ADVANTAGE STEEL

NO. 67 SUMMER 2020

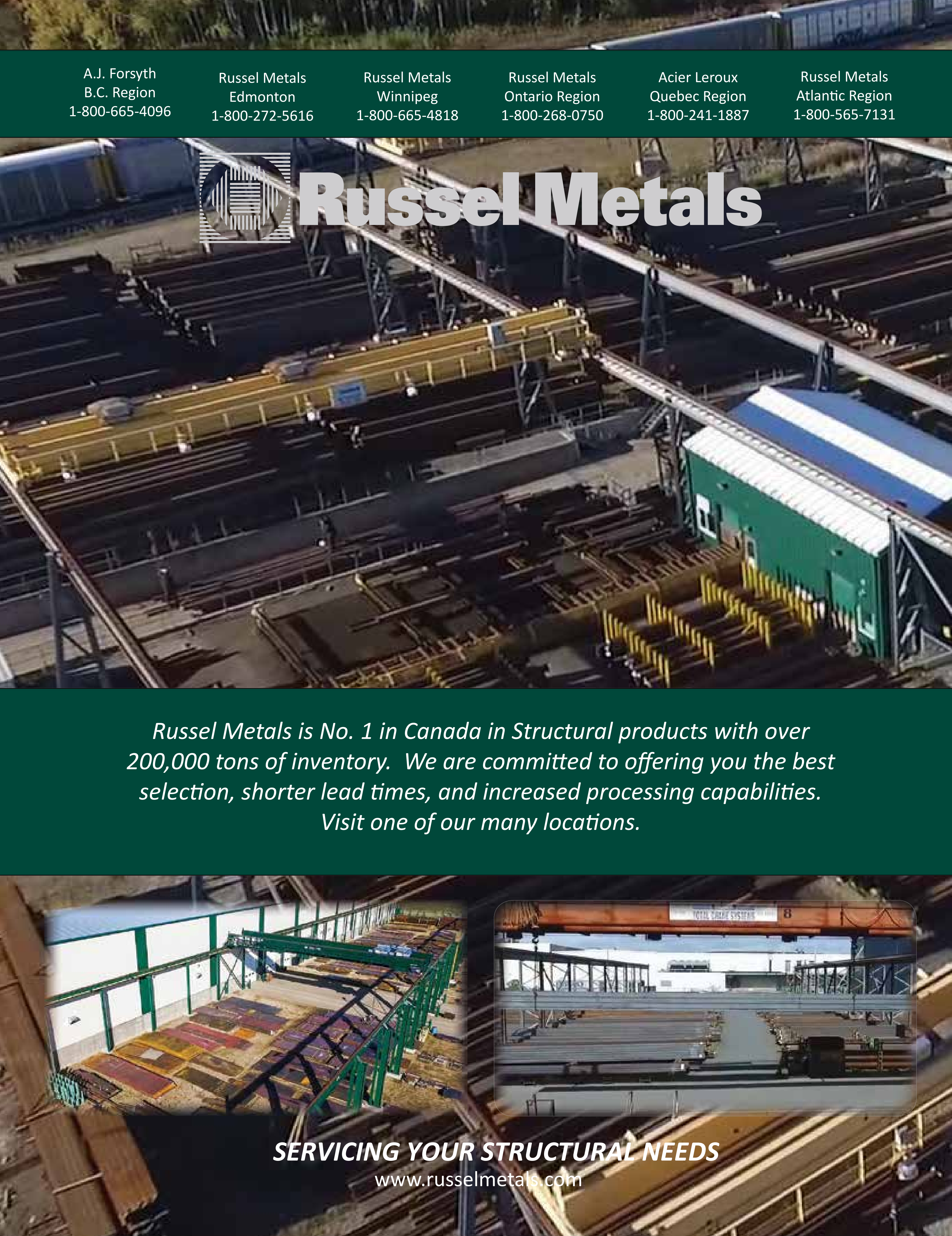
REVOLUTIONIZING STEEL CONSTRUCTION

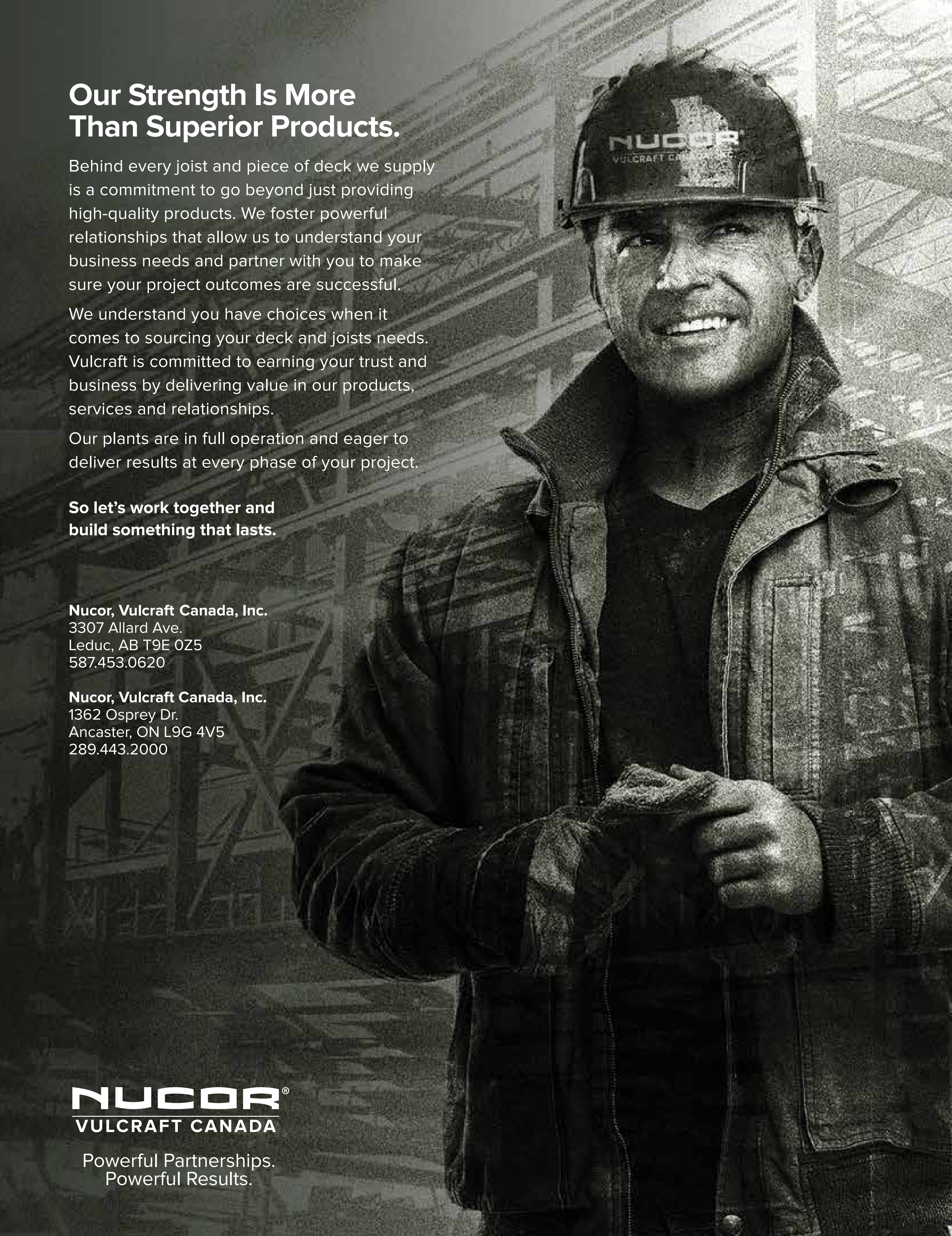
+

CIBC SQUARE
STEEL COLUMN BASES
STEEL BRIDGES
CALGARY COMPOST FACILITY
FORMULA 1

cisc icca
CANADIAN INSTITUTE OF STEEL CONSTRUCTION

PM#40787580


A.J. Forsyth
B.C. Region
1-800-665-4096
Russel Metals
Edmonton
1-800-272-5616
Russel Metals
Winnipeg
1-800-665-4818
Russel Metals
Ontario Region
1-800-268-0750
Acier Leroux
Quebec Region
1-800-241-1887
Russel Metals
Atlantic Region
1-800-565-7131
Russel Metals
Russel Metals is No. 1 in Canada in Structural products with over 200,000 tons of inventory. We are committed to offering you the best selection, shorter lead times, and increased processing capabilities. Visit one of our many locations.
SERVICING YOUR STRUCTURAL NEEDS
www.russelmetals.com


Our Strength Is More Than Superior Products.
Behind every joist and piece of deck we supply is a commitment to go beyond just providing high-quality products. We foster powerful relationships that allow us to understand your business needs and partner with you to make sure your project outcomes are successful.
We understand you have choices when it comes to sourcing your deck and joists needs. Vulcraft is committed to earning your trust and business by delivering value in our products, services and relationships.
Our plants are in full operation and eager to deliver results at every phase of your project.
So let's work together and build something that lasts.
Nucor, Vulcraft Canada, Inc.
3307 Allard Ave.
Leduc, AB T9E 0Z5
587.453.0620
Nucor, Vulcraft Canada, Inc.
1362 Osprey Dr.
Ancaster, ON L9G 4V5
289.443.2000
NUCOR®
VULCRAFT CANADA
Powerful Partnerships.
Powerful Results.
NUCOR
VULCRAFT CA

ADVANTAGE STEEL

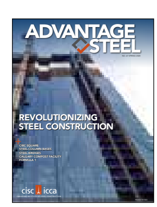
NO. 67 SUMMER 2020

FEATURES

IN EVERY ISSUE

COLUMNS

The Canadian Institute of Steel Construction (CISC) is the Voice for the Canadian Steel Construction industry. The CISC represents a diverse community of structural steel industry stakeholders including manufacturers, fabricators, erectors, service centres, consultants, detailers, industry suppliers, owners and developers. Steel construction industry stakeholders are encouraged to apply to become a member or associate. Visit cisc-icca.ca for more information. If you are working on a project that you think should be featured, send us an email at ciscmarketing@cisc-icca.ca.



On the Cover: CIBC SQUARE on Bay Street in downtown Toronto

Ed Whalen, P.Eng.
President & CEO, CISC

Uncertain and Unsettling Times

IF THERE IS ANY term I have learned to hate more than all others, it's "uncertain and unsettling times". It seems to be used on a daily basis, and I am sick of it. Sick of it because if we just followed a few simple rules, life would be a whole lot more certain and less unsettling. For example, our initial reaction in February to wear masks to protect ourselves was correct. We were smarter than we give ourselves credit for. Now 6 months later, after being told masks were of no use to the regular population, governments have flipped and are now just beginning to mandate their use in some locations. In some locations? Things would be a lot less uncertain and less unsettling if all people would simply wear a mask. And yes, that means all you folks that are having parties and visiting your extended family.

Listen, I'm not a doctor, but anyone can read the tea leaves and see what will be coming. That's right, the so called second wave. Did we even finish the first one yet? The stores are full, people are out and about and the number of people wearing masks is or was less than 50 per cent. I'm not sure what defines a wave, but unless Canadians all begin to wear masks, there will be many more surges and waves worse than the first. Just look south of the border for a glimpse of our possible future.

This is where the governments failed, in my opinion, but there is still time. All governments across Canada should pass legislation for mandatory mask usage. This should not be restricted to just hot zones, but everywhere. By doing so we will be able to continuously open all economies across Canada well past Stage 2, allowing businesses to open and remain open. Isn't this what it's all about – how to get business operating again and people back to work?

When would the masks come off? When there is a vaccine and it has been provided to everyone. This might seem harsh, but the alternates are the bumpy ride of COVID-19 waves and economic shutdowns. Shutdowns negatively impact the economy and construction in more ways than one. The federal government has racked up $350 billion in debt from the first COVID-19 wave (as of July 2020) and they haven't even started any financial, stimulus funding on infrastructure yet. Can we assume that every wave will cost the Canadian economy $350 billion? If that's the case, we can't afford a second wave, let alone the thought of hearing about a third one. Someone will have to pay for all this, and don't think your RRSPs and CPP will be a safe. Now that's unsettling!

So, here's my plan for governments:

1. All governments mandate the use of Canadian masks until all Canadians have received the vaccine. For you anti-vaxxers, no complaints and no health care funding after rejecting the vaccine. You should have to pay for your beliefs.

2. The governments encourage local Canadian fashion designers and textile companies to manufacture "near" N95-grade masks and make more fashionable than 3Ms. This would also stop the selfish people that won't wear masks because they believe it won't help them personally or fashionably.

3. The government sign contracts for manufacturing capacity of COVID-19 vaccine. Only Canadian! Nothing from the rest of the world. This is my gift to the anti-vaxxers.

4. All governments to allow all businesses to open using COVID-19 safety measures and, of course, Canadian masks.

cisc icca

CHAIRMAN
Todd Collister

MANAGING EDITOR
Amanda Charlebois, CISC

Advantage Steel and the French-language edition **Avantage Acier** are published by the Canadian Institute of Steel Construction (CISC) on behalf of its members and associates. CISC is not responsible for the opinions expressed in this publication by those contributing articles.

Connect with us:
Tel: (905) 604-3231
info@cisc-icca.ca • cisc-icca.ca

@CISC_ICCA

linkedin.com/company/ciscicca

facebook.com/389982921529947

@cisc_icca

By doing these things, the governments in Canada could make our lives a whole lot more certain and keep our country above water financially.

5. Governments cease the financial aid for people sitting at home. This summer there are a lot of people that would rather sit at home and receive their government money than work. Been to a store lately? The shelves are half empty. I'm sorry, but put businesses back to work and get workers off the government payroll. Companies need workers and we don't need higher taxes.

6. Governments provide stimulus to Canadian companies to build and make things. No infrastructure money to foreign companies, period.

7. Governments put their money where their mouths are and buy everything they need from their local and Canadian businesses. Made in Canada for Canada.

8. Governments put Canadian construction and manufacturing to work to stimulate the economy by rebuilding Canada's ageing infrastructure. Offshore companies need not apply.

9. The government keep the borders open for the supply chains but closed to everyone else (yes, especially the U.S.).

By doing these things, the governments in Canada could make our lives a whole lot more certain and keep our country above water financially. I am not in the mood to spend all my retirement savings (what little I have) to pay for a mismanaged crisis. We all know what is needed, though some don't want to hear it, and governments and the population need to suck it up, stop complaining and do what is required – for certain times! AS

Charles Albert, P.Eng.
Manager of Technical Publications & Services, CISC

CISC provides this column as part of its commitment to the education of those interested in the use of steel in construction. Neither CISC nor the author assumes responsibility for errors or oversights resulting from the use of the information contained herein. Suggested solutions may not necessarily apply to a particular structure or application and are not intended to replace the expertise of a licensed professional engineer or architect.

Question 1: What are the different grades of steel covered in ASTM A709?

Answer: ASTM A709 steel is used mainly for bridges and has been referenced in CSA S6 since the 2014 edition. It is an "umbrella" standard that includes the grades listed below. For each designation, the first number indicates the minimum specified yield stress, F_y , in ksi, and the second number [in brackets] in MPa.

- 36 [250] – Corresponds to ASTM A36/A36M.
- 50 [345] – Corresponds to ASTM A572/ASTM A572M grade 50/345.
- 50S [345S] – Has a maximum yield stress and a maximum yield-to-tensile ratio, useful for seismic applications. It corresponds to ASTM A992/A992M and is generally available in shapes.
- 50W [345W] – Has enhanced atmospheric corrosion resistance (weathering steel). This grade corresponds to ASTM A588/A588M.
- HPS 50W [HPS 345W], HPS 70W [HPS 485W], HPS 100W [HPS 690W] – High-performance steels with low carbon content, resulting in improved weldability, toughness and corrosion resistance. These grades are available in plates only.
- 50CR [345CR] – Stainless steel with improved corrosion resistance. It corresponds to ASTM A1010/A1010M.

