from many diverse, talented people. It has also given me many opportunities for leadership roles—even before I was ready for them. I have learned more from my volunteer work than I could have ever imagined.

The Engineers Canada Gold Medal is a national recognition of achievements. What are your most compelling accomplishments?

I never thought of it when I started, but looking back and having talked to so many other female engineers over the years, the fact that as a woman I have been able to succeed is surprising to me and a highlight.

I started my career by working and doing my graduate studies at Western University's Boundary Layer Wind Tunnel Laboratory—a world-renowned facility—so I started out very inspired. Then I came to work for an equally inspiring firm, Morrison Hershfield. I am proud of the company that I have helped build, from less than a 100-person firm when I started to over 1,200 people now, all the while maintaining our collegiality, professionalism and reputation for technical excellence.

It has also been a highlight and a huge privilege to serve my profession by being elected to lead OSPE, PEO and Engineers Canada.

What is your message to female engineers seeking to take on leadership roles?

The future for women in engineering



is very exciting. Today we are looking at a different paradigm of leadership, and it plays naturally to the strengths of women. At the same time, I think it is very important for women to be selective in choosing the company and the people they work with so that they are supported, respected and appreciated.

Can gender imbalance in the engineering industry be solved?

Respected studies have shown that it is the culture of the workplace that drives women out of a company and the field altogether—in fact 50% of them. The best way to change these cultural challenges is to firstly acknowledge that they exist—talk about them, openly, candidly. It is only by talking about these issues that firms can begin to do the necessary things to address them and help eliminate bias and improve corporate culture. The low attraction and retention of women in engineering is a complex problem, but I know we can do this—after all, we're engineers, and solving complex problems is what we do.

If not an engineer, what do you think you would you have become?

If not an engineer I think I may have been a scientific researcher or in medicine. I do like research and science.

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PROJECT SUBMISSIONS

Do you have a project using sheet steel that you would like to see in *Steel Design*? The editor welcomes submissions of completed buildings – commercial, institutional, industrial, recreational and residential – using components made from steel, including cladding, steel decking, light steel framing, steel roofing, steel doors, steel ceiling systems and steel building systems. Please send a description of the project, including photographs, to:

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COVER PHOTO: Grand Quai – Port of Montreal, Montréal, Québec
PHOTOGRAPHER: David Boyer



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thus providing a very favourable impression to arriving cruise passengers. The pier is now named Grand Quai du Port de Montréal.

6 Fox Lake Cree Nation School, Gillam, Manitoba

The building massing utilizes stepped, sloping roofs which avoid valleys and the possibility of water or snow coming down on entry points. The high gymnasium volumes act as a backdrop to the rest of the building and the curved roof edges soften the school's rooflines and add a dynamic sense of movement.



10 Menlo-Atherton Performing Arts Center, Atherton, California

With a mission to bring music and drama to the surrounding community, this performing arts building, located on the campus of an arts-oriented high school, features broad, overhanging eaves designed to complement existing low-slung classroom buildings. A simple standing seam roof, draped over an assemblage of functional elements provides a single reading of these complex functions while diminishing the mass of a 21.3m (70 ft.) tall fly tower.



14 Certification of Canadian Manufacturers of Lightweight Steel Framing (LSF)

As of January 1, 2019, certification is a requirement for membership as a CSSBI Light Steel Framing (LSF) Manufacturer Member. It is also a requirement for a company to use the LSF load tables currently being developed. The CSSBI believes that this initiative will be an advantage for the Canadian construction industry.



18 Green Storage, Hamilton, Ontario

Significant challenges were experienced in turning a structure that was built 100 years ago into a state of the art energy efficient building that will be NET ZERO on electricity and heating/cooling.

IN | THIS | ISSUE

3 Grand Quai du Port de Montréal, Québec
Provencher Roy restored the old Alexandra Pier and transformed it into an exceptional river walk, which was integrated into the existing pedestrian network built up over the past few decades along the side of the Saint Lawrence River. The Iberville Passenger Terminal, built in 1967 on the pier, was also completely renovated with modern facilities,



9 Wolfville, Nova Scotia Library

In 2017 it was determined that the original shingles on the railroad station, now the Wolfville Library, had reached the end of their service life. FMB Architecture | Design, the architect chosen for the re-roofing, elected to use a diamond shape roof tile made from ArcelorMittal Dofasco's pre-painted AZM150 Galvalume® steel in the Granite® Deep Mat paint system.



16 Design Versatility, Ease of Installation and Resilience

Steel is used in everything from industrial to iconic structures and is particularly suited to mid-rise construction, where turnkey framing solutions for virtually any type of residential or commercial building project are available.



Pre-painted Galvanized Steel Insulated Steel Panels complement revitalized Terminal 1

Ideally located on the St. Lawrence River, Montreal's Old Port is renowned for its walking and cycling network, along with free public spaces with spectacular views of the river and of the city skyline. This project, completed in 2018, the Port of Montreal's Grand Quai, adds to this network and showcases an insulated steel panel exterior envelope solution on the buildings.