When notch-tough material is required, ASTM A709 grades can be ordered with the addition of a suffix to specify the type of tension component ("T" for non-fracture critical or "F" for fracture-critical). And for each type of component, the impact testing temperature zone (1, 2 or 3) is specified.

Question 2: When loading is applied on the top flange of an unbraced beam segment, CSA S16:19 Clause 13.6.1(a) states that the destabilizing effect can be taken into account using a rational analysis. Could you provide a reference?

Answer: When loading is applied above the shear centre, a destabilizing moment (P x a) is induced as the cross-section rotates during lateral-torsional buckling, decreasing the beam's moment capacity. A typical situation involving gravity loading on a floor beam is illustrated in Figure 1(a). This generally occurs during construction while the top compression flange is not yet braced by the deck.

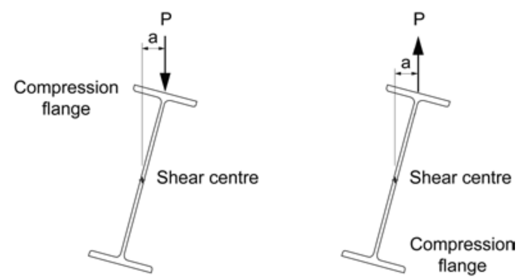


FIGURE 1
(a) Gravity Loading (b) Wind Uplift

The elastic buckling moment may be determined according to "Lateral Buckling of Beams," J.W. Clark and H.N. Hill, ASCE Journal of the Structural Division, Vol. 86, July 1960:

$$M_u = \frac{\omega_2 \pi}{L}\left[\frac{\pi E I_y}{L} C_2 g + \sqrt{\left(\frac{\pi E I_y}{L} C_2 g\right)^2 + E I_y G J + \left(\frac{\pi E}{L}\right)^2 I_y C_w}\right]$$

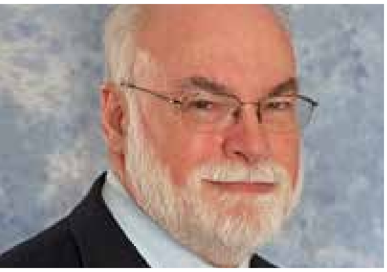
EQUATION 1

where $\omega_2 = 1.13$ and $C_2 = 0.45$ for simply supported beams with uniformly distributed loading. The magnitude of "g" is the vertical distance between the shear centre and the point of application of the load, or d/2 where "d" is the beam depth. For gravity loading, the sign of "g" is negative when loading is applied above the shear centre.

Another common situation involves wind uplift on a roof beam, as shown in Figure 1(b). In this case, the unbraced bottom flange is in compression and the upward load on the top flange exerts a stabilizing effect. The sign of "g" in Equation 1 would then be positive, increasing the moment resistance.

Alternatively, S16:19 provides a simple (although conservative) method to account for the destabilizing effect by using $\omega_2 = 1.0$ and $C_2 = 0$ and an effective unbraced length of 1.2L for flexurally simply supported ends or 1.4L for other end restraint conditions. AS

Questions on various aspects of design and construction of steel buildings and bridges are welcome. They may be submitted via email to info@cisc-icca.ca. CISC receives and attends to a large volume of inquiries; only a selected few are published in this column.



Bob Shaw

CSA S16's New Annex P on Specifying Third-Party Inspections

THE NEW CSA S16:19 Design of steel structures introduces "Guidance for specifying third party inspection of steel structures" as an informative annex. The challenge of writing such a document is one that was well-stated in the Foreword of the 1946 American Welding Society D1.0 *Standard Code for Arc and Gas Welding in Building Construction*, as follows,

"The importance of adequate inspection of welded work must never be overlooked. Yet, in drafting a code equally applicable to large structures supporting substantial loads and minor installations or alterations, explicit, elaborate provisions which might appear desirable in the first case become a useless burden upon the latter. Unless a logical criterion can be devised – and none has been – to mark the dividing line between important and unimportant work, so that separate regulations governing inspection of the two can be formulated, it must rest with the sound judgment and common sense of the administrative authority whether any distinction is to be made."

The Technical Committee on Steel Structures for Buildings is to be commended for bringing this topic forward and attempting to address inspection of fabricated and erected structural steel (materials, welding, bolting, workmanship and details) and nondestructive examination (NDE) of welds for the structural steel industry, in a manner that provides for public safety without becoming a "useless burden."

The new CSA S16:19 Design of steel structures introduces "Guidance for specifying third party inspection of steel structures" as an informative annex.

There are several points that must be understood. The Annex is informative, not normative, and provides the engineer recommendations for consideration, the engineer being ultimately responsible for including any third-party inspection requirements into the project specification. The Annex is written using normative "shall" language in clause P2, to ease the specification-writing process for the engineers who choose to require third-party inspections and NDE. However, there are also numerous "should" statements throughout the remaining sections that require careful consideration by the engineer, with a few "shall" requirements included.

Clause P.2.1 addresses responsibility for the third-party inspection. It mentions the engineer, the fabricator and/or erector. As this Annex addresses third-party inspection, by definition, those responsible for the work (fabricator and/or erector) should be excluded from selecting and compensating the third-party inspection agency. In addition to the engineer, the owner of the project, whether public or private, would be an appropriate choice to select and compensate the third-party inspection agency.

Clause P.2.1 also mentions that the project specification should identify who pays for initial testing, presumed to include inspection, and who pays for follow-up or additional testing to rectify deficiencies. To address this item, the engineer should reference the CISC Code of Standard Practice for Structural Steel, clause 6.7 "Inspection of Steelwork," that

The importance of adequate inspection of welded work must never be overlooked.

states "The cost of this inspection and testing is the responsibility of the Client. Deficiencies in the Work of the Fabricator and/or Erector requiring re-inspection or re-testing shall have costs borne by the Fabricator and/or Erector."

The engineer selects the Inspection Class or Classes (IC1 through IC4), as addressed in clause P3. This should not be confused with Importance Categories as used in building codes. The engineer is to select the Inspection Class for the structure, and perhaps for specific elements of the structure, based on "the required reliability, the type of structure, and the type of loading for which the structure is designed." Table P.1 "Inspection classes" provides guidance to the engineer but leaves questions as to areas of high-rise buildings (over 15 storeys), grandstands, arenas, stadia and other high-occupancy assembly buildings that are not deemed "critical." For more detailed guidance, the engineer may want to look to other globally used standards, such as EN 1993-1-1:2005/A1:2014, Annex C, which replaced the system described in EN 1090-2:2008. Another resource addressing only risk for various building types is the International Building Code (2018), Table 1604.5 "Risk Category of Buildings and Other Structures."

Table P.2 "Frequency of third-party inspections" provides recommended rates of inspections for numerous aspects of steel fabrication performed in the shop, in terms of percentage of welds, bolted connections, headed stud anchors and general conformance in terms of workmanship. It also addresses field inspections of the same items and adds inspection of steel decks, braced frames, seismic braces and seismic frames. The rate of inspection varies according to Inspection Class, ranging from "Optional" to 100 per cent. Some items, such as reviewing mill certificates, company welding certification, weld procedures and welder qualifications are simply designated "Optional" or "Yes."

Three elements of Table P.2 warrant a more detailed consideration by the engineer:

1. **Under field inspection,** there are recommendations for visual inspections of shop-bolted and shop-welded connections. These visual inspections are also called out under shop inspection. Fabricator preference is always for shop inspection, as the cost and time required for field corrections is substantially higher. Repeat visual field inspection may not be warranted and may not be effective.

2. **For bolted connections,** Table P.2 also recommends witnessing installation for a percentage of pretensioned and slip-critical connections, whether pretensioned (tightened) in the shop or field. A "witness" activity is not called for in clause 23.8 for bolting inspection procedures. Also, there is no requirement for witnessing of production welding in CSA W59, only specific items such as qualification tests. Although bolting does not require bolting supervisors and qualified bolting installers, as does welding, such programs should be considered by the industry to increase confidence in the quality of bolt installations and changing the recommended witnessing to periodic routine observation of installation techniques and use of visual inspection upon completion.

3. **Note 5 of Table P.2** suggests increasing rates of inspection when the steel is "fabricated in regions where the degree of compliance with Canadian requirements is less established." This may be difficult to write into a project specification if the engineer does not have control of the source of fabrication, but a separate table of inspections tasks and rates of inspection should be considered by the engineer if the fabrication is to be performed offshore.

Table P.3 "Extent of NDE of welds" addresses specific weld types (fillet, full penetration [CJP] groove or partial penetration [PJP] groove) and joint types (butt, T or cruciform), with consideration for whether the welded joint is part of the seismic system, whether the weld is longitudinally or transversely loaded or if

PYTHONX® STRUCTURAL

SUCCESS STORY: M&G Steel

Retains a competitive edge with 14-year-old PythonX Technology

Based in Oakville, Ontario, M&G Steel Ltd. has grown into one of the leading structural steel fabrication and erection contractors in Canada.

CHALLENGE

M&G Steel is not your typical structural steel fabricator; they do more customized structural steel. Their niche is working on and through very complex projects that present challenges in engineering, site access, tight timelines and coordination. Their customers expect a quality product that is on time and as cost-effective as possible in the market and sometimes that can be a challenge. So they needed to think outside the box to find a way to provide a good quality product to their customers at a competitive price.

SOLUTION

Since they performed all fab shop operations manually, they quickly needed to get up-to-date with technology. M&G realized that adding a traditional drill line and saw only brought their capabilities to that of their competitors. What they were looking for was something that gave them a distinct advantage over others within their market.

BRIAN THOMPSON
Vice President, Operations

PRODUCT

Coincidentally, they received a CD from PythonX in the mail, and once they viewed the CD, they were impressed with this new technology. PythonX STRUCTURAL was completely different from any of the other machines that they were considering. So they took a leap of faith and purchased it a week later. After 14 years, the PythonX STRUCTURAL is better than ever and has proven to be the most profitable piece of equipment they have ever owned.

RESULTS

INCREASED THROUGHPUT
Production more than doubled

PERFORMANCE
14 YEARS
IN OPERATION

MINIMAL WEAR & TEAR
Virtually maintenance-free

LINCOLN ELECTRIC®

For more information on this revolutionary technology: Call +1 833 PYTHONX
Watch the Video: www.pythonx.com/mg-steel

> The Annex is informative, not normative, and as such, the engineer should not invoke it without clarification using clear and concise language.

the joint is in compression. The tables apply equally to shop and field welds. A percentage of groove welds are recommended to receive either Ultrasonic Testing (UT) or Radiographic Testing (RT) and to receive either Penetrant Testing (PT) or Magnetic Particle Testing (MT). A percentage of fillet welds are recommended to receive either PT or MT.

Clause P.5.4 provides a project failure rate above which the rates of NDE should be increased. The project specification should state whether this failure rate is determined by using the number of welds that fail the NDE or using the length of the welds that fail the NDE. Also, this clause makes it clear that the contractor responsible for the welding is also responsible for any increased rates of NDE. This particular clause is within the NDE provisions, yet also uses the term " inspection" in addition to "testing." The engineer should also consider implementation of this clause to the visual inspection tasks described in Table P.2 "Frequency of third-party inspections."

Any new provision, such as Annex P, that is added to a standard is subject to a variety of interpretations by the parties involved. The engineer should work with all parties involved in the work to ensure that there is a common understanding and should use the project specification for this purpose. As stated, the Annex is informative, not normative, and as such, the engineer should not invoke it without clarification using clear and concise language.

A CISC Commentary to this Annex should be expected to clarify the recommendations and further assist the engineer in writing the project specifications, as well as helping those who manage or perform the inspections and NDE tasks described. AS

Promoting Excellence in Steel Construction

Craig Martin
Chairman of CISC's Education & Research Council

EXCELLENCE IN STEEL construction is a shared goal for our industry. We know that steel is the obvious choice for an economic, flexible, creative and sustainable infrastructure. In order to see steel continue to be the material of choice for construction – and to let others know as well – we must pay attention to how we support the next generation of steel professionals and drive innovation in our industry.

The Education and Research Council (ERC) plays a critical role within the CISC and the industry in achieving this objective. The ERC oversees work in several areas to support education, research and innovation in the Canadian steel construction industry. These include:

- support for technical colleges, expanding their focus on skilled trades critical to the industry's success,
- competitions and scholarships for engineering students to encourage a focus on structural engineering,
- competitions and scholarships for architecture students to drive creative thinking in steel design,
- research grants to support innovation in steel construction,
- support for Steel Centres of Excellence, building communities of steel professionals within academia and industry, and
- development of training programs for existing steel professionals, helping to keep knowledge current and promote excellence.

As you can see, the ERC's work is focused not just on structural engineers but on multiple areas that will help drive the industry forward. Having skilled trades, architects and engineers with a solid understanding of steel construction is of critical importance – as is connecting them to our industry and the CISC. Research and innovation are also critical as we look to make our industry more competitive and creative in the face of ever-evolving construction methods and global pressures. The ERC is also pleased to support the development of new and expanded training courses to help both novice and seasoned steel professionals upgrade and maintain their knowledge in the areas of codes & standards, design methodology, estimating, inspection and other key areas.

I would encourage you to visit the CISC's website and click on the #SupportSteel tab for a full overview of all the ERC's programs and initiatives. You can also hear – in their own words – the stories of individuals that have benefitted from the work of the ERC.

The ERC is grateful for the continued support of the CISC and our funding partners. Much has been accomplished, but we need to continue to expand the breadth of support by our industry to see our programs expand and address evolving needs. If you have a passion for supporting the next generation of steel professionals and for the future of the Canadian steel construction industry, I encourage you to consider becoming an ERC financial supporter.

I would like to acknowledge the support of my fellow council members as I move into the role of Chair of the ERC and appreciate their continued commitment to the work that we do. I would also like to recognize the work of our outgoing Chair, Mike Holleran. Mike effectively led the ERC as it worked to expand and build on our programs, and his contributions have been key in the ERC's continued success. Thanks Mike!

Please contact the CISC for more information on how you can support the work of the ERC. Working together, we can help steel be the material of choice for construction now and in the future. AS

Excellence in steel construction is a shared goal for our industry.

cisc icca

CANADIAN INSTITUTE OF STEEL CONSTRUCTION
INSTITUT CANADIEN DE LA CONSTRUCTION EN ACIER

Choose **Excellence.**

Choose a **CISC Fabricator**

A CISC Fabricator is a steel industry leader with the depth and breadth of experience to deliver excellence and peace of mind on your next project!

CISC Fabricators are part of an elite network with proven expertise and track record of working on some of Canada's most complex steel construction projects.

With CISC Fabricators you have a local partner that is committed to customer and manufacturing excellence with:

- Globally competitive pricing
- The highest standards in safety and environmental practices in the world
- Dedicated and highly skilled workforce
- On the ground, consultative project management
- Exacting quality standards with state of the art fabrication and operational facilities
- Strong commitment to the local community

Choose a CISC Fabricator, choose excellence.

Visit our website for a CISC Fabricator near you!

cisc-icca.ca

Need Steel Detailers?

Canada's Only Steel Construction Modelling Program, Steel Detailing Technician, Produces Job-Ready Employees in 10 Months.

IN TODAY'S COMPETITIVE steel industry, you need hard-working junior steel detailers competent in steel-detailing knowledge with skills in the latest 3D modelling software, right now. You can't afford to spend enormous amounts of time and money training graduates from other disciplines. Vancouver Community College (VCC) has been filling this need for decades, producing well-trained steel detailers ready for the job from Day One.

Evolving along with industry, we are changing the name of our Steel Detailing program to Steel Construction Modelling to reflect our major focus on 3D modelling.

Steel Construction Modelling (Steel Detailing Technician) has been a standout program in VCC's CAD and BIM department for over 50 years. We are proud to be the only steel-detailing training program in Canada, and we have produced thousands of proficient steel detailers, many of whom are now top personnel in our industry.

THE PROGRAM

The 10-month Steel Construction Modelling certificate runs September to June. Students are immersed in basic drafting skills using AutoCAD (provided by Autodesk), before moving into the steel construction modelling specialty.