At the entrance to the Grand Quai is the Port Centre, with a conference room and a permanent History of Ships exhibition.

In 1967 the Iberville Passenger Terminal, or Terminal 1, was constructed on a 305m x 91m (1,000 ft. x 298.5 ft.) pier for receiving cruise ship passengers. Parallel to it was a parking structure, or Terminal 2. They extend nearly the entire length of the pier.

A project to renovate the entire cruise ship terminal was launched in 2014. The parking structure, which covers 7,500m² (80,730 sq. ft.), was renovated. The contractor first removed the second story of Terminal 1, then demolished



a building at the entrance to the pier and sloped the far end of the pier so that both pedestrians and cyclists could easily descend to the water's edge.

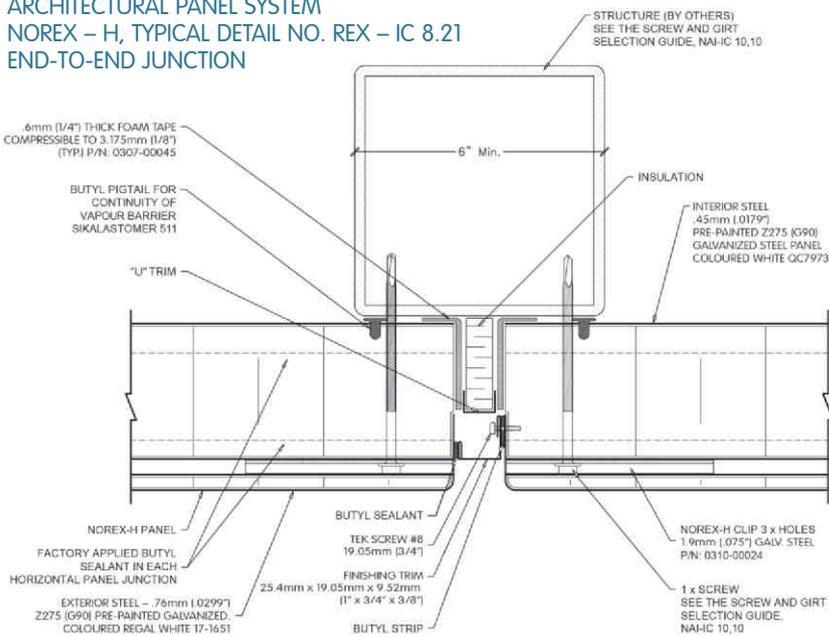
A Port Centre was built on the site of the demolished building and is connected to Terminal 1. Terminal 1 was rebuilt on one level and a Pavilion was built onto the far end of the structure. Provencher_Roy specified Norex-H, 76.2mm (3") thick, insulated steel panels, manufactured and supplied by Norbec, for the exterior of the 8,150m² (86,708 sq. ft.), Terminal 1, Port Centre and Pavilion.

Each panel measures 760mm by 4,825mm (30 in. x 15.8 ft.). The exterior is pre-painted .76mm (.0299") Z275 (G90)

galvanized steel, with a fluoropolymer paint system, coloured Regal White 17-1651. The interior surface is .45mm (.0179") Z275 (G90) galvanized steel, pre-painted with Interior White QC7973. A total of 2,350m² (25,295 sq. ft.) of Norex-H was used.

"The building is very long. This kind of product works well to cover long surfaces without windows and doors. It has a geometry that works well in the context of a maritime station," says Sonia Gagné, Partner and architect with Provencher_Roy. "It is economical, rapid to install and the panels marry well with a simple building volume. The horizontal modules emphasize the linearity of the building."

**ARCHITECTURAL PANEL SYSTEM
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PRODUCT USED:

Norbec's Norex-H, pre-painted Z275 (G90) galvanized steel panels. Panel thickness: 76.2mm (3")

INTERIOR STEEL	EXTERIOR STEEL:
• .45mm (.0179")	• .76mm (.0299")
• Colour: White QC7973	• Colour: 17-1651 Regal White
• Profile: Silkline (striated)	• Profile: Silkline (striated)
• Finish: Smooth	• Finish: Smooth

DESIGN AND CONSTRUCTION TEAM

- BUILDING OWNER: Port de Montréal
- ARCHITECT: Provencher_Roy 514-844-3938
- INTERIOR DESIGN: Provencher_Roy | Design intérieur 514-844-3938
- CONTRACTOR: Pomerleau 514-789-2728
- STEEL WALL PANEL SUPPLIER: Norbec Inc. 877-667-2321
- STEEL WALL PANEL INSTALLERS: Le Groupe EFC. 418-878-5660 and RHR Revêtement 450-359-4192
- STRUCTURAL STEEL SUPPLIER: Groupe C. & G. Beaulieu Inc. 450-653-9581
- ELECTROMECHANICAL: Pageau Morel et associés 514-382-5150
- LANDSCAPING: NIP Paysage 514-272-6626
- STRUCTURAL ENGINEERING: NCK Inc. 514-878-3021
- MARITIME INFRASTRUCTURE: WSP Group 514-340-0046
- CIVIL ENGINEERING: WSP Group 514-340-0046
- PHOTOGRAPHER: David Boyer 450-822-9545





Norex, is a polyurethane core panel which offers unparalleled thermal value. It provides fire and rain protection barriers as well as ensuring resistance against wind and tears because of its exclusive anchoring system, when installed. The design of this product is cavity free and has a thermal barrier, reducing the risk of condensation penetration and in return moisture.

Norex H insulated steel panels being installed on the light steel framing of Terminal 1 and on the Pavilion of Grand Quai.

Redesigned and renovated, the Port of Montréal's Grand Quai receives cruise ships and welcomes local pedestrians and cyclists to a waterside park in this beautiful, historic area.



Pre-painted Galvanized Steel – perfect for Wall and Roof Cladding

Number Ten Architectural Group has a long history of working in remote areas of northern Canada. In particular, the Winnipeg-based firm's academic buildings have enriched the educational and recreational quality of life for indigenous communities. Pre-painted Z275 (G90) galvanized steel was chosen for the wall and roof cladding for its durable and non-combustible properties.

The Fox Lake Cree Nation School is located in the town of Gillam, a semi-rural community in Northern Manitoba. The 1,349m² (14,520 sq. ft.) elementary school accommodates a student population of 65 (town population 1,300), as well as a high school re-entry program and adult education. The school's modest scale and low-slung roofs create an intimate setting for students, staff and visitors alike.

The mandate called for a flexible design that would allow for community use of the facility during both school and non-school hours for continuing education programs, recreation and social events. The building's compact plan utilizes a "corridor loop"

around a central core and two sets of lockable, interconnecting doors. Designed as a 'house within a house', the central core comprises washrooms, Principal's office and Administration spaces. Clear sightlines across gathering spaces and through interior windows promotes interaction between students and staff, while fostering a sense of security. The centrally-designed layout and flexible programming allows visitors access to the Library, Computer Room and Gymnasium, while leaving the classrooms undisturbed.

While the interior features warm colours and natural materials, the exterior also features a simple palette.





The high gymnasium volumes act as a backdrop to the rest of the building and the curved roof edges soften the school's rooflines and add a dynamic sense of movement.

Pre-painted steel was selected for the wall cladding and roof for its durable and non-combustible properties, particularly in an area where forest fires are a concern.

Additional benefits include its lightness, range of colour options and ease of transport and installation – especially valuable given the location 1,000km (621 miles) north of Winnipeg and 200km (124 miles) south of Churchill.

Gillam's subarctic climate, with average January lows of -30°C, presented unique challenges, which the architects mitigated through the building's orientation and massing. Windows are located to maximize natural light: diffuse,

northern light in classrooms and warm, direct sunlight in the kindergarten spaces. Entrances are shielded from harsh winds. The tall Gymnasium volume provides protection to the playground from the winter wind. To improve the building systems' serviceability, the mechanical equipment is installed on a mezzanine – a controlled environment rather than the traditionally used roof or grade-level pad configurations. This improves site safety conditions, simplifies routine maintenance procedures (reducing the significant costs of transporting parts and technicians), and allows for a clean, clear roofline.

The standing seam steel roof system was specifically

The building massing utilizes stepped, sloping roofs that avoid valleys and the possibility of water or snow coming down on entry points. Pre-painted steel was selected for the wall cladding as well as the roof for its durable and non-combustible properties.

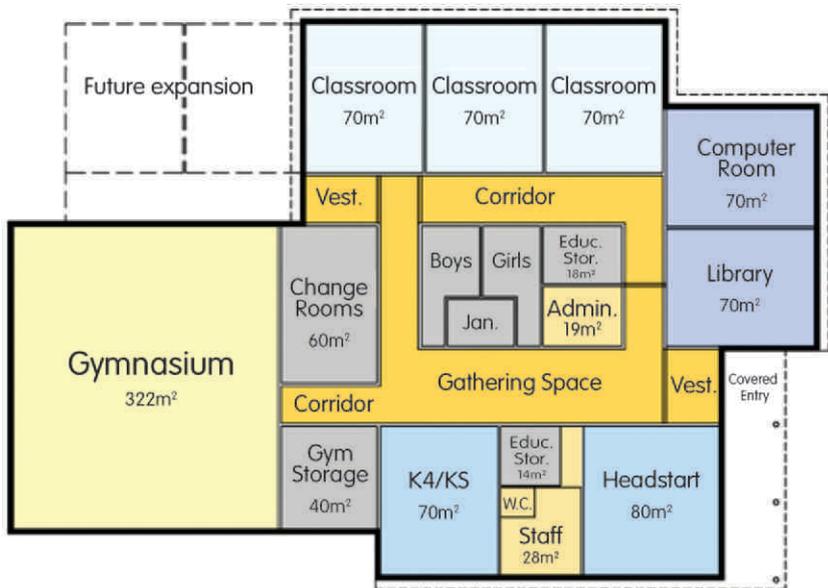
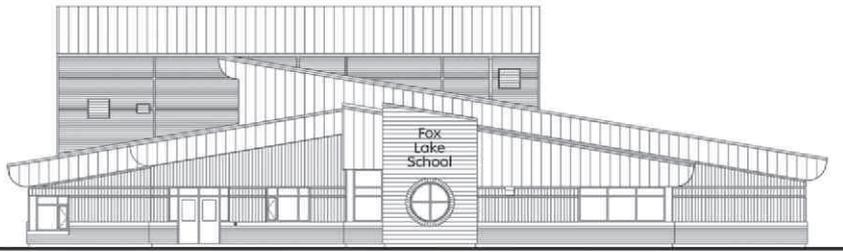
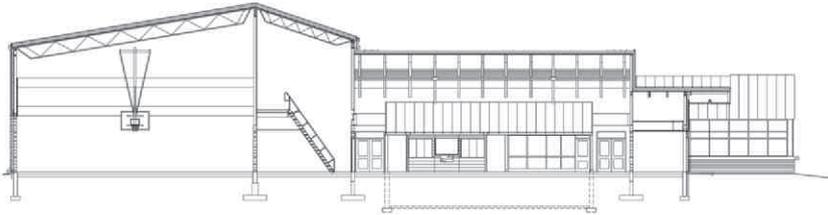