We consult with our Program Advisory Committee, made of successful steel detailing companies and fabricators in the Metro Vancouver area. With their help, we are able to keep our course content relevant and current to present industry methodology.

The Steel Construction Modelling program takes students through traditional steel detailing, creating various steel detailing drawings. They learn the necessary skills, while learning about bolting, welding, working with the CISC Steel Construction Handbook and fabricator standards. Students apply these skills in class on various commercial and industrial projects.

OUR GRADUATES ARE READY FOR YOUR JOB

Our Steel Construction Modelling graduates are in high demand, receiving multiple employment offers from across Canada and the U.S. Employers tell us our graduates are more than job ready; they demonstrate strong steel-detailing knowledge paired with competent expertise in Tekla Structures. Less in-house training is required from job start, and this is a significant savings on your company's training resources.

Visit our website at www.vcc.ca/programs/steel-detailing-technician-certificate/ AS

TORONTO'S NEW CIBC SQUARE HAS

Nothing is standard about this project meant to change everything

By Derek Howchin, Senior Project Manager, Walters Group and Jessica Ranalli, Project Manager,

CHALLENGES ONLY STEEL CAN SOLVE

about office buildings

Walters Group

HEAD DOWN THE Gardiner Expressway in Toronto and you can't miss the towering structure next to Scotiabank Arena: CIBC SQUARE.

It's the most advanced tower ever constructed in Canada and likely all of North America. It has been planned for more than seven years, with construction challenges that rival anything previously built in Canada. Yet the tower is just one part of this extremely complex project, which also includes a pedestrian bridge to the neighbouring arena and a one-acre park being built over the second-busiest railway station in North America. Added to all this is a second tower, which will begin construction this summer.

The first tower, 81 Bay Street, is currently under construction and will have 49 occupied stories upon completion this fall. Its twin will be 141 Bay Street (site of the current GO bus terminal), which will consist of 50 occupied stories, scheduled for occupation in 2024. Together, the towers will add three million square feet of space to downtown Toronto.

GETTING WITH THE PLAN

Real estate firms Ivanhoé Cambridge and Hines began work on the project over 10 years ago with architect Adamson Associates, resulting in a stunning design built to meet several criteria: efficient use of space, speed of construction, design-forward features, connections to transportation and innovations in environmental sustainability.

"We chose a hybrid structure with a concrete core and structural steel, primarily for speed," says John Frank, Senior Vice President (Construction) for Hines. "With steel, a building can be completed six to eight months faster."

It was in April of 2017 that CIBC chose the building to be the home of their new Canadian head office. In that same timeframe, Canadian steel icon Walters Group Inc. was brought on to work with EllisDon, the general contractor. "Walters was able to provide the engineering expertise and best practices and assist us with the design, as we knew it would evolve over the course of this project," says Andrea Quadrini, Project Manager for EllisDon.

The project's many challenges resulted in solutions that only steel could solve. With a location in one of the busiest parts of Canada, construction needed to be fast and design changes would be coming quickly, so steel was chosen to be more easily reconfigured to accommodate the changes.

The building design included floor plates that were designed with access to natural daylight and column-free floor plates, so steel was needed to span large, open spaces. Steel was also found to be the best support for glass and retain its durability over time. RJC Engineers understood early on that steel would be best for this project. "It made economic sense to go with steel," says Andrew Voth, RJC Engineers' Engineer on Record for the pedestrian bridge and rail corridor overbuild.

It's the most advanced tower ever constructed in Canada and likely all of North America.

"Steel also comes in ready for erection," adds his colleague Benoit Boulanger, the Engineer of Record for the tower, who started work as a designer for the project seven years ago. "There's more to be done beforehand, but if it were concrete, columns like those in the tower lobby would need to be at least twice as large."

Many efficiencies were developed in the planning stages that ended up saving countless days of work, one of which was the use of a custom-made formwork system that was able to climb more than six metres per cycle, which has never been done on any project in Canada.

"We worked closely with our formwork, rebar and structural steel sub-trades to develop a program that would be based on a five-day cycle," says Quadrini. "This enabled us to form, pour and strip concrete, erect steel and curtain wall based on this cycle."

AS YOU BUILD IT, CHALLENGES WILL COME

After years of planning, the project's groundbreaking was held in June 2017. Since then, even with constant communication and coordination with every possible organization involved, challenges have still happened – even when they're foreseen well in advance.

A frequent challenge is difficulty in stopping traffic to accommodate construction. The increase in road and pedestrian traffic from one of Canada's most popular entertainment venues immediately next door is also an ongoing challenge as construction finishes up.

"Every time you do one step forward, you do two steps backward, trying to please everyone," says Boulanger. "Every change affects everyone, so we need to discuss them constantly with the City, neighbours, crews, architects and tenants."

CHALLENGE HIGHLIGHT: RAIL CORRIDOR OVERBUILD

Spanning 16 rail tracks and connecting the towers will be a one-acre park – a concept that has never been done to this scale before in Toronto.

"There's no way the overbuild could have been built with anything except steel," says Frank. "If any column is taken out, the overbuild will still stay up. Enormous steel cantilevers will even be installed to support a restaurant."

"We looked at concrete and precast construction, but for the construction logistics and the economics and space, steel was really the only option," adds Voth. "In one evening, Walters' crew swung into place a 45.5-metre long-span truss, the weight of 53 mid-sized cars, over the corridor tracks. There was a very short window to stop all train traffic, and they did it perfectly."

Any time work along the tracks was required, a work plan needed to be submitted, reviewed and approved for every single operation along the long spans. "Sometimes Walters only had four hours a night to work," says Boulanger. "And other times there would be a full work crew ready to go, then a train would be delayed, so the entire evening would be cancelled."

STEEL FACTS:

15,360 tonnes of structural steel are being used

The heaviest truss on the overbuild is 45.5 metres long, 4 metres deep and weighs **85,000** kilograms

The pedestrian bridge connecting the tower to Scotiabank Arena is just over 36 metres long and weighs **210,000** kilograms

The Bay Street canopy is **69** metres long, 14 metres wide and stands 25 metres above ground level

If you stacked all **100** trusses from the rail corridor overbuild end-to-end, they would be 2.5 times the height of the CN Tower

There are **208,000** bolts being used. If you laid them out end-to-end, they would stretch as long as the Gardiner Expressway

CHALLENGE HIGHLIGHT: THE SCOTIABANK ARENA BRIDGE

The 36-metre bridge is unlike any other, with a glass wall on the south side, spanning across Bay Street to the arena.

"The Scotiabank Arena bridge has a very challenging structural system to accommodate a full-height glass wall overlooking Lake Ontario," says Tim Verhey, Executive Vice President, Engineering & Operations, Walters Group. "Our crews preassembled it at the Cherry Street docks and delivered it to the site in two sections." The bridge was installed over Labour Day weekend last year, one of the few occasions that this section of Bay Street could be shut down with minimal disruption.

THE NEXT GENERATION OF TOWER CONSTRUCTION

In addition to the stunning steel structures that require years of planning and unparalleled communication and logistics, CIBC SQUARE also represents the leading edge of technology and environmental innovation.

"This is a next-generation building," says Frank. "It's the most technologically advanced project I've ever worked on, and I've been with Hines for 35 years. It's certainly the best office building in Canada. Maybe even North America."

Highlights include:

- Engineered to LEED® platinum standards (Walters' fourth LEED®-certified office tower)
- Pursuing WELL Building Standard™ building certification
- First building in Toronto to have earned Wired® platinum certification for best-in-class technology infrastructure
- Energy costs will be reduced by 40 per cent as outlined by the National Energy Code of Canada for buildings
- Tenants will receive feedback on their energy consumption
- Each tower will include more than 500 bicycle storage racks and tenant-shower facilities

A BUILDING OF SUCCESSFUL STORIES

This project will have a positive, lasting impact on Toronto and will change the way commuters and residents enjoy downtown.

"This has been a very challenging, complex project for all involved. It truly has been an honour to be a part of the team and work amongst some of the most respected and talented individuals within the industry," shares Verhey. "It will stand out for all of those who worked on the project, as well as amongst Toronto's skyline, for many years to come."

"Once both towers have been completed, CIBC SQUARE will be one of the most iconic landmarks in the City of Toronto," concludes Quadrini. AS

STEEL COLUMN BASES

Under Combined Axial Load and Bi-Axial Bending

By Dr. Muntasir Billah, P.Eng. Assistant Professor, Department of Civil Engineering, Lakehead University

COLUMN BASE PLATE connections, typically consisting of a steel member welded to a steel base plate connected to the concrete base via anchor rods and grout, are commonly found in building and non-building structures. This base connection is one of the most important structural components, which acts as a transfer medium for all the forces and moments from the entire building into the foundation. Failure of these base plate connections can result in the collapse of the entire frame as it affects the ductility demand and force distribution in the structure (Grauvilardell et al., 2005). After the 1994 Northridge Earthquake, design of steel connections has been significantly revamped across North America. However, a significant amount of effort has been dedicated to the steel beam-column connections under seismic loading. In comparison, limited experimental and numerical investigations were devoted to study the behaviour of column base connections. As a result, the design of a column base connection presents several issues, which are not limited to characterization of force and deformation demands, characterization of deformation capacities of the connection components and failure mechanisms and development of desirable hierarchies of failure modes (Gomez et al., 2010).

Most of the previous studies and design guidelines are focused on base plate design under axial load and uniaxial bending moment (typically major axis). However, very often these base plates are subjected to bidirectional bending moment from lateral loads such as wind and earthquake. Current design codes and guidelines do not address the design of these exposed base plate connections under axial load and bi-axial bending. Although the columns are designed and checked under combined axial load and bi-axial bending, when it comes to the base plate connection, only the axial load and major axis bending are considered. Practising engineers often adopt complex finite element methods or design them in the two directions separately, which often results in overly conservative design.

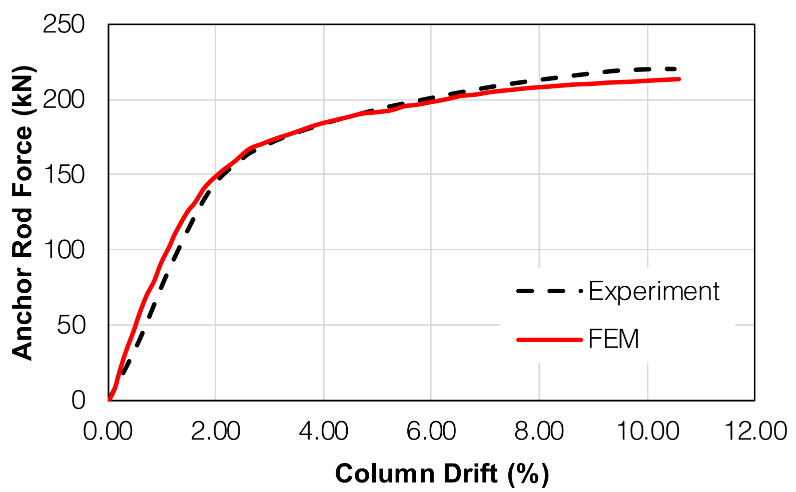


FIG. 1: Comparison of experimental and numerical results

Currently, there exists a gap in the research to develop a design guideline for exposed column base plate connection under combined axial load and bi-axial bending. The overarching objective of this research is to develop a simplified design guideline for exposed column base plates under combined axial load and bi-axial bending. This will be achieved through the pursuit of the following objectives: (i) finite element simulation of base plates under combined axial load and bi-axial bending, (ii) experimental investigation of column base plates under combined axial load and bi-axial bending, (iii) comprehensive parametric study to identify the parameters that influence the behaviour of exposed column base plates and (iv) developing interaction equations, design methods and simplified tools for practising engineers.

PRE-TEST ANALYTICAL STUDY AND FINITE ELEMENT ANALYSIS

This pre-test analytical study is conducted to investigate the performance of column base connections under axial load and uniaxial bending. The purpose of this analytical study is to select and validate a suitable modelling strategy that can mimic the experimental response of column base connections with reasonable accuracy. For pre-test analytical study, a 3D finite element (FE) model is developed using ABAQUS simulation platform. In order to validate the accuracy of the adopted modelling techniques and material models, the results from the FE model is compared with the experimental

[redacted]

results from Gomez et al. (2010, large scale experiment test no. 1). This specimen was tested monotonically without any axial (gravity) load and having 10.6 per cent peak column drift. Fig. 1 shows the comparison of the experimental and numerical results in terms of anchor rod force and column drift. From Fig. 1, it can be concluded that the developed numerical model can predict the experimental results with reasonable accuracy. The maximum anchor rod force is found 220.12 kN and 213.24 kN for the experimental and numerical results, respectively having a 3 per cent difference between them.

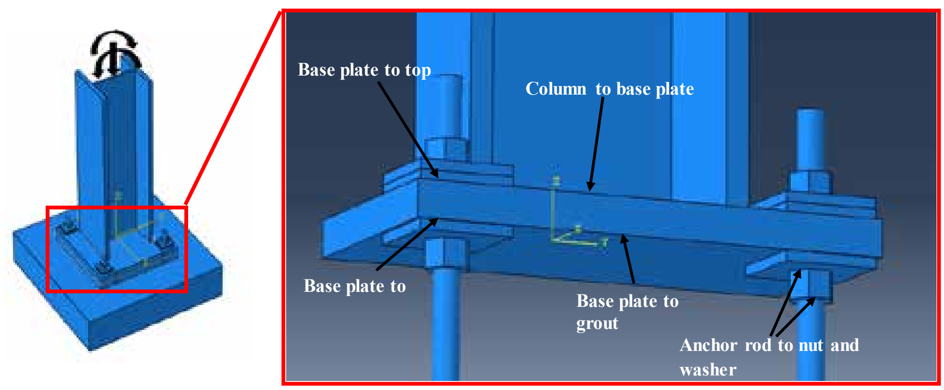


FIGURE 2: Overview of the finite element model

BASE CONNECTION RESPONSE UNDER UNIAXIAL AND BI-AXIAL BENDING

As the first phase of this research, column base connections are numerically investigated under combined axial load and bi-axial bending. Fig. 2 schematically represents the FE model and the applied loadings. Tie constraints are provided between the column and base plate, anchor rod, nut and washer and grout and concrete, since they have monolithic properties. Surface-to-surface contact interactions are defined between the interface of base plate-grout, base plate and both the top and bottom washer and anchor rod-base plate with finite sliding formulation. Two different interaction properties are defined for these surface-to-surface interactions. Contact details between the elements are also shown in Fig. 2.

Column behaviour: To represent the gravity load, an axial load equal to 30 per cent of the column capacity was applied as an axial compression. For uniaxial monotonic loading, a lateral drift of 10.6 per cent was applied along the strong axis direction of the column, whereas for bi-axial loading, additional 4.9-per-cent drift was introduced towards its weak axis direction in addition to the axial compression. The column subjected to bi-axial loading suffered considerable out-of-plane local buckling near its base, compared to uniaxial loading. This occurred due to localized compression, as well as not having sufficient thickness of the web and flanges to resist weak axis bending. In Fig. 3, it can be seen that the stresses are concentrated near the column base when subjected to uniaxial loading. However, for bi-axial loading (Fig. 4), the stresses are spread along the column's height up to half of its total length due to an angular resultant displacement caused by simultaneous bidirectional loading. Maximum stress of the column is found to be three per cent higher for bi-axial loading compared to the uniaxial loading.