designed to avoid roof valleys that are susceptible to ice damming and roof leaks. Pre-finished downspouts and steel gutters are utilized at roof edges at entrances and in high traffic areas. The architects designed a 'soft' curved edge profile – mimicking a feather – in contrast to the metal siding.

The architects engaged the community in a competition to

design the stained-glass feature window at the school entry. Like in the building itself, its colours – white, yellow, red and black – were derived from the Nation's four sacred colours and directions. "The Fox Lake school is one of my favourite projects of my career," says Project Architect Greg Hasiuk. He and Number Ten have continued to design and build schools across Saskatchewan and Alberta, further refining model schools that don't feel overly formal and institutional. "Our mission is to get rid of cells and bells."

It was important that the design be flexible in order to allow for community use. The community specifically identified the gymnasium, change rooms, computer room and library as areas that would be extensively utilized by the community both during and after school hours.



DESIGN AND CONSTRUCTION TEAM

OWNER: Fox Lake Cree Nation

PROJECT MANAGER:
P.M. Associates 204-949-5150

ARCHITECT: Number Ten Architectural Group 204-942-0981

STRUCTURAL CONSULTANT:
Crosier Kilgour & Partners Ltd. 204-943-7501

MECHANICAL & ELECTRICAL CONSULTANT:
Cochrane Engineering Inc. 204-477-6650

LANDSCAPE CONSULTANT:
Hilderman Thomas Frank Cram 204-944-9907

GEOTECHNICAL, SURVEY & ENVIRONMENTAL CONSULTANT:
Cochrane Engineering 204-477-6650

CONSTRUCTION MANAGER:
Fox Lake Cree Nation 204-953-2760

GENERAL CONTRACTOR:
T.L. Penner Construction 204-486-556-1400

ROOF & WALL CLADDING MANUFACTURER:
Vicwest 1-800-661-6936

ROOF & WALL CLADDING INSTALLER:
Oakwood Roofing & Sheet Metal Co. 204-0237-836

All material is pre-painted galvanized steel conforming to ASTM A653 Grade 33 and coating to ASTM A924.

ROOF CLADDING: Pre-painted .76mm (.0299") Z275 (G90) stand seam, 38mm (1-1/2") rib. Colour: Cambridge White 56161.

WALL CLADDING: Pre-painted .76mm (.0299") Z275 (G90) 22.2mm (7/8") corrugated. Colours: Slate Blue 56067; Red 56064 & Cambridge White 56161 Fascia.

FASCIA, SOFFITT & TRIM: Pre-painted .76mm (.0299") Z275 (G90) galvanized steel. Colours: Cambridge White 56161 & Tan 56074.

ROOF DECK: Vicwest RD938 – 76mm (.0299") ZF75 Galvaneal (standard and acoustic).

FLOOR DECK: Vicwest HB938 – 76mm (.0299") ZF75 Galvaneal. ZF75 conforms to ASTM A653.

AZM150 Galvalume® Steel Provides Added Protection to this Heritage Trust Structure

Wolfville's Railroad Station is one of Nova Scotia's few remaining brick railway stations. The Station was abandoned in 1990 when Dominion Atlantic Railway ceased passenger service in the Annapolis Valley. However, after months of community fundraising efforts, private donations, and support from the Province and the Town of Wolfville, the station was purchased by the Wolfville Library Foundation.

The station, a two-and-a-half storey brick and stone building, is valued for its historical association to the railway system in the Annapolis Valley and for its renovation in 1993 by Wolfville's citizens. In 1994, the Foundation received the Heritage Trust of Nova Scotia Built Heritage Award for the Station's restoration. The current Wolfville Memorial Library, is one of eleven branches of the Annapolis Valley Regional Library System. In 2017 it was determined that the original shingles on the railroad station, now the Wolfville Library, had reached the end of their service life.

Harvey Freeman, of FMB Architecture I Design, the project architect for the re-roofing, elected to use a diamond shaped roof tile made from ArcelorMittal Dofasco's .38mm (.0149") pre-painted AZM150 Galvalume steel in the Granite Deep Mat paint system, coloured QC60035 Graphite Gray. Granite Deep Mat is a pre-painted Galvalume coated steel that combines excellent formability and corrosion resistance and brings differentiation and originality in roofing and cladding designs for residential and commercial building projects.

According to a community consultation done by the Annapolis Valley Regional Library (AVRL) in late 2017, most agree that a larger library is needed in Wolfville. "The planning is in the early stages," says Ann-Marie Mathieu, chief executive officer of AVRL. "We are looking at all possibilities and how a new library fits in with the aspirations of the Town of Wolfville."

According to the survey results, most people want the library to stay in the current building, but the community has two needs: a traditional library as well as a social gathering space. The current Library space is 269m² (2,900 sq. ft.). The Annapolis Valley Regional Library – Wolfville Library Needs Assessment, 2017, estimated that the design population for the

Wolfville Library to be 13,000, with the total space requirement being 1,382m² (14,880 sq. ft.). A working group of staff and volunteers, with relevant experience, has been composed and is looking at how the library fits with the ongoing review of the town's planning documents.



Original diamond shaped asbestos shingles on the old roof.



South and Northwest elevations of the re-roofed historic Wolfville Railway Station, now the Wolfville Library, showing the new Agway diamond shaped pattern roofing tile made from ArcelorMittal Dofasco's pre-painted .45mm (.0179") AZM150 Galvalume using the Granite Deep Mat paint system coloured QC60036 Graphite Gray, with snow guards.

DESIGN AND CONSTRUCTION TEAM

OWNER: Town of Wolfville, N.S. 902-542-3960

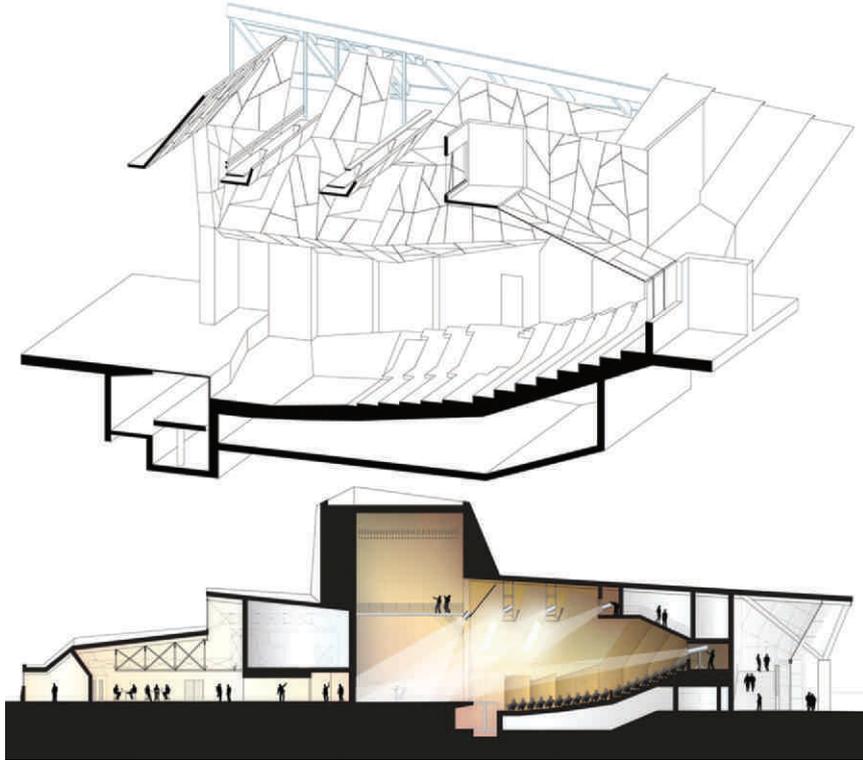
ARCHITECT: FMB Architecture I Design 902-429-4100

STEEL ROOF CLADDING SUPPLIER:
Diamond Steel Roofing Systems 888-810-7663

STEEL ROOFING INSTALLER:
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STEEL ROOF CLADDING MANUFACTURER:
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Innovative design utilizing pre-painted Galvalume Cladding and Hollow Structural Steel framing



This centre is a state-of-the-art, multi-discipline performing arts space designed for community and professional use. Since its opening it has housed dance, theatre and musical performances of all types and skill levels.

It is on the campus of Menlo-Atherton High School, surrounded by the semi-rustic environment of Menlo Park. The project's highly conceptual design was inspired by the surrounding heritage valley and coastal oak groves on campus.

The interior of the centre is dominated by a five-hundred seat auditorium which can be optimized acoustically for either dramatic performances or musical events. It includes a 19.8m (65-foot) high loft, fly gallery, stage house, orchestral lift, practice and academic meeting spaces, a "green" room and a cafeteria/warming kitchen.