Base plate behaviour: Identifying yield lines in the base plate of deformed base connections is important and can be a difficult task. The current AISC design guideline assumes the yield line forms in parallel with the flange of the column. A detailed experimental program conducted by Gomez et al. (2010) revealed that yield lines develop in inclined patterns under uniaxial bending. Similarly, the FE model showed development of inclined yield lines on the tension side of the base plate (Fig. 5a) under uniaxial loading. This can be attributed to the resistance to the tensile force by the anchor rods causing a curve-shaped deflection at the tension end. A straight yield line is formed beneath the column flange on the compression side of the plate

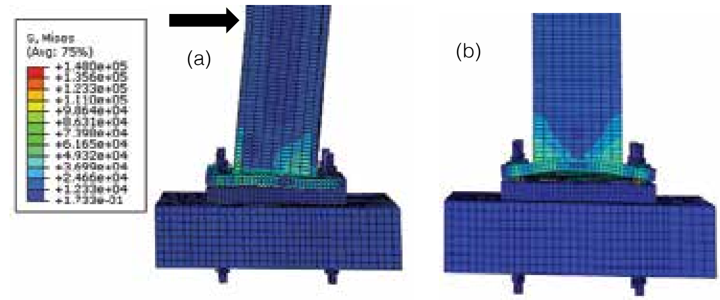


FIGURE 3: Column stress (Von mises) along (a) weak axis and (b) strong axis under uniaxial loading

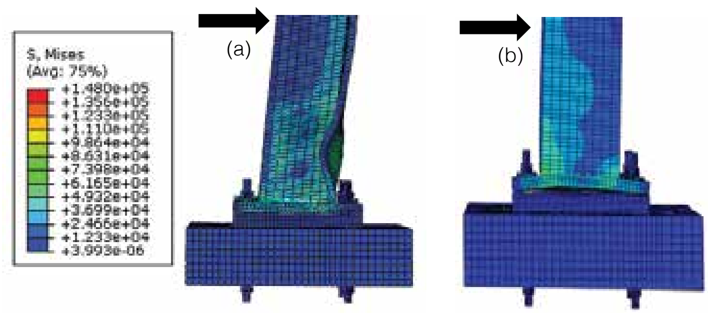


FIGURE 4: Column stress (Von mises) along (a) weak axis and (b) strong axis under bi-axial loading

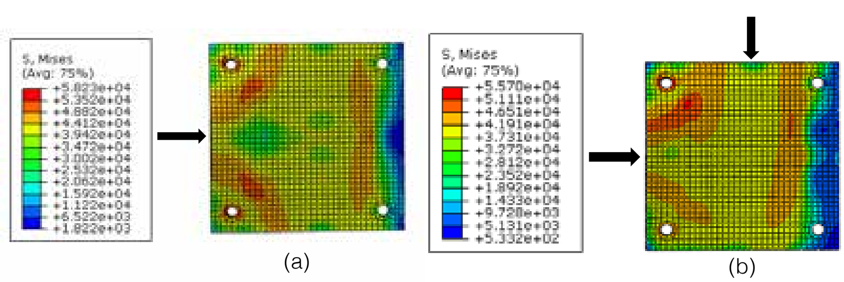


FIGURE 5: Base plate behaviour under (a) uniaxial and (b) bi-axial loading

"After the 1994 Northridge Earthquake, design of steel connections has been significantly revamped across North America."

(Fig. 5a). Under bi-axial loading, yield line is critical near the anchor rod which is in tension during both loading direction (Fig. 5b). There is also a formation of yield lines under the column flange across the width on the other side of the base plate extending to the edge of the base plate (Fig. 5b). Maximum stress is found to be four per cent lower in case of bi-axial loading compared to uniaxial loading since there is alternative tension-compression behaviour under bi-axial loading.

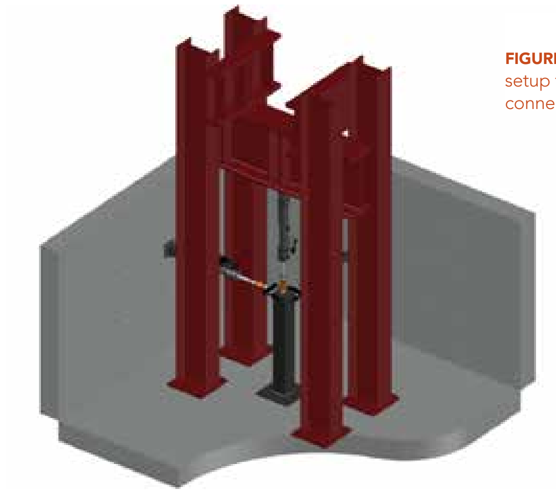


FIGURE 6: Proposed experimental setup for column base plate connection testing

PLANNED EXPERIMENTAL PROGRAM

With the financial support of the CISC, an extensive experimental program will be conducted on six reduced-scale exposed-type steel column base plate connections in summer 2020 to establish the design methods and interaction equations for column base connections under combined axial load and bi-axial bending. Two steel HSS columns and four steel wide flange columns (W-section) will be welded to the centre of the base plate. The column size, as well as width-thickness ratio, will be selected to prevent yielding and local buckling of the column before failure of the base connection. In the experimental study, the thickness of the baseplate for the HSS columns will be kept constant, while two different base plate thicknesses will be considered for wide flange columns. The proposed test setup is shown in Fig. 6.

NEXT STEPS

The next step in this ongoing research is to perform experimental investigations on column base connections under combined axial load and bi-axial bending. This research will be critical to potentially improve base plate and anchor rod design with accuracy and economy under multi-axial loading. All the specimens have been designed and are currently being fabricated. Detailed experimental testing will be done in summer 2020.

REFERENCES

Grauvilardell, J.E., Lee, D., Hajjar, J.F., and Dexter, R.J. (2005), "Synthesis of Design, Testing and Analysis Research on Steel Column Base Plate Connections in High Seismic Zones," Structural Engineering Report, No. ST-04-02, Department of Civil Engineering, University of Minnesota, Minneapolis, Minnesota.

Gomez, I.R., Kanvinde, A.M., and Deierlein, G.G. (2010), "Exposed Column Base Connections Subjected to Axial Compression and Flexure," Technical Report submitted to the American Institute of Steel Construction, AISC, Chicago, Illinois. AS

FEATURE

STEEL BRIDGES AND B

Evaluation Methods for Fatigue Life and Toughness Assessment of

By Michelle Y.-X. Fan, BASc, University of Waterloo; Prof. Bertram Kuehn, PhD, Technische

RITTLE FRACTURE

Steel Bridges

Hochschule Mittelhessen, Germany ; Prof. Scott Walbridge, PhD, University of Waterloo

AMONG THE COMMON FAILURE MODES for steel bridges, brittle fracture is a major concern to structural engineers as it has significant consequences in terms of safety and cost. Although occurrences are rare in the present day, it is well known that they occur without warning and may lead to the sudden closure of a bridge, loss of service, expensive repairs and/or loss of property or life.

One special case of brittle fracture is known as constraint-induced fracture (CIF), which may occur under a tri-axial state of stress, when there are multiple intersecting welds, such as a web-flange-stiffener connection without a sufficiently wide web gap. In recent years, several cases of CIF in bridges, notably the US 422 Bridge (built 1965) and Hoan Bridge (built 1972), have demonstrated the need for a review of current practices in identifying CIF-prone details.

In Canada, steel bridge fracture is a major concern due to our harsh climate, which, if the toughness properties are improperly specified, could put many steels on the lower shelf of the toughness-temperature curve. Based on a review of recent research conducted in Europe and the United States, it is observed that more sophisticated approaches have been developed in terms of modelling and understanding brittle fracture in existing and new bridges than the ones currently in use in Canada.

This project aims to increase the Canadian state of knowledge surrounding brittle fracture and CIF by assessing the reliability level of the current toughness provisions in the Canadian Highway Bridge Design Code (CSA S6)[1] and developing improved assessment tools to evaluate the brittle fracture risk in bridges.

The brittle fracture provisions within Eurocode 3: Design of steel structures (EN 1993-1-10)[2] consist of two methods of analysis, a simplified method using design tables and a fracture-mechanics-based method. Both the Eurocode simplified method and CSA S6 (Section 10.23) design for brittle fracture use the minimum service temperature of the location of interest to determine the appropriate steel grade, subgrade and CVN test requirements: test temperature [°C] and energy absorbed [J]. However, aside from the service temperature, the similarities end there. The Eurocode takes into account numerous other factors such as plate thickness, yield strength of the material, stresses on the component, radiation losses, member shape and dimension, safety allowances, strain rate and cold forming (if applicable). A very simplified summary of the Eurocode steps are as follows:

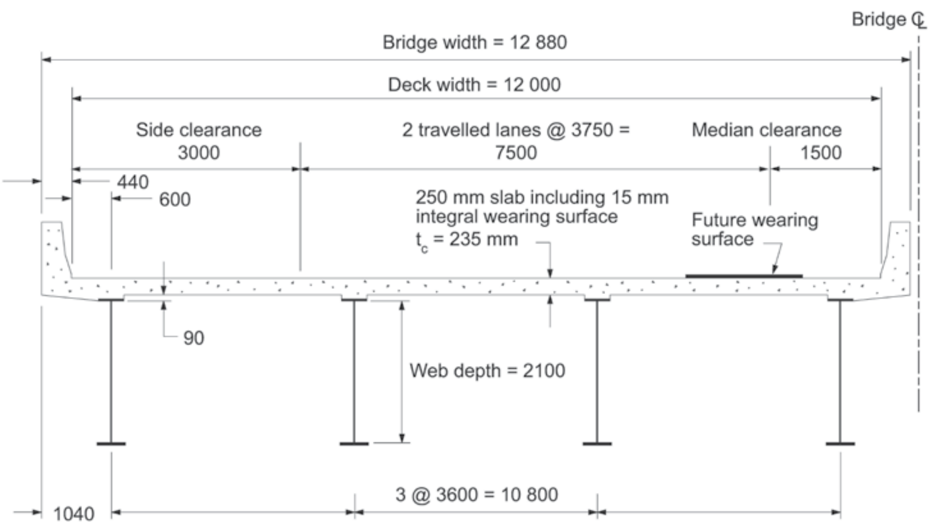


FIGURE 1: CISC Steel Bridge Design Example 1.

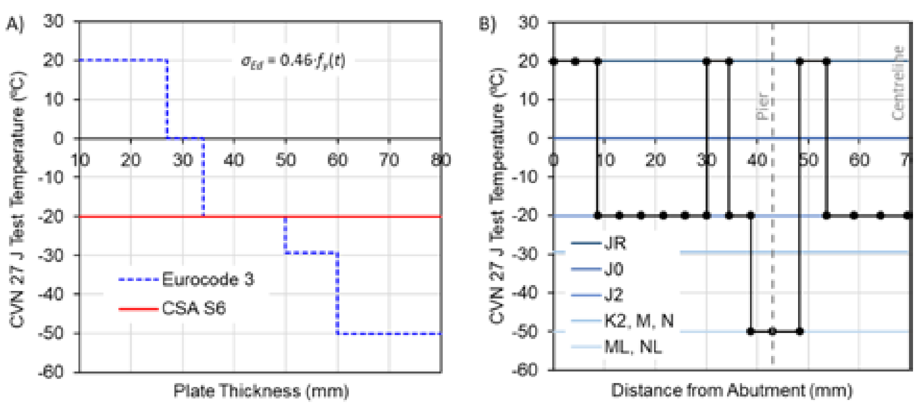


FIGURE 2: Comparison of CSA S6 [1] and Eurocode [2] brittle fracture provisions.

- A thickness-adjusted yield strength $f_y(t)$ is calculated from the nominal strength.
- The maximum stress on the component is calculated using an SLS load combination.
- The maximum stress level is expressed as a proportion of adjusted yield strength (e.g. $0.75 \cdot f_y(t)$)
- The reference temperature is determined from the minimum extreme temperature with a 50-year return period and radiation losses considered, along with temperature adjustments for member shape and dimension, safety allowance, strain rate and degree of cold forming.
- A steel subgrade is then selected from the Eurocode design table, based on the reference temperature, stress level and plate thickness. Conversely, if the subgrade is known, the maximum allowable plate thickness for the component can be determined.

When the stress level and/or reference temperature fall in between two columns in the design table, interpolation may be used. Typically for rapid assessments, it is acceptable to take a more conservative approach by applying the next-highest stress level or the next-lowest temperature on the chart and determining the toughness requirements based on this information.

Although the Eurocode is more complex and takes more factors into consideration, a question of interest is whether the complexity takes a more or less conservative approach than the current Canadian provisions and, even if so, whether this increase complexity is justified.

To answer these questions, a basic analysis was performed to compare the Eurocode with the CSA S6 brittle fracture provisions, using the CISC Straight Plate Girder Bridge Design Example 1 as a common "base case" scenario (see Figure 1). This bridge has four x three span continuous girders (43 m / 53 m / 43 m) with flange and web plate thicknesses varying along the span. For comparison purposes, the steel grades chosen are European S355 and Canadian W350, which have similar yield strengths of 355 MPa and 350 MPa, respectively.

The first part of the analysis involved varying plate thickness at the location of maximum positive stress along the girder (Span Reference 5), while holding all other parameters constant to study the effects of different thickness on the toughness requirements between the two codes. Note that instead of applying a minimum mean daily temperature like CSA S6, the Eurocode requires the input of a minimum extreme temperature with a 50-year return period. Historical weather data

References:

1. CSA (Canadian Standards Association). (2019). Canadian highway bridge design code. CAN/CSA-S6-19.

2. European Commission. (2006). Eurocode 3: Design of steel structures. EN 1993.

3. Kuehn, B. (2005). Beitrag zur Vereinheitlichung der europäischen Regelungen zur Vermeidung von Sprödbruch (Contribution to the standardization of the European regulations to avoid brittle fracture), PhD Dissertation, TU Aachen, Germany.

for Waterloo, ON, was collected accordingly, and a Gumbel distribution is fitted to the data.

While the Canadian W350's CVN toughness is 27 J at -20 C, the different subgrades of the European S355 do not all correspond to a 27 J CVN requirement, rendering a direct toughness comparison difficult. The non-27 J subgrades are converted to an "equivalent 27 J," with an adjustment made to their test temperature using an equation developed in [3] to obtain a more direct comparison between the steels. Figure 2(a) shows the variation in the required CVN test temperature corresponding to the required steel grade/subgrade in the two design codes for varying plate thickness.

The toughness requirements in CSA S6 are independent of plate thickness, as represented by the horizontal line, and are more conservative than the Eurocode for thinner plates (below 34 mm), resulting in a lower CVN test temperature requirement for 27 J. Both codes have the same toughness requirement in the middle range of plate thicknesses, and the Eurocode becomes more conservative for thicker plates (above 50 mm). Although this analysis is specific to a particular loading scenario for the CISC Straight Plate Girder Bridge Design Example 1 and the specific climatic data for Waterloo, ON, the step function trend is similar for other European steel grades, such that toughness requirements for thicker plates are more rigorous.

A second comparison is done for the entire span of the CISC Design Example 1. While the first analysis is performed for a single location on the bridge (location of maximum positive stress), this second analysis (see Figure 2(b)) looks at the changes in steel grade/subgrade requirements using the Eurocode where the stress level and plate thickness are both varying along the length of the bridge.

Depending on the stresses and plate thickness, the toughness requirement along the length of the bridge can vary significantly, based on this analysis using the Eurocode. This type of graph can help designers determine the toughness requirement to properly specify steel grade. Although the toughness requirement varies along the length, for ease of construction, it is generally preferable to use the same grade along the entire bridge. In this example case study, the pier is the location of maximum negative stress and governs the fracture toughness requirement for the entire bridge. It is observed that the locations of lower toughness requirement (JR) are generally near the inflection points.

One possible use for this type of output might be to permit a lower toughness level at positions along the span other than the critical one for assessment purposes, such as assessing a point along the bridge span where a fatigue crack has been detected or the structure has been damaged – e.g. by vehicle impact – or has a fatigue or CIF-prone detail present. Further work would be needed, however, to explore the value and potential pitfalls of using such an approach for assessment purposes. Other future work planned for this CISC-supported research project will include such things as comparing the results obtained so far with results obtained using the Eurocode fracture mechanics approach, as well as incorporating reliability considerations in the comparison of these various design approaches. It is expected that this work will lead to proposals for possible improvements to the brittle fracture approach currently specified in CSA S6 or additional provisions for use in bridge assessment. AS

THINKING INSIDE THE BOX

Steel curing structure at Calgary's Composting Facility

By James Peters

WHEN THE CITY of Calgary was looking for expertise on pre-engineered buildings for its new compost facility, the project's general contractor (GC) included Behlen Industries, a manufacturer of steel building systems, on the tendering list. Behlen's buildings are expandable, energy efficient and straightforward to construct – and they also retain architectural flexibility. Everything, in fact, the city facility was looking for.

The company was first approached by the joint venture consortium of Nason Contracting Group (a subsidiary of Bird Construction) and Maple Reinders in June 2015. The two companies together became the general contractor for the composting facility, and Behlen and the GC solidified the plans over the next several months. Steel was first shipped to the site from the Behlen plant in Brandon, Manitoba in late 2015, and the building was virtually completed by August 2017. As it now stands, the Calgary Composting Facility remains the largest of its kind in Canada.

Behlen's Vice-President of Engineering and Innovation, Pat Versavel, says, "I'm sure Behlen was originally included in the tendering process because of our previous involvement in the City of Hamilton's compost facility. These kinds of plants don't typically use pre-engineered steel buildings, but we were involved in a successful project in Hamilton, and that was obviously to our favour."

Behlen manufactures two distinct building systems – rigid frame and frameless – and the two have their separate advantages. Which system is going to be the most suitable and cost-effective for the client depends on a host

of criteria, such as size, purpose, function and the site itself. Rigid frame systems excel in energy efficiency, condensation control and noise reduction, and the construction process is engineered to create virtually no waste, keeping the building both cost-effective and environmentally sustainable. The technique was used for the Calgary project.

The Calgary Composting Facility produces high quality compost from both food and yard waste collected from the city's green cart program and dewatered solids, a nutrient-rich by-product from wastewater treatment. There are three principal buildings that make up the composting facility: the main building, curing building and storage building. Taken together, the entire compound is 521,000 square feet and processes upwards of 145,500 metric tons of residential food and yard waste and dewatered biosolids every year. Behlen's component for the compound was the curing building, which is where the composted material enters and remains for 21 days. Pipes in the floor draw air in and through the material to further enhance break down. After curing, the material is moved to the storage facility. Through a series of defined stages, compost is ultimately sold back into the market in bulk, with proceeds helping to reduce the processing cost and lower the Green Cart program fee.

Versavel says, "At the beginning of this project, the GC only had some rough outlines in terms of what they wanted to do. So, we came up with some preliminary drawings and presented a design solution. In the beginning, we were only given the basics, such as that the roof would need a slope, but there weren't any specifics as to pitch and degree. So, we gave the GC a concept they could work with, and there was a lot of back and forth throughout before any steel was manufactured. But that's not typically how we work. Behlen usually receives specific instructions from a GC on what's required for a project, and that's what we provide."

In spite of the atypical start on the Calgary project, the final steel structure ultimately worked. Versavel adds, "Our company designs and fabricates steel shells but we always work from the foundation up. We provide the materials and ship them in parts to the site. We don't do any electrical or mechanical or actually put up the building. So yes, the compost plant was challenging and occasionally frustrating to work on but

PROJECT PARTICIPANTS WERE:

RECIPIENT: BEHLEN INDUSTRIES **OWNER:** CITY OF CALGARY **ARCHITECT:** STANTEC **STRUCTURAL ENGINEER:** STANTEC **GENERAL CONTRACTOR:** MAPLE/NASON CHINOOK DBJV **STEEL ERECTOR:** TRU-STEEL INC.

"Looking back at the project, I know everyone on the team feels the same way. It was a challenging and unusual project for us, but we're all glad we did it."

Pat Versavel, Behlen Industries

ultimately satisfying when it all came together."

Uncertainties in the building were less concrete. Versavel says, "The structural framing on this project was very long and not very tall, which are both unusual conditions. And because of the building's overall size and width, you have a higher number of structural members. That becomes a fabrication challenge, because your tolerances have to be more precise, obviously. As you add up all the pieces to form the assembly, you can't be out with your measurements as you progress down the line."

The effect of creep was also a challenge. The curing building was large in square footage but short in height. So, if tolerances weren't as precise as they need to be, a millimetre at the front would show up as a metre at the back end. A taller structure, for example, allows for more wiggle room, and that meant the team at Behlen's fabrication plant had to maintain tighter tolerances.

Versavel says, "Remember, we're not exactly building a Swiss watch with our structures – they are steel buildings. But with the compost facility, everything had to be seal-welded and the steel was hot-dip galvanized. Those were all extra layers of complexity. What was also different about this job was to introduce a concept as a solution. That's not typical for us. The GC may have had other solutions, but they liked ours and made some changes to it as we progressed, but they didn't have much developed on their side. So, the two things were going on in tandem."

In April 2019, Behlen Industries received the award in the Pre-Fabrication category at the CISC Manitoba/NW Ontario Steel Design Awards Gala in Winnipeg. Versavel concludes, "Looking back at the project, I know everyone on the team feels the same way. It was a challenging and unusual project for us, but we're all glad we did it. This kind of a build only broadens your horizons as a company, and you learn from it. Ultimately it was very satisfying, and the award was just the icing on the cake." AS

CANADIAN FORMULA

Infrastructure refurbishment

By Hellen Christodoulou, Ph.D. Eng., B.C.L., LL.B., M.B.A., Regional Director, Quebec, Canadian

1 GRAND PRIX

Institute of Steel Construction (CISC-CISC)

THE CIRCUIT GILLES-Villeneuve covers most of Montréal's Notre Dame Island and is an integral part of Parc Jean-Drapeau and its annual activities. The Canadian Formula 1 Grand Prix has been held there every year since 1978. This major event garners international visibility for both Montréal and Parc Jean-Drapeau.

NEW INFRASTRUCTURE AT THE CIRCUIT GILLES-VILLENEUVE

As part of the 2015 to 2029 renewal of the Canadian Grand Prix Agreement, the Société du Parc Jean-Drapeau (SPJD) committed to contributing to the refurbishment and expansion of the Circuit Gilles-Villeneuve infrastructure.

The objective of the project was to upgrade the equipment in the paddocks, which was built in 1988, to the requirements of the Fédération Internationale de l'Automobile (FIA) and the Formula One World Championship (FOWC) while increasing the capacity of the loges above the garages to 5,000 people, compared to 1,800 in the former building. Several structures had exceeded their useful lifespan and required upgrading.

The new construction inevitably required the demolition of the existing tower and garages, as well as the reconstruction of the building that houses, among other things, the team spaces, the control tower and the Paddock Club. In addition to meeting budget requirements, the mandate's main challenge was absolute adherence to the schedule prioritizing planned events.

Jonathan Binette, Eng., mentored by Alexandre Poulin, Eng., and Associate Partner (CIMA) acted as structural designer in addition to

"This modern, bright and versatile building, a new iconic addition to the City of Montréal, is a major project that positions FNX-INNOV as an expert and beacon in the field."

FNX-INNOV

PROJECT TEAM

CLIENT: SOCIÉTÉ DU PARC JEAN-DRAPEAU (SPJD) **STRUCTURAL ENGINEERS:** CIMA+ **ARCHITECT:** ARCHITECTES FABG **GENERAL CONTRACTOR:** GEYSER GROUP **GIRDERS:** CANAM GROUP **QUALITY CONTROL:** FNX-INNOV

Two Ironworkers completing bolting operations at a splice location of two track elements.

Credit: Martin Brossu

Major projects: Espace Paddock – An international-scale experience, just steps from downtown Montréal

providing heightened oversight of the Canadian Formula 1 Grand Prix infrastructure refurbishment. Very specific constructability challenges had to be considered in the design, such as absolute adherence to the schedule to limit any impact on event activities, a small, enclosed workspace between the Olympic Basin and the racetrack and structural work primarily undertaken in winter conditions. Binette opted for a steel structure design, which allowed the team to meet both the technical challenges and the project's very tight deadlines. As compared to other construction materials, this choice afforded the Société du Parc Jean-Drapeau a more cost-effective solution.

The new paddocks at the Circuit Gilles-Villeneuve houses the garages of the various F1 teams, control tower, staff premises, corporate loges, media spaces and podium. The three-storey building, with a surface area of more than 21,500 square metres, comprises a ground-floor structural slab on screw piles, steel framing covered primarily by composite cement slabs on the upper floors and glued-laminated timber roofing. A design using concrete slab on metal deck and girders was favoured in the office area due to smaller spans. The trusses were supplied by CANAM Group Inc.

With a length of more than 300 metres, the building was separated into four structurally independent sections with connections allowing for longitudinal movement. Sliding steel beams allow the expansion joints separating these sections to move.

BUILDING SEPARATED INTO FOUR SECTIONS

- Longitudinal expansion joints to mitigate the effects of thermal expansion
- Fabrication of exposed steel meets AESS requirements and specifications
- Composite beams on upper floors to maximize the capacity of steel beams
- Exposed columns in HSS with tapered ends
- Plan design: Final plans and specifications within six months
- Construction of the paddocks: Nine-month construction timeline

A building that aims to be multi-purpose, conventional in its choice of materials and modern in its envelope. While blending almost seamlessly into the Parc's landscape, the refurbishment of the Circuit Gilles-Villeneuve paddocks includes:

- An accelerated project completed in record time – ten months between two Canadian Grand Prix events,
- A concern for the surrounding ecosystem and users of nearby facilities, including the Olympic Basin and Jean-Doré Beach, as well as cyclists on the circuit, and
- Carefully selected construction methods, including factory-prefabricated structures requiring little assembly on site.

ENTERPRISING DESIGN BY ARCHITECTES FABG

The bold design of Architectes FABG presented structural engineers with several significant challenges. Among them are very long spans (more than 12 metres), numerous overhangs at each end of the building, leaning tubular steel columns with conical tops slanted on two floors, precast concrete slabs on tiered beams, giant

"We are very proud to have been able to showcase the expertise of Canadian steel artisans on a project that has incredible international visibility."

ALEXANDRE POULIN, Eng. Associate Partner / Project Engineer / Building–Structure, CIMA

screen mounts on the roof, solar panel mounts and virtually no margin for error with respect to completely masking the steel connections in the wooden beams.

Composite steel beams were used in the design for their extremely broad span. Adding Nelson studs on the upper cap makes composite action between the steel beams and the concrete slab feasible. This optimizes the structure and minimizes the weight, thus cutting costs.

Designing the connections between the triangulated timber frame and the tubular steel columns was also a puzzle. The engineering and modelling of details required a high degree of optimization and precision. To meet both aesthetic and fire-resistance requirements, the steel joining plates had to withstand significant stress while remaining hidden inside the wood. Differences in the fabrication and installation tolerances of the two materials also had to be taken into account in the design of the connections.

An efficient and rigorous coordination process had to be implemented rapidly during the execution phase to allow the suppliers of wood and steel structures to quickly begin production.

A bright, modern and private space of astonishing magnitude in a unique location only five minutes from downtown Montréal. Facilities specially intended for the Formula 1 racing world, offering visitors from near and far a spectacular show and providing competitors and their teams a flawless experience.

Now occupying three floors, the building's layout has been completely reimagined to meet everyone's needs: team staff, media and commentators, but especially crowds eager for thrills in a state-of-the-art space!

On the first floor are more spacious garages for sports teams, plus a hospitality section in the back completely redesigned for added comfort.

The new paddocks will be able to accommodate technical garages and up to 13 teams, each of which will have two front entrances for single-seaters, drivers and technical teams, as well as a service entrance at the back of the building for equipment or quick access to the hospitality area.

Designed with no fixed dividing wall, the garage space is modular to best meet the team's needs during each Grand Prix du Canada event. Temporary partitions will be used to break up the space according to the technical needs of this ever-evolving sport.

When designing and drafting the plans, it was essential for the building's architecture to seamlessly blend into the natural surroundings of the Parc, with an emphasis on local know-how.

The elegant structure and choice of materials of the new paddocks enhance the Parc's unique environment: its insular nature, proximity to the city, the legacy of Expo 67 and, of course, the mythical Circuit Gilles-Villeneuve.

During the demolition of the old paddocks and construction of the new paddocks, the FNX-INNOV team of soil and material engineers and building specialists was contracted to monitor and control the quality of materials. Throughout the project, specialists provided ongoing lab-based quality-control services for all materials, including cement concrete structures, embankments, steel and timber structures and monitored the building's waterproofing and roofing work for optimum performance.

"This modern, bright and versatile building, a new iconic addition to the City of Montréal, is a major project that positions FNX-INNOV as an expert and beacon in the field." FNX-INNOV

INTEGRATED ARCHITECTURE AND ENGINEERING EXCELLENCE – QUEBEC AT ITS BEST!

The professionals who worked on the project therefore had a rich source of inspiration and judiciously opted for characteristics putting Quebec Engineering front and centre. AS

NEWS AND EVENTS

NEW MEMBERS & ASSOCIATES (FEBRUARY 2020)

MEMBERS

Steel Fabricator
Fabrication Dulac, Saint-Ludger, QC

Les Réparations Marc Marine Inc., Gatineau, QC

ASSOCIATES

Fabricator:
McGrath Contracting Ltd. Dba Coastal Welding & Metal Fabrication, Campbell River, BC

Cogan Wire & Metal Products, Terrebonne, QC

Consultant Company:
Niik Group inc., Edmonton, AB

Tacoma Engineers, Guelph, ON

Professional Individual:
Jeffery Reid, London, ON

Wayne Kassian, Calgary, AB

Professors:

Ronald Palma, Vancouver Community College

Carlos Molina Hutt, University of British Columbia

Sean Owen, British Columbia Institute of Technology

LAMBTON METAL SERVICE
SAFETY, QUALITY & SERVICE
LAMBTON METAL SERVICE
FABRICATING CONTRACTORS
LMS
Structural Steel Erectors
Structural Steel Fabrication and Erection
Specializing in Design-Build Projects
Open Web Steel Joists
Metal Roof Deck
Miscellaneous Steel
Stairs - Railings - Ladders - Walkways
General Maintenance
Custom Fabrication
Sand Blasting
Industrial Coatings
295 McGregor Road South
Sarnia, Ontario Canada
P.O. Box 457 N7T 7J4
Toll Free 1.888.569.6757
Phone 519.344.3939
www.lambtonmetalservice.ca
cisc icca
CWB CERTIFIED
NACE
THE WORLDWIDE CORROSION AUTHORITY
SSPC
SGS

Your partner for structural and specialized steel work services to the North American Energy/Power Generation, Oil and Gas, Mining, Agriculture, Forestry, and General Commercial Construction

MQM Quality Manufacturing Ltd.
Telephone : 506-395-7777
Fax : 506-395-7770
P.O. Box 3586 Main Station
2676 Commerce Street
Tracadie, New Brunswick E1X 1G5
www.mqm.ca

MQM
QUALITY MANUFACTURING
STRUCTURAL STEEL • PLATEWORK • MECHANICAL

valmont COATINGS

PURE METAL GALVANIZING, A VALMONT COMPANY
As Canada's largest custom galvanizer, Pure Metal Galvanizing augments the capabilities of its own highly experienced staff with access to the experience of the world's finest consultants through membership in national and international organizations.
Valmont Coatings protect steel for life.

Mississauga 416.675.3352
905.677.7491
Brantford 519.758.5505
238 Britannia Rd. E.
Mississauga, ON
valmontcoatings.com/locations/canada

Exact is proudly serving you from our 5 Canadian offices located in British Columbia, Alberta and New Brunswick.

- Structural and Miscellaneous Steel Detailing
- Connection Design
- Concrete Drafting
- BIM Coordination
- 3D Survey and Point Cloud Integration

Exact Detailing LTD.
Phone : (250) 590-5244
1770 Fort St. Unit 200
Victoria, BC V8R 1J5
www.exactdetailing.com

EXACT

We bring your goals to life with structure and integrity. Balancing practical expertise with innovative ideas, we know how to make your vision real, on time and on budget.