With the objective to bring music and drama to its students and the surrounding community, this 2,880m² (31,000 sq. ft.)

"At the heart of Hodgetts + Fung's vivid, tactile architecture is an ability to heighten the way people see and experience space."

Alan Hess



Steel struts surmounting massive concrete columns complement the oaks facing the lobby and support the exposed structure of the roof above the depressed entry courtyard sheltered by a branching structure designed to inspire spontaneous outdoor performances.



performing arts building is located on the campus of Menlo-Atherton High School, an arts-oriented high school. It features broad, over-hanging eaves – designed to complement existing low-slung classroom buildings and monumental structural trees – which echo the entry grove of historic oaks. The building is configured to serve both a formal, regional audience and a more casual group of parents and students. A direct response to the community's revered heritage oak trees established the axial alignment and served as the governing metaphor for the building's structural, volumetric and aesthetic development.

Single, folded roof plane encloses this theater complex for Menlo-Atherton High School.



A simple standing seam roof draped over an assemblage of functional elements provides a single reading of these complex functions while diminishing the mass of the 19.8m (65 ft.) tall fly tower.

Variations in the relationship of the folded planes of the roof to the surrounding landscape provide opportunities for student meeting places and mechanical equipment. To the south, steel struts surmounting massive concrete columns complement the oaks facing the lobby, and support the exposed structure of the roof above the depressed entry courtyard sheltered by a branching structure designed to inspire spontaneous outdoor performances.



Photograph showing hollow structural steel (HSS) used for the light support framing in lobby area.

PROJECT SIZE: 2,900m² (31,209 sq. ft.)

ROOF DECK:

- .91mm (.036") G60 Galvanized ASTM A653 Grade 33.

ROOF CLADDING:

- .61mm (.0239") AZ50 Galvalume (AZM150 in Canada) 22.2mm rib x 457mm (7/8" rib x 18") wide flat panel, standing seam roof, coloured Champagne in the Kynar paint system.

HSS SECTIONS AT PATIO:

- HSS Diagonal Braces: HSS 304.8mm x 304.8mm x 15.87mm (12" x 12" x 5/8") A500 Grade B (Diagonal bracing at patio).
- HSS Pedestal Base: HSS 457mm x 12.7mm (18" x 1/2") A500 Grade B.

HSS SECTIONS – LOBBY:

- HSS Light Support Framing – Roof framing above: 355.6mm x 558.8mm (14" x 22") beams Grade A992.
- HSS hangers from WF beams above: HSS 152.4mm x 101.6mm x 12.7mm (6" x 4" x 1/2") A500 Grade B.
- HSS horizontal members: HSS 152.4mm x 101.6mm x 6.35mm (6" x 4" x 1/4") A500 Grade B.
- HSS skewed light support beams: HSS 152.4mm x 101.6mm x 6.35mm (6" x 4" x 1/4") A500 Grade B.
- Diagonal angle bracing: 50.8mm x 50.8mm x 7.94mm (2" x 2" x 5/16") A36.
- Roof Framing above: W12 and W16 beams Grade A992.

GUARDRAIL FRAME – ALONG MAIN STAIR ASCENDING TO 2nd FLOOR

- Top, intermediate & bottom rails: HSS 101.6mm x 50.8mm x 3.175mm (4" x 2" x 1/8") A500 grade B.
- Stub pieces between rails: HSS 152.4mm x 50.8mm (6" x 2").
- Steel Deck above brace assembly/roof framing: .91mm (.036"). G60 Galv.
- Grab rail: 38.1mm (1-1/2") standard pipe.
- Grab rail brackets: 38.1mm (1-1/2") thick shaped/bent plate A36.
- Pictured above: HSS 304.8mm x 304.8mm x 15.875mm (12" x 12" x 5/8").
- Roof support w/plate assembly (penetrating glass): A500 Grade B 609mm x 1,397mm (24" x 55") and assorted size WF roof beams Grade A992.



SUSTAINABILITY OBJECTIVES

An energy saving H-Vac system, which distinguishes between the rarely occupied auditorium and the heavily used support facilities – scenic shop, rehearsal room, and community space – is programmed to harvest cool or warm air and direct it to the occupied portions of the facility. Operable windows allow for heating and cooling, while occupancy sensors keep lighting needs regulated indoors and out.

An under floor plenum delivers conditioned air directly to seated theater patrons by means of registers under each seat. This technique avoids the waste associated with conventional systems by providing tempered air at the occupied zone.