Atkins + Van Groll Consulting Engineers
Phone: (416) 489-7888
Email: hello@atkinsvangroll.com
130 Bridgeland Avenue, Suite 101
Toronto, ON M6A 1Z4
atkinsvangroll.com

ATKINS + VAN GROLL
CONSULTING ENGINEERS

M&G
M&G STEEL LIMITED
A Division of the TAGG Group of Companies

2285 Speers Road, Oakville ON L6L 2X9 / Tel: 905-469-6442 / Fax: 905-469-9662 / www.mgsteel.ca

Membership list as of August 2020

Legend:
*sales office only
B Buildings
Br Bridges
S Structural
P Platework
J Open-web Steel Joist

MEMBERS

FABRICATOR

ATLANTIC

Canam-Structures Saint-Gédéon-de-Beauce Plant J, S
Saint-Gédéon-de-Beauce, QC 418-582-3331
www.canamstructures.com

Cherubini Metal Works Limited B, Br, P, S
Dartmouth, NS 902-468-5630
www.cherubinigroup.com

Design Built Mechanical Inc. B, Br, S
Charlo, NB 506-684-2765
www.dbminc.ca

Livingston Steel Inc. B, S
Summerside, PE 902-724-2424
http://livingstonsteel.com

Marid Industries Limited B, S
Windsor Junction, NS 902-860-1138
www.marid.ca

Modular Fabrication Inc. Br, S
Miramichi, NB 506-622-1900
www.modularfab.com

MQM Quality Manufacturing Ltd. P, S
Tracadie-Sheila, NB 506-395-7777
www.mqm.ca

MSE Inc. B, P, S
Borden-Carleton, PE 902-855-2100
www.mseinc.ca

Ocean Steel & Construction Ltd. Fredericton Plant
Fredericton, NB 506-444-7989
www.oceansteel.com

Ocean Steel & Construction Ltd. - Saint John Plant B, Br, P, S
Saint John, NB 506-632-2600
www.oceansteel.com

Prebilt Structures Ltd. B, Br, P, S
Charlottetown, PE 902-892-8577
www.prebiltsteel.com

RKO Steel Limited - Dartmouth Plant 1 B, P, S
Dartmouth, NS 902-468-1322

RKO Steel Limited - Dartmouth Plant 2 Br, S
Dartmouth, NS
www.rkosteel.com

Tek Steel Ltd. S
Fredericton, NB 506-452-1949
www.teksteelltd.com

QUEBEC

Acier Métaux Spec. Inc. S
Chateauguay, QC 450-698-2161
www.metauxspec.ca

Acier MYK Inc.
Jonquière, QC 418-542-9381
www.aciermyk.com

Acier Sélect B
St-Jean-sur-Richelieu, QC 450-545-1767
www.acierselect.com

Canam Bridges Canada Inc. - Laval Plant B, S
Laval, QC 450-786-1300
www.canambridges.com

Canam-Bridges - Quebec Plant Br
Quebec City, QC 418-683-2561
www.canambridges.com

Canam-Structures Saint-Gédéon-de-Beauce Plant J, S
Saint-Gédéon-de-Beauce, QC 418-582-3331
www.canamstructures.com

Charpentes d'acier Sofab Inc. S
Boucherville, QC 450-641-2618
www.sofab.ca

Constructions PROCO Inc. S
St. Nazaire, QC 418-668-3371
www.proco.ca

Fabrication Dulac B, S
Saint-Ludger, QC 819-548-5839
www.fabricationdulac.com

Groupe Canam inc. | Canam Group Inc. Boucherville Plant J, S
Boucherville, QC
www.canam-construction.com

Lainco Inc. B, Br, S
Terrebonne, QC 450-965-6010
www.lainco.ca

Les Aciers Fax inc. B, S
Quebec, QC 418-841-7771

Les Constructions Beauce-Atlas Inc. Plant 1 B, S
Ste-Marie de Beauce, QC 418-387-4872
www.beauceatlas.ca

Les Constructions Beauce-Atlas Inc. Plant 2 Br
Ste-Marie de Beauce, QC

Les Industries V.M. Inc. S
Longueuil, QC 450-651-4901
www.industriesvm.com

Les Réparations Marc Marine
Gatineau, QC 819-893-9030
http://marcmarine.ca

Les Structures CDL Inc. S
St-Romuald, QC 418-839-1421
www.structurescdl.com

Les Structures G.B. Ltée P, S
Rimouski, QC 418-724-9433
www.structuresgb.com

Métal Moro Inc. S
Montmagny, QC 418-248-1018
www.metalmoro.com

Métal Perreault Inc. B, P, S
Donnacona, QC 418-285-4499
www.metalperreault.com

Mometal Structures Inc. B, S
Varennes, QC 450-929-3999
www.mometal.com

NGA Structure Inc. B, S
Drummondville, QC 819-477-6891
www.nga.qc.ca

Norgate Metal 2012 Inc. B
La Guadeloupe, QC 418-459-6988
www.norgatemetal.com

Produits Métalliques PMI S
Rimouski, QC 418-723-2610
www.pmistructures.com

Quirion Métal Inc. S
Beauceville, QC 418-774-9881
www.quirionmetal.com

Structures XL B, Br, J
Terrebonne, QC 450-968-0800
www.structuresxl.com

Sturo Metal Inc. S
Lévis, QC 418-833-2107
www.sturometal.com

Supermétal Structures Inc. P, S
Lévis, QC 418-834-1955
www.supermetal.com

Tecno-Métal Inc. B, S
Quebec, QC 418-682-0315
www.tecnometal.qc.ca

ONTARIO

AC Metal Fabricating Ltd.
Oldcastle, ON 519-737-6007

ACL Steel Ltd. S
Kitchener, ON 519-568-8822
www.aclsteel.ca

Akal Steel (2005) Inc. B, P, S
Brampton, ON 905-458-7555
www.akalsteel.ca

Algonquin Bridge A Division of AIL International Inc. Br
Thorndale, ON 226-213-4707
www.algonquinbridge.com

Arkbro Structures S
Mississauga, ON 905-766-4038
www.arkbrostructures.com

Benson Steel Limited J, S
Bolton, ON 905-857-0684
www.bensonsteel.com

Burnco Mfg. Inc. Br, S
Concord, ON 905-761-6155
www.burncomfg.com

C_ore Metal Inc. S
Oakville, ON 905-829-8588
www.coremetal.com

Canam-Buildings - Mississauga Plant J, S
Mississauga, ON 905-671-3460
www.canam-construction.com

Central Welding & Iron Works B, Br, P, S
North Bay, ON 705-474-0350
www.centralwelding.ca

Cooksville Steel Limited - Kitchener Plant S
Kitchener, ON 519-893-7646
www.cooksvillesteel.com

Cooksville Steel Limited - Mississauga Plant S
Mississauga, ON 905-277-9538
www.cooksvillesteel.com

D & M Steel Ltd. S
Newmarket, ON 905-836-6612

Fortran Steel Contracting Ltd. S
Ottawa, ON 613-821-4014
www.fortransteel.com

G & P Welding and Iron Works P, S
North Bay, ON 705-472-5454
www.gpwelding.com

Gensteel Division of Austin Steel Group Inc. S
Brampton, ON 905-799-3324
www.gensteel.ca

Hans Steel Canada B, Br, P
Stouffville, ON 905-640-1000

IBL Structural Steel Limited B
Mississauga, ON 905-671-3301
www.iblsteel.com

JCT Metals Inc. S
Strathroy, ON 519-518-0246
www.jctmetalsinc.com

Lambton Metal Service S
Sarnia, ON 519-344-3939
www.lambtonmetalservice.ca

Linesteel (1973) Limited B, S
Barrie, ON 705-721-6677
www.linesteel.com

Lorvin Steel Ltd. S
Brampton, ON 905-458-8850
www.lorvinsteel.com

M&G Steel Ltd. S
Oakville, ON 905-469-6442
www.mgsteel.ca

M.I.G. Structural Steel (Div. of 3526674 Canada Inc.) S
St-Isidore, ON 613-524-5537
www.migsteel.com

Mariani Metal Fabricators Limited S
Etobicoke, ON 416-798-2969
www.marianimetal.com

Mirage Steel Limited S
Brampton, ON 905-458-7022
www.miragesteel.com

Norak Steel Construction Limited S
Concord, ON 905-669-1767
www.noraksteel.com

Pittsburgh Steel Group S
Mississauga, ON 905-362-5097
www.pittsburghsteel.com

Quad Steel Inc. S
Bolton, ON 905-857-9404
www.quadsteel.ca

Shannon Steel Inc. S
Orangeville, ON 519-941-7000
www.shannonsteel.com

Steelcon Fabrication Inc. B
Brampton, ON 416-798-3343
www.steelcon.ca

Telco Steel Works Ltd. S
Guelph, ON 519-837-1973
www.telcosteelworks.ca

Trade-Tech Industries, Inc. B, P, S
Port Hope, ON 905-623-5060
www.tradetech.ca

Tresman Steel Industries Ltd. S
Mississauga, ON 905-795-8757
www.tresmansteel.com

Trevco Steel Ltd. B
Erin, ON 519-833-9009
www.trevcosteel.ca

Victoria Steel Corporation S
Oldcastle, ON 519-737-6151
www.victoriasteel.ca

Vulcraft Canada, Inc. J
Ancaster, ON 289-443-2000
www.vulcraft.ca

Walters Inc. - Hamilton Plant Br, P, S
Hamilton, ON 905-388-7111
www.waltersinc.com

Walters Inc. - Princeton Plant B, P, S
Princeton, ON
www.waltersinc.com

Walters Inc. - Stoney Creek Plant B, P, S
Stoney Creek, ON
www.waltersinc.com

MANITOBA / NW ONTARIO

Abesco Ltd. S
Winnipeg, MB 204-667-3981
www.abesco.ca

Behlen Industries LP B, Br
Brandon, MB 204-728-1188
www.behlen.ca

Capitol Steel Corp. Br, S
Winnipeg, MB 204-889-9980
www.capitolsteel.ca

Coastal Steel Construction Limited P, S
Thunder Bay, ON 807-623-4844
www.coastalsteel.ca

Lakehead Ironworks Inc. S
Thunder Bay, ON 807-622-0658
www.lakeheadironworks.com

Sperling Industries Ltd. B, Br, P, S
Sperling, MB 204-626-3401
www.sperlingind.com

Supreme Steel LP B, P, S
Winnipeg, MB 204-589-7371
www.supremegroup.com

SASKATCHEWAN

Elance Steel Fabricating Co. Ltd. S
Saskatoon, SK 306-931-4412
www.elancesteel.com

IWL Steel Fabricators Ltd.
Martensville Plant B, P, S
Martensville, SK 306-242-4077
www.iwlsteel.com

IWL Steel Fabricators Ltd.
Saskatoon Plant B, P, S
Saskatoon, SK 306-242-4077
www.iwlsteel.com

Supreme Steel LP P, S
Saskatoon, SK 306-975-1177
www.supremegroup.com

Weldfab Ltd. S
Saskatoon, SK 306-955-4425
www.weldfab.com

ALBERTA

Bow Ridge Steel Fabricating S
Calgary, AB 403-230-3705

C.W. Carry Ltd. P, S
Edmonton, AB 780-465-0381
www.cwcarry.com

Canam-Buildings - Calgary Plant J, S
Calgary, AB 403-252-7591
www.canam-construction.com

Empire Iron Works Ltd. J, P, S
Wabamun, AB 780-892-3773
www.empireiron.com

Garneau Manufacturing Inc. S
Morinville, AB 780-939-2129

Metal-Fab Industries Ltd. S
Rock View, AB 403-236-5211
www.metal-fab.ca

Norfab Mfg (1993) Inc. B, P, S
Edmonton, AB 780-447-5454
www.norfab.ca

Rapid-Span Bridges Inc. Br
County of Grande Prairie No. 1, AB 780-538-9199

RIMK Industries Inc. B, S
Calgary, AB 403-236-8777

Supermétal Structures Inc.
Western Division P, S
Leduc, AB 780-980-4830
www.supermetal.com

Supreme Steel LP Br, S
Acheson, AB 780-483-3278
www.supremegroup.com

Supreme Steel LP B, Br, P, S
Edmonton, AB 780-467-2266
www.supremegroup.com

Supreme Steel LP P, S
Edmonton, AB 780-467-2266
www.supremegroup.com

Supreme Steel LP P, S
Edmonton, AB 780-483-3278
www.supremegroup.com

Triangle Steel Ltd.
Calgary, AB

TSE Steel Ltd. S
Calgary, AB 403-279-6060
www.tsesteel.com

Vulcraft Canada Inc. J
Nisku, AB 780-955-3390
www.omegajoists.com

Vulcraft Canada Inc. J
Leduc, AB 587-453-0620
www.vulcraft.ca

WF Steel & Crane Ltd. S
Nisku, AB 780-955-7671
www.wfsteelandcrane.com

BRITISH COLUMBIA

AI Industries
Surrey, BC 604-583-2171
www.ai-industries.com

George Third & Son P, S
Burnaby, BC (604) 526-2333
www.gthird.com

Impact Ironworks Ltd. B, S
Surrey, BC 604-888-0851

JP Metal Masters 2000 Inc. B, Br, J, P, S
Maple Ridge, BC 604-465-8933
www.jpmetalmasters.com

Northern Steel Ltd. B, Br, P
Prince George, BC 250-561-1121

Pacific Industrial & Marine Ltd. Br, P
Duncan, BC 250-746-7272
www.pacificindustrialmarine.ca

Rapid-Span Structures Limited Br, P
Armstrong, BC 250-546-9676
www.rapidspan.com

Solid Rock Steel Fabricating Co. Ltd. S
Surrey, BC 604-581-1151
www.solidrocksteel.com

Supreme Steel Vancouver B, Br, P, S
Delta, BC 604-524-4421
www.supremegroup.com

Warnaar Steel Tech Ltd. S
Kelowna, BC 250-765-8800
www.warnaarsteel.com

Wesbridge Steelworks Limited S
Delta, BC 604-946-8618
www.wesbridge.com

West Coast Steel Ltd. B, Br
Coquitlam, BC 604-554-0171
www.westcoaststeel.ca

SERVICE CENTRE OR STEEL WAREHOUSE

A.J. Forsyth, A Division of Russel Metals Inc.
Delta, BC 604-525-0544
www.russelmetals.com

Acier Leroux Boucherville
Division de Métaux Russel Inc.
Boucherville, QC 450-641-2280
www.leroux-steel.com

Acier Pacifique Inc.
Laval, QC 514-384-4690
www.pacificsteel.ca

Custom Plate & Profiles Ltd.
a div. of Samuel, Son Co. Ltd
Delta, BC 604-524-8000
www.customplate.net
Cut to size steel plate in various grades to 12" thick. Stock size sheets of plate to 12"

Metalium Inc.
Laval, QC 450-963-0411
www.metalium.com

Russel Metals Inc. [Edmonton]
Edmonton, AB 780-439-2051
www.russelmetals.com

Russel Metals Inc. [Lakeside]
Lakeside, NS 902-876-7861
www.russelmetals.com

Russel Metals Inc. [Mississauga]
Mississauga, ON 905-819-7777
www.russelmetals.com

Russel Metals Inc. [Saskatoon]
Saskatoon, SK 306-931-3338

Russel Metals Inc. [Winnipeg]
Winnipeg, MB 204-772-0321
www.russelmetals.com

Samuel, Son & Co., Limited
Nisku, AB 780-955-4750
www.samuel.com

Triad Metals Inc.
Oshawa, ON 905-732-2100
www.triadmetals.com

VARSTEEL Ltd. [Delta]
Delta, BC 604-946-2717
www.varsteel.ca
Beam, angle, channel, HSS plate, sheet, expanded metal, pipe flats, rounds etc.

VARSTEEL Ltd. [Lethbridge]
Lethbridge, AB 403-320-1953
www.varsteel.ca
Beam, angle, channel, HSS plate, sheet, Grating, expanded metal, pipe, flats, rounds etc.

VARSTEEL Ltd. [Nisku]
Nisku, AB 780-955-1953
www.varsteel.ca

VARSTEEL Ltd. [Saskatoon]
Saskatoon, SK 360-955-3777
www.varsteel.ca

Mill/Aciérie
Atlas Tube Canada ULC
Harrow, ON 519-738-5000
www.atlastube.com

Gerdau Corporation
Whitby, ON 905-668-8811
www.gerdau.com/longsteel

DETAILER

A.D. Drafting B
Brampton, ON 905-488-8216

A-1 Detailing and Engineering Ltd. B, P
Nackawic, NB 506-575-1222

Acklam Drafting Service B, Br, S
Tecumseh, ON 519-979-1674

Aerostar Drafting Services B
Georgetown, ON 905-702-7918

Apex Structural Design Ltd. B
Red Deer, AB 403-343-2001
www.apexstructural.ca

Astructures Inc. B, S
Chambly, QC 514-267-3840
www.astructures.com

CADD Atla Drafting & Design B
Edmonton, AB 780-461-3550
www.caddalta.com

Dessins de Structures DCA Inc. B
Lévis, QC 418-835-5140
www.structuredca.com

Draft-Tech Inc. B
Tecumseh, ON 519-979-3858
www.dtigroup.ca

Dtech Enterprises Inc. B
White Rock, BC 604-536-6572
www.dtechenterprises.com

Exact Detailing Ltd. B, Br, J, P
Victoria, BC 250-590-5244
www.exactdetailing.com

Haché Technical Services Ltd.
Haché Services Techniques Ltée B, P
Caraquet, NB 506-727-7800

Husky Detailing Inc. B
Zurich, ON 226-219-6293
www.huskydetailing.com

iGL Inc. B
Trois-Rivières, QC 888-573-4982

IKONA Drafting Services Inc.
Regina, SK 306-522-2650

INFocus Detailing Inc. B, Br, P
Kemble, ON 519-376-8717
www.infocusdetailing.com

IRESCO Ltd. B
Edmonton, AB 780-433-5606
www.steeldetailers.com

JCM & Associates Limited B, P
Frankford, ON 613-398-6510
www.jcmdrafting.com

JITECH ASSOCIATES, INC. B, Br, P, S
Montreal, QC 514-697-8999
http://jitech.ca

JMT Consultants Inc. B, P
Winnipeg, MB 888-781-8952
www.jmtconsultants.com

JP Drafting Ltd. B, Br, J, P
Maple Ridge, BC 604-465-8933
www.jpdrafting.com

KGS Group Steel Detailing Division B
Winnipeg, MB 204-896-1209
www.kgsgroup.com

Les Dessins Trusquin Inc. B, Br
Boisbriand, QC 450-420-1000
www.trusquin.com

ProDraft Inc. B, Br, P
Surrey, BC 604-589-6425
www.prodraftinc.com

Ranmar Technical Services Ltd. B, P
Mt. Pearl, NL 709-364-4158
www.ranmartech.com

Redfox Structural Design Ltd.
Rogersville, NB 506-346-0144
www.redfoxstructural.ca

River City Detailers Limited B, Br, P, S
Winnipeg, MB 204-221-8420
www.rivercitydetailers.com

Service Technique Asimut inc
Charny, QC 418-988-0719
www.asimut.ca

Summyx inc. Br, S
Ste-Marie, Beauce, QC 418-386-5484
www.summyx.com

TDS Industrial Services Ltd. B, P
Prince George, BC 250-561-1646
www.tdsindustrial.com

Techflow Inc. B, Br, J, S
Langley, BC 604-880-9552
http://techflowengg.com

Tenca Steel Detailing Inc. Br
Quebec, QC 418-634-5225
www.tencainc.com

Vet Dessin
Terrebonne, QC 450-477-1000
www.vetdessin.com

AFFILIATE

CWB Group/Le Groupe CWB
Milton, ON 905-542-1312
www.cwbgroup.org

ASSOCIATES

SMALL & MISCELLANEOUS FABRICATOR

Acier Charron Ltée
Boisbriand, QC 450-434-1890
www.aciercharron.com

A-Post Aluminum Fabricators
Winnipeg, MB 204-663-8800
www.a-post.com

Bourque Industrial Ltd
Saint John, NB 506-633-7740
www.bourqueindustrial.com

Coastal Welding & Metal Fabrication a division of McGrath Contracting Ltd.
Campbell River, BC 250-286-9992
www.coastalwelding.ca

Cogan Wire & Metal Products Ltd.
Terrebonne, QC 514-353-9141
www.cogan.com

Ed Lau Ironworks Limited
Kitchener, ON 519-745-5691
www.edlau.com

EZ-Steel (A division of Quirion Metal)
Leduc, AB 780-980-2001
www.ezsteel.ca

Ganawa Bridge Products and Services
Ajax, ON 905-686-5203
www.ganawa.ca

I & M Welding & Fabricating Ltd.
Saskatoon, SK 306-955-4546

Magnum Fabricators Ltd.
Kamloops, BC 250-374-9771
www.magnumfab.com

Maple Industries Inc.
Chatham, ON 519-352-0375
www.mapleindustries.ca

NorthWest Fabricators Ltd.
Athabasca, AB 780-675-4900

Old Tymer Welding
Orillia, ON 705-327-1964
www.oldtymerwelding.com

Payford Steel Inc.
Thunder Bay, ON 807-577-8455
www.payfordsteel.com

Times Iron Works Inc.
Stouffville, ON 905-888-9696
www.timesironworks.ca

ERECTOR

Arcweld Industries Inc. B, Br, J, P, S
Winnipeg, MB 204-661-3867
www.arcweld.ca

E.S. Fox Limited B, Br, J, P, S
Niagara Falls, ON 905-354-3700
www.esfox.com

K C Welding Ltd. B
Angus, ON 705-424-1956

KWH Constructors Ltd. B, Br
Burnaby, BC 604 629 4897

Niagara Rigging & Erecting Company Ltd. B, Br, J, S
Thorold, ON 289-296-4594

Stampa Steel Erectors Ltd. B, Br
Vaughan, ON 905-760-9988
www.stampasteel.com

Structures de Beauce Inc. B, Br, J, S
Sainte-Marie, QC 418-464-2000
www.structuresdebeauce.com

Valley Structures Ltd.
Perth-Andover, NB 506-273-2244
www.valleystructuresltd.com

SUPPLIER

Acier Altitube Inc. / Altitube Steel Inc.
Chomedey, Laval, QC 450-975-8823
www.altitube.com

Acier Picard Inc.
St-Romuald, QC 418-834-8300
www.acierpicard.com

Advanced Bending Technologies Inc.
Langley, BC 604-856-6220
www.bending.net
Rolled or bent structural sect

Aggressive Tube Bending Inc.
Surrey, BC 604-662-4872

AGT Robotics
Trois-Rivières, QC 819-693-9682
www.agtrobotics.com

Agway Metals Inc.
Brampton, ON 905-799-7535
www.agwaymetals.com

Akhurst Machinery
Edmonton, AB 780-435-3936
www.akhurst.com

All Fabrication Machinery J.V.
Leduc, AB 780-980-9661
www.allfabmachinery.com

Amcan Jumax Inc.
St-Hubert, QC 450-445-8888
www.amcanjumax.com

Amico Canada Inc.
Langley, BC 604-607-1475
www.amicoglobal.com

Applied Bolting Technology
Bellows Falls, VT 802-460-3100
www.appliedbolting.com

AXIS Inspection Group Ltd.
Winnipeg, MB 204-488-6790
www.axisinspection.com

AZZ Inc.
Montréal-Est, QC 514-322-9120
www.azz.com

Bentley Systems, Incorporated
Burlington, ON 800-236-8539
www.bentley.com

Borden Metal Products (Canada) Limited
Beeton, ON 905-729-2229
www.bordengratings.com
Aluminum, stainless steel, steel grating

Brunswick Steel
Winnipeg, MB 204-224-1472
www.brunswicksteel.com
Steel-structures plate bars, HSS

BuildingPoint Canada Inc.
Boisbriand, QC 855-922-6735
www.buildingpointcanada.ca

Canadian Quality Inspections Ltd.
Winnipeg, MB 204-663-7775
www.cqinspections.ca

CANSTUD Welding And Supply Inc.
Delta, BC 604-952-4066
www.canstud.com

Carboline / AD Fire Protection
Whitby, ON 877-393-3303
www.adfire.com

Cast Connex Corporation
Toronto, ON 416-806-3521
www.castconnex.com

Cloverdale Paint Inc.
Edmonton, AB 780-453-5700
www.cloverdalepaint.com
Specialty hi-performance industrial coatings and paint products

Cloverdale Paint Inc. - B.C. Region
Surrey, BC 604-329-0703

Commercial Sandblasting & Painting Ltd.
Saskatoon, SK 306-931-2820
Sandblasting and protective coating applications

Corbec Inc.
Lachine, QC 514-364-4000
www.corbecgalv.com
Supplier of hot dip galvanizing only

Corbec Inc.
Lachine, QC 514-364-4000
www.corbecgalv.com
Supplier of hot dip galvanizing only

Corrcoat Services Inc. Sandblasters and Coaters
Surrey, BC 604-881-1268
www.corrcoat.ca
Sandblasters and coaters

Court Galvanizing Ltd.
Cambridge, ON 519-624-5544
www.courtgalvanizingltd.com

Cowan Insurance Group
Cambridge, ON 519-650-6363
www.cowangroup.ca

Daam Galvanizing Edmonton Ltd.
Edmonton, AB 780-468-6868
www.daamgalvanizing.com
Hot dip galvanizing

Daam Galvanizing Saskatoon Ltd.
Saskatoon, SK 306-242-2202
www.daamgalvanizing.com
galvanizing services

DryTec Trans-Canada
Terrebonne, QC 450-965-0200
www.drytec.ca
Grating, metallizing, paint

EBCO Metal Finishing L.P.
Richmond, BC 604-244-1500
www.ebcometalfinishing.com
Hot dip galvanizing

Ficep Corporation
Forest Hill, MD 410-588-5800
www.ficepcorp.com

Frank's Sandblasting & Painting
Nisku, AB 780-955-2633

Graitec Inc.
Montreal, QC 514-935-1155
www.graitec.ca

Harris Transport Ltd.
Winnipeg, MB 204-255-2700
www.harristransport.ca

Harsco Industrial IKG (Grating Division)
Newmarket, ON 905-953-7779
www.harsco.com

HDIM Protective Coatings
Edmonton, AB 780-482-4346
www.hdimpc.ca

Industries Desormeau Inc.
St-Léonard, QC 514-321-2432
www.desormeau.com

Infasco
Marieville, QC 450-658-8741
www.infasco.com

Inland Steel Products Inc.
Saskatoon, SK 306-652-5353
www.inlandsteelproducts.com

International Paints, a div. AkzoNobel
Edmonton, AB 780-454-4900
www.international-pc.com

Kubes Steel Inc.
Stoney Creek, ON 905-643-1229
www.kubesteel.com

La Compagnie Américaine de Fer et Métaux Inc. / American Iron & Metal Inc.
East Montréal, QC 514-494-2000
www.scrapmetal.net

Leland Industries Inc.
Toronto, ON 416-291-5308
http://leland.ca

Les Produits Métalliques Bailey Limitée
Dorval, QC 514-735-3455
www.bmp-group.com

Les Soudures Giromac enr.
Papineauville, QC 819-427-5377

Lincoln Electric Company of Canada LP
Toronto, ON 416-421-2600
www.lincolnelectric.com
Welding equipment and welding

Magnus Inc.
Ste-Thérèse, QC 866-435-6366
www.magnus-mr.ca
SDS/2 Design Software

McCann Equipment Ltd. / Équipement McCann Ltée.
Oakville, ON 905-829-3393
www.torquetools.com

Metal Fabricators and Welding Ltd.
Edmonton, AB 780-455-2186
www.metalfab.ca

Midway Wheelabrating Ltd.
Abbotsford, BC 604-855-7650
www.midwaywheelabrating.com
Wheelabrating, sandblasting, industrial coatings

Moore Brothers Transport Ltd.
Mississauga, ON 905-840-9872
www.moorebrothers.ca

Nucap Industries Inc.
Toronto, ON 416-494-1444
www.gripmetal.com

Nucor Grating [Edmonton]
Edmonton, AB 780-481-3941
www.fisherludlow.com
Welded steel/ aluminum/stainless steel grating, "Grip Span" and "Shur Grip" safety grating

Nucor Grating [Longueuil]
Pointe Aux Trembles, QC 514-640-5085
www.fisherludlow.com
Welded steel/ aluminum/stainless steel grating, "Grip Span" and "Shur Grip" safety grating

Nucor Grating [Surrey]
Surrey, BC 604-888-0911
www.fisherludlow.com
Welded steel/ aluminum/stainless steel grating, "Grip Span" and "Shur Grip" safety grating

Pacific Bolt Manufacturing Ltd.
Langley, BC 604-524-2658
www.pacbolt.com
Steel fasteners, structural bolts, anchor bolts, tie rods

Peddinghaus Corporation
Bradley, IL 815 937 3800
www.peddinghaus.com

Peikko Canada Inc.
Quebec, QC 418-263-2023

Peinture Internationale (une division de Akzo Nobel Peintures Ltée) / International Paints (A Division of Akzo Nobel Coating Ltd.)
Dorval, QC 514-631-8686
www.international-coatings.com
Protective coatings, corrosion-resistant paints

Praxair Canada Inc.
Darmouth, NS 902-468-0978
www.praxair.com

Pure Metal Galvanizing
Mississauga, ON 905-677-7491
www.puremetal.com

Rapid Check Solution
Delson, QC 514-434-8778
http://rapidchecksolution.com

Reliable Tube Inc.
Langley, BC 604-857-9861
www.reliabletube.com
Hollow structural steel tube

Selectone Paints Inc.
Weston, ON 416-742-8881
www.selectonepaints.ca
Paint primers, fast dry enamels, coatings

SGS Canada Inc.
Montréal, QC 800-361-1679
www.sgs.ca

Silver City Galvanizing Inc.
Delta, BC 604-524-1182
Custom "hot dip' Zinc Galvanizing: Picking and Oiling

Sivaco Québec
Marieville, QC 450-658-7694
www.sivaco.com/sivacoquebec

Skyway Canada Inc.
Edmonton, AB 780-413-8007
www.skycan.ca

STRUMIS LLC
Collegeville, PA 610-280-9840

Superior Finishes Inc.
Winnipeg, MB 204-985-9820
www.superiorfinishesinc.com

Supreme Galvanizing Ltd.
Brampton, ON 905-450-7888
www.supremegalvanizing.com

Terraprobe Inc.
Brampton, ON 905-796-2650
www.terraprobe.ca

The Blastman Coatings Ltd.
Brampton, ON 905-450-0888
www.blastmancoatings.com

The Sherwin-Williams Company
Edmonton, AB 780-289-5322
www.sherwin-williams.com

The Sherwin-Williams Company
Oakville, ON 416-676-2954
www.sherwin-williams.com

The Sherwin-Williams Company
Dartmouth, NS 506-381-0743
www.sherwin-williams.com

The Sherwin-Williams Company
Anjou, QC 514-754-8008
www.sherwin-williams.com
Specialty industrial coatings

Tuyaux et Matériel de Fondation Ltée / Pipe and Piling Supplies Ltd.
St. Hubert, QC 450-445-0050
www.pipe-piling.com
Hot Roll-Wide-Flange-Bearing Pile Beams

Vicwest Building Products [Delta]
Delta, BC 604-946-5316
www.vicwest.com
Steel metal floor/roof deck, wall and roof cladding

Vicwest Building Products [Edmonton]
Edmonton, AB 780-454-4477
www.vicwest.com
Steel metal foor/roof deck, wall and roof cladding

Vicwest Building Products [Moncton]
Memramcook, NB 506-758-8181
www.vicwest.com
Steel metal foor/roof deck, wall and roof cladding

Vicwest Building Products [Oakville]
Oakville, ON 800-387-7135
www.vicwest.com

Vicwest Building Products [Winnipeg]
Winnipeg, MB
Steel metal floor/roof deck, wall and roof cladding