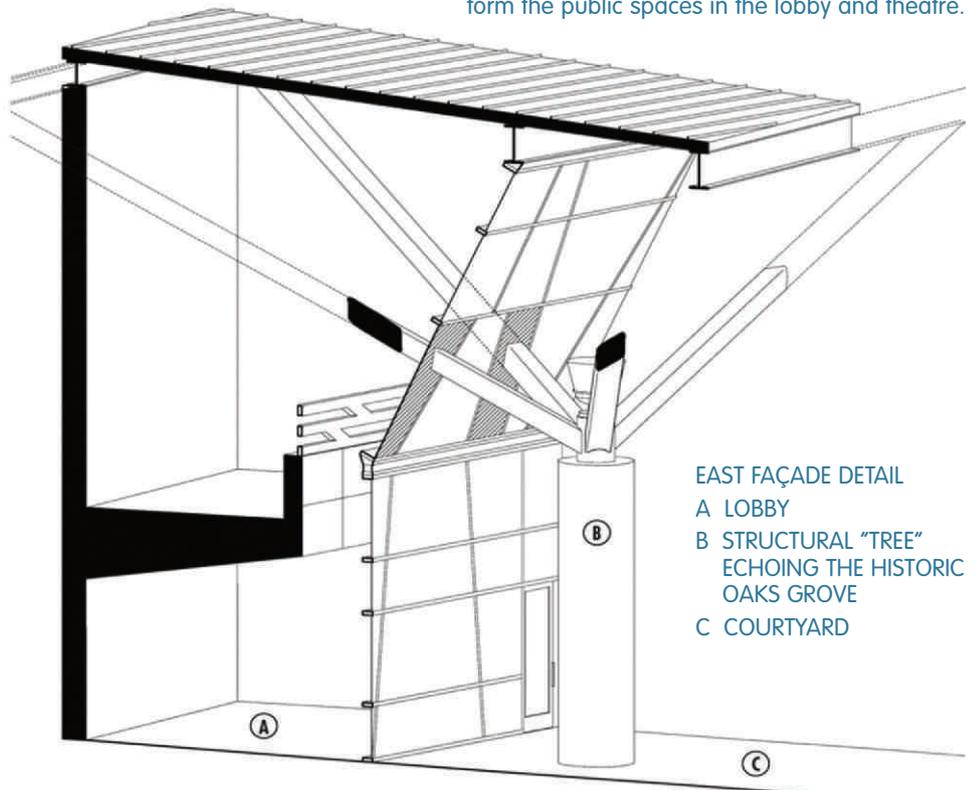
Sustainable, yet visually rich materials such as exposed steel – have been carefully detailed with laser cut precision to form the public spaces in the lobby and theatre.

Main Stair ascending to 2nd floor. See sidebar on page 11.



Broad, overhanging eaves designed to complement the surrounding low-slung classroom buildings and monumental structural “trees” which echo the entry grove of historic oaks.

Exemplified by the structural “trees” sustainable, yet visually rich materials – such as exposed steel, have been carefully detailed with laser cut precision to form the public spaces in the lobby and theatre.



- EAST FAÇADE DETAIL
- A LOBBY
- B STRUCTURAL “TREE” ECHOING THE HISTORIC OAKS GROVE
- C COURTYARD

DESIGN AND CONSTRUCTION TEAM

CLIENT: Sequoia Union School Board

ARCHITECT:
Hodgetts + Fung Design and Architecture 323-937-2150

GENERAL CONTRACTOR:
Blach Construction Co. 408-244-7100

STRUCTURAL ENGINEER:
Englekirk Structural Engineers 323-733-6673 or 714-557-8551

MECHANICAL ENGINEER:
IBE Consulting Engineers Inc. 818-377-8220

CIVIL ENGINEER:
BKF Engineers Surveyors Planners 650-482-6300

ACOUSTICAL: Akustiks 203-299-1904

THEATRE: Fisher Dachs Associates 212-691-3020

LANDSCAPE: Tanaka Design Group 415-863-7800

FABRICATOR/ERECTOR:
Concord Iron Works, Inc. 925-432-0136

STEEL DECK SUPPLIER: Verco Decking Inc. 916-488-8180

STEEL DECK INSTALLER: B.T. Mancini Co. Inc. 408-942-7900

PHOTOGRAPHS:
Courtesy: Hodgetts + Fung Design and Architecture



The interior of the centre is dominated by a five-hundred seat auditorium which can be optimized acoustically for either dramatic performances or musical events.



Certification of Canadian Manufacturers of Lightweight Steel Framing (LSF)

The CSSBI has developed a new standard CSSBI 61-18 *Manufacturer Certification Requirements for Cold Formed Steel Framing Members*. Under the CSSBI certification program, a participating Manufacturer certifies that the designated structural and non-structural cold formed steel (CFS) framing members it produces meet or exceed the applicable ASTM International (ASTM), Canadian Standards Association (CSA) and American Iron and Steel Institute (AISI) requirements.

The product certification is validated by independent 3rd-party testing and inspection. This certification program is designed so that products qualifying for certification meet

the requirements of the National Building Code of Canada.

As of January 1, 2019, certification is a requirement for membership as a CSSBI Light Steel Framing (LSF) Manufacturer Member. It is also a requirement for a company to use the LSF load tables currently being developed. The CSSBI believes that this initiative will be an advantage for the Canadian construction industry.

The CSSBI represents the Canadian manufacturers of sheet steel building products. The list of current members and resource material can be obtained from the web site www.cssbi.ca



A steel building, characterized by the absence of load bearing walls, is intrinsically more versatile and flexible than other types of structures.



Dimensional Stability
+ Fire Resistance
+ Ductility
= Durability

Steel is durable, safe, and strong. It is not susceptible to rot, termites, or mold. Steel structures require less material (both reduced weight and reduced volume) to carry the same loads as concrete or masonry or wood structures.



Design Versatility, Ease of Installation and Resilience

The versatility of steel gives architects and engineers the freedom to achieve their most ambitious visions, and provides contractors with a highly engineered, high-quality building material. Steel is used in everything from industrial to iconic structures, and is particularly suited to mid-rise construction, where turnkey framing solutions for virtually any type of residential or commercial building project are available.

Steel offers consistently high-quality standards, precision products and guaranteed strength and durability in the most challenging environments. Steel is produced to the most exacting specifications under highly controlled conditions, eliminating the risks of on-site variability, which is an inherent disadvantage with other building materials.

- Steel is dimensionally stable and can be manufactured to very tight tolerances, making it easier for engineers to use in building design, unlike softwood products which are susceptible to shrinkage due to varying moisture content and structural design properties that have recently been downgraded by up to 30%¹ due to changes in wood resource mix.

- Steel lends itself well to prefabrication, where the assembly of the individual steel elements takes place offsite under controlled, highly regulated and safe factory conditions where leading-edge technology delivers precision engineered components.



- Steel structures can be erected speedily. The predictability and accuracy of steel components, in addition to just-in-time site delivery, speeds up the process and allows follow on trades to get to work sooner, resulting in quicker building completion and earlier occupancy.



- Steel design benefits include longer spans, larger bays and wider frame spacing than wood or concrete construction. This allows for maximized usable floor space and large interior spaces that can be constantly adapted to cope with changing requirements of occupants.





- Steel framed structures are inherently ductile. Structures are designed to absorb energy produced by earthquake ground movement and wind by "flexing" or "deflecting" in varying degrees, depending upon the construction materials, design of the structure, quality of construction, level of engineering, and the applicable building code requirements.



- With consistent chemical and mechanical properties, steel behaves in a predictable manner when subjected to the structural loads imposed by high wind and seismic events. Bella Concert Hall and Taylor Centre for the Performing Arts.

¹ SFIA fact sheet "Downgrade of Southern Pine Values Increase Cost of Building with Wood". November 2013.



Pre-painted Z275 (G90) galvanized steel, clads environmentally conscious self storage structure

The renovation of this 100-year-old 18,580m² (200,000 sq. ft.) Yarn Mill into an energy efficient storage facility, occurred over several phases. PHASE 1: Demolition started January 5, 2018 and occupancy on the first floor was July 25, 2018.

PHASE 2 begins this summer. Significant challenges were experienced in turning a structure which was built 100 years

ago into a state-of-the-art energy efficient building that would be NET ZERO on electricity and heating/cooling. Consistent with the owners sustainability goals a geothermal energy system was installed that provides heating/cooling and in turn controls the humidity.

This Summer a Net Metering System will be installed that will produce electricity for their own consumption. To help keep the size and cost of these systems feasible, they had to look all the loads that would be created and try to reduce consumption of watts per square foot. Research was conducted to determine

cost effective ways to find the balance of costs between LED lighting, insulation, solar, geothermal, domestic water consumption and controls. The result, is an energy efficient, spacious and attractive facility. Objective achieved.

Green Storage Facilities are located across Ontario – Ajax, Bolton, Aurora, Keswick, Newmarket, Orillia, Toronto and now Hamilton.

DESIGN AND CONSTRUCTION TEAM

OWNER: Green Storage Solutions Inc. 905-424-2947

ARCHITECT & ENGINEER: Adkins + Van Groll 416-489-7888

CLADDING MANUFACTURER: Agway Metals 1- 866-631-3239

CLADDING INSTALLER: Chais Sheet Metal 519-954-0936

PHOTOGRAPHS: Green Storage Staff and Google

Wall cladding utilized for the exterior cladding on the renovated Yarn Mill:

WALL CLADDING:

Agway Metals 7-175 and HF12 siding coloured QC28262 Black

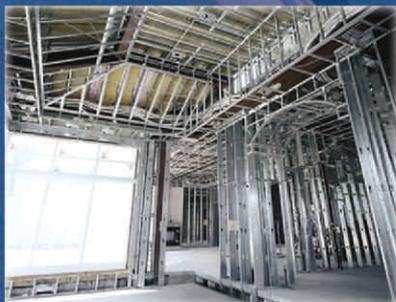
TRIM: Agway QC10581 coloured Storage Green.







ArcelorMittal



Build on Success from top to bottom

Designing and building with ArcelorMittal Dofasco steel makes sense in today's world. Consider the bottom line. Consider the environment. And consider quality.

Steel provides the most desirable and cost-effective combination of strength and design flexibility. ArcelorMittal Dofasco steel has industry leading recycled content and is the only steel recognized by Environment Canada's Environmental Choice Program.

Light steel framing, cladding and roofing. Superior performance from the inside out.

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