Vixman Construction Ltd.
Rockwood, ON 519-856-2000
www.vixman.com
Roof and floor deck

Voortman USA Corporation
Monee, IL 708-885-4900
www.voortmancorp.com

Wells Fargo
Montreal, QC 514-868-2303

Z-Modular Canada Inc.
Toronto, ON 416-763-0383

CONSULTANT COMPANY

Adjeleian Allen Rubeli Ltd., Ottawa, ON 613-232-5786

AECOM Canada Ltd., Mississauga, ON 905-238-0007

AECOM Canada Ltd., Québec, QC 418-648-9512

ARUP, Toronto, ON 416-515-0915

Atkins + Van Groll Inc., Toronto, ON 416-489-7888

Axys Consultants inc.
Sainte-Marie de Beauce, QC 418-387-7739

Axys Consultants inc.
Sainte-Marie de Beauce, QC 418-387-7739

Bantrel Co., Calgary, AB 403-290-2800

BAR Engineering Co. Ltd.
Lloydminster, AB 780-875-1683

BBA inc., Mont-Saint-Hilaire, QC 450-464-2111

Blackwell, Toronto, ON 416-593-5300

BPTEC Engineering Ltd., Edmonton, AB 780-436-5376

Brenik Engineering Inc., Concord, ON 905-660-7732

Bureau d'études spécialisées inc.
Montréal, QC 514-393-1500

Calculatec Inc., Montréal, QC 514-525-2655

CBCL Limited (482), Halifax, NS 902-421-7241

CIMA+, Québec, QC 418-623-3373

CIMA+ Partenaire de génie, Laval, QC 514-337-2462

COSEB INC., Chambly, QC 514-229-2901

CPE Structural Consultants Ltd.
Toronto, ON 416-447-8555

Crosier Kilgour & Partners Ltd.
Winnipeg, MB 204-943-7501

CWMM Consulting Engineers Ltd.
Vancouver, BC 604-868-2308

D'Aronco, Pineau, Hébert, Varin
Laval, QC 450-969-2250

DaVinci Structures Inc., Quebec, QC 418-843-1000

Dialog Design, Edmonton, AB 780-429-1580

Dorlan Engineering Consultants Inc.
Mississauga, ON 905-671-4377

DTI Structural Engineers Inc.
Tecumseh, ON 519-979-3858

Elema Experts-Conseils, Montreal, QC 514-787-3355

ENGCOMP, Saskatoon, SK 306-978-7730

Entuitive, Vancouver, BC 604-900-6224

Entuitive, Toronto, ON 416-477-5832

Entuitive Corporation, Calgary, AB	403-879-1270
exp, Hamilton, ON	905-525-6069
Fluor Canada Ltd., Calgary, AB	403-537-4000
Glotman Simpson Consulting Engineers Vancouver, BC	604-734-8822
Golder Associates Ltd., Mississauga, ON	905-567-4444
Groupe-conseil Structura international Montréal, QC	514-360-3660
Haddad, Morgan and Associates Ltd. Windsor, ON	519-973-1177
Harbourside Engineering Consultants Darmouth, NS	902-405-4696
Hatch, Mississauga, ON	902-421-1065
Hatch, Saskatoon, SK	306-657-7500
Herold Engineering Limited Nanaimo, BC	250-751-8558
IBI Group, Etobicoke, ON	416-679-1930
IRC McCavour Engineering Group Inc. Mississauga, ON	905-607-7244
JML Engineering, Thunder Bay, ON	807-345-1131
Klohn Crippen Berger Ltd. Vancouver, BC	604-669-3800
Kontzamanis Graumann Smith MacMillan Inc. (KGS Group), Regina, SK	306-757-9681
Kova Engineering (Saskatchewan) Ltd. Saskatoon, SK	306-652-9229
Krahn Engineering Ltd., Vancouver, BC	604-294-6662
Latéral, Montréal, QC	514-883-3921
Leekor Engineering Inc., Ottawa, ON	613-234-0886
Les Conseillers BCA Consultants Inc. Montreal, QC	514-341-0118
Les Services exp inc. Drummondville, QC	819-478-8191
McElhanney, Vancouver, BC	604-683-8521
Morrison Hershfield Ltd., Markham, ON	416-499-3110
MPa GROUPE CONSEIL INC. Carignan, QC	450-447-4537
MTE Consultants Inc., Burlington, ON	905-639-5555
MTE Consultants Inc., Burlington, ON	905-639-5555
N.A. Engineering Associates Inc. Stratford, ON	519-273-3205
Niik Group, Edmonton, AB	780-868-4510
Number TEN Architectural Group Winnipeg, MB	204-942-0981
Omicron, Vancouver, BC	604-632-1144
ONEC Engineering Inc. Parkland County, AB	780-440-0400
Parsons Inc., Ottawa, ON	905-943-0500
Pharaoh Engineering Ltd. Medicine Hat, AB	403-526-6761
Pier Structural Engineering Corp. Waterloo,	519-885-3806
Pow Technologies, Div. of PPA Engineering Technologies Inc., Ingersoll, ON	519-425-5000
Protostatix Engineering Consultants Edmonton, AB	780-423-5855
R.J. Burnside & Associates Limited Collingwood, ON	705-446-0515
Raymond S.C. Wan, Architect Winnipeg, MB	204-287-8668
RJC Engineers, Calgary, AB	403-283-5073
RJC Engineers, Kelowna, BC	778-738-1700
RJC Engineers, Lethbridge, AB	403-320-0467
RJC Engineers, Nanaimo, BC	250-716-1550
RJC Engineers, Kitchener, ON	519-954-6392
RJC Engineers, Kingston, ON	613-767-6936
RJC Engineers, Kingston, ON	613-767-6936
RJC Engineers, Toronto, ON	416-977-5335
RJC Engineers, Vancouver,	604-738-0048
RJC Engineers, Victoria, BC	250-386-7794
RJC Engineers, Edmonton, AB	780-452-2325
Robb Kullman Engineering Ltd. Saskatoon, SK	306-477-0655
Safe Roads Engineering, Gormley, ON	905-727-4198
Schorn Consultants Ltd., Waterloo, ON	519-884-4840
SDK et Associés, Montréal, QC	514-938-5995
Siefken Engineering Ltd. New Westminster, BC	604-525-4122
SKC Engineering Ltd., Surrey, BC	604 882 1889
SNC Lavalin Inc. (Montréal) Montréal, QC	514-393-1000
Stantec Consulting Ltd, Calgary, AB	403-716-8000
Stantec Consulting Ltd, Calgary, AB	403-716-8000
Stantec Consulting Ltd, Edmonton, AB	780-917-1879
Stantec Consulting Ltd., Winnipeg, MB	204-489-5900
Stantec Consulting Ltd., Saskatoon, SK	306-667-2400
Stantec Consulting Ltd., Vancouver, BC	604-696-8176
Stantec Consulting Ltd., Victoria, BC	250-388-9161
Stantec Consulting Ltd., Dartmouth, NS	902-468-7777
Stantec Consulting Ltd., Longueuil, QC	514-281-1033
Stantec Consulting Ltd., Ottawa, ON	613-784-2303
Stantec Consulting Ltd., Yellowknife, NT	867-920-2882
Stantec Consulting Ltd., Mississauga, ON	905-858-4424
Stephenson Engineering Ltd. Toronto, ON	416-635-9970
Tacoma Engineers, Guelph, ON	519-763-2000
Tower Engineering Group Limited Partnership Winnipeg, MB	204-925-1150
Valron Structural Engineers - Steel Detailers, Moncton, NB	506-856-9601
VanBoxmeer & Stranges Engineering Ltd. London, ON	519-433-4661
WALTERFEDY, Kitchener, ON	519-576-2150
Weiler Smith Bowers, Burnaby, BC	604-294-3753
WHM Structural Engineering Burnaby, BC	604-484-2859
Wolfrom Engineering Ltd. Winnipeg, MB	204-452-0041
Wood Canada Limited, Trail, BC	250-368-2407
Wood Canada Limited, Saskatoon, SK	306-477-1155
Wood Canada Limited, Dartmouth, NS	902 468 2848
Wood Group PSN, St. John's, NL	709-778-4000
WSP Canada Inc. (Markham) Markham, ON	905-475-7270

BUILDER / STAKEHOLDER

EdgeCorp Developments Ltd. Winnipeg, MB www.edgecorpgroup.com	204-771-4009
Impact Canada Regina, SK www.ironworkerswesterncanada.org	306-536-0442
Impact Canada St. Albert, AB www.impact-net.org	780-459-3389
Ironworkers International Coquitlam, BC www.ironworkers.org	614-313-8678
Ironworkers Local 97 Burnaby, BC www.ironworkerslocal97.com	604-879-4191
Ironworkers Local Union 728 Winnipeg, MB www.ironworkers728.com	204-783-7853
Manitoba Infrastructure (Water Management and Structures) Winnipeg, MB www.gov.mb.ca	204-391-5253
Neeginan College of Applied Technology Winnipeg, MB www.cahrd.org	204-989-9784
Ontario Erectors Association Thornbury, ON http://ontarioerectors.com	705-445-9415
Upbrella Construction Brossard, QC www.upbrella.com	450-646-5757

PROFESSIONAL - INDIVIDUAL

Vitomir, M Acimovic, Montréal, QC	514-940-9511
William J. Alcock, North Vancouver, BC	604-986-0663
Ahmed Altalmas, Red Deer, AB	406-596-8135
Dean Anderson, Albert, AB	587-290-3004
Christian Audet, Sherbrooke, QC	819-434-1832
Dwain A. Babiak, Calgary, AB	403-826-4744
Dwain A. Babiak, Calgary, AB	403-338-5826
Ray T. Bailey, St. John's, NL	709-579-4255
Stephen Barbour, St. John's, NL	709-753-2260
Michel Baril, Sherbrooke, QC	819-821-2395
Max Bischof, North Vancouver, BC	604-985-6744
Andrew Boettcher, Vancouver, BC	604-568-9373
Eric Boucher, Québec, QC	418-871-8103
Gordon D. Bowman, Gloucester, ON	613-742-7130
Jozef Budziak, Toronto, ON	416-740-5671
Julie Bui, London, ON	519-657-4703
Iain J. Cameron, Victoria, BC	250-999-9350
George Casoli, Richmond, BC	604-273-7737
James Chapman, Edmonton, AB	780-438-9000
François Charest, Repentigny, QC	450-581-8070
M.P. (Michel) Comeau, Halifax, NS	902-429-5454
Marc-André Comeau Salaberry-de-Valleyfield, QC	450-371-8585
Louis Crépeau, Montréal, QC	514-931-1080
Jean-Pierre Dandois, Magog, QC	514-592-1164
Ryan DeMerchant, Fredericton, NB	506-452-8480
Harold Dibben, Trenton, ON	613-392-9287
Daniel Dumont, Gatineau, QC	819-360-5229
Arno Dyck, Calgary, AB	403-255-6040
Afshin AE Ebtekar, Thornhill, ON	905-597-7723
Thomas Egli, Montreal, QC	514-845-2545
Elie El-Chakieh, Laval, QC	514 892 2717
Timothy Emmons, Inverary, ON	613-353-6865
Daniel A. Estabrooks, Saint John, NB	506-674-1810
Chris Evans, Udora, ON	705-228-8412
Timothy P. Fraser, Bellingham, WA	360-937-0448
Alex Fulop, Vaughan, ON	905-760-7663
Robert Gale, North Vancouver, BC	604-986-1222
Bernard Gérin-Lajoie, Outremont, QC	514-279-4821
Jean-Paul Giffard, Lévis, QC	418-839-7937

Eric Gilbert, Sherbrooke, QC	819-563-8960
Robert Girard, Chicoutimi, QC	418-549-9687
Kyle Girouard, Bathurst, NB	506-452-1804
John Green, Amherst, NS	902-667-3300
Donald Gregory, Hamilton, ON	905-218-5482
Movses R. Gulesserian, North York, ON	416-219-6651
John Stuart Hall, Ottawa, ON	613-789-0261
Matthew Hartog, Toronto, ON	416-368-1700
Roland A. Hase, Scarborough, ON	416-291-3723
Ralph W. Hildenbrandt, Calgary, AB	403-245-5501
Ralph W. Hildenbrandt, Calgary, AB	403-245-5501
Iraj Hoshyari, Langley, BC	604-888-1968
David Howard, Burlington, ON	905-632-9040
Roman Hudon, Winnipeg, ON	204-255-7251
Sean Hutchinson, Markham, ON	905-475-8727
Yousif Jarjees, Mississauga, ON	416-662-5300
Brian Johnson, Kanata, ON	613-591-1533
Jacob Kachuba, Mississauga, ON	416-254-2829
Wayne Kassian, Calgary, AB	403-255-6040
Ely E. Kazakoff, Kelowna, BC	250-763-2306
Ian M. Kier, Grande Prairie, AB	780-532-6035
Franz Knoll, Montréal, QC	514-878-3021
Antoni Kowalczewski, Edmonton, AB	780-451-9214
Zoltan Lakatos, Burlington, ON	905-331-8307
Claude Lamothe, Shefford, QC	514-927-2647
Pierre Lanoue, Laval, QC	450-973-5405
Barry F. Laviolette, Edmonton, AB	905-901-8535
Nazmi Lawen, Charlottetown, PE	902-368-2300
Graham Lawrence, Saint John, NB	506-634-8259
Hugo G. Le Bihan, Kelowna, BC	250-448-4830
Marc LeBlanc, Dieppe, NB	506-382-5550
Paul-Maurice LeBlanc, Drummondville, QC	819-395-2752
Normand Leboeuf, Montréal, QC	514-282-8100
Jeff Leibgott, St-Laurent, QC	514-933-6621
Salvatore Leo, Kirkland, QC	514-334-1234
William C.K. Leung, Woodbridge, ON	905-851-9535
Haijun Li, Markham, ON	905-479-9525
Chet Liu, Chatham, ON	519-351-9612
Clint S. Low, Vancouver, BC	604-688-9861
Ibe Marcus, Regina, SK	306-740-6147
Alfredo Mastrodicasa, Woodbridge, ON	905-856-2530
Rein A. Matiisen, Calgary, AB	403-338-5804
Brian McClure, Nanaimo, BC	250-713-9875
Glenn J. McMillan, London, ON	519-453-1480
Neil McMillan, Nepean, ON	905-697-9698
Konstantinos Mermigas, North Bay, ON	905-704-2345
Andrew W. Metten, Vancouver, BC	604-688-9861
Jason Mewis, Saskatoon, SK	306-978-7730
Yannick Michaud, Pohénégamook, QC	418-859-2927
Mark Milner, Richmond Hill, ON	905-737-6881
Namvar Moazzami, Calgary, AB	403-400-5345
Mark K. Moland, Lepreau, NB	506-659-6388
David T Molloy, Burlington, ON	905-332-1404
Neil A. Paolini, Etobicoke, ON	416-249-4651
Louis Paradis, Lac-Beauport, QC	418-572-8829
Françis Paré, Trois-Rivières, QC	819-373-1145
Serge Parent, Sherbrooke, QC	819-640-0310
Erick Pépin, St-Georges, QC	418-228-2223
Michael Picco, Concord , ON	905-760-9688
Gérard Pilon, Valleyfield, QC	450-373-9999
David Prud'Homme, Dorval, QC	514-833-4715
R. Paul Ransom, Burlington, ON	905-639-9628
Dan S. Rapinda, Winnipeg, MB	204-488-6674
Hamidreza Razaghi, Edmonton, AB	780-577-5662
Mehrak Razzvi, North Vancouver, BC	604-988-7131
Jeffery Reid, London, ON	519-204-6510
Joël Rhéaume, Beauport, QC	418-660-5858
Aaron Rideout, St. John's, NL	709-726-3468
Danny Rosanova, Markham, ON	905-475-8727
John Rosenquist, Lake Zurick, IL	847-540-9286
James Rudy, Beaconsfield, QC	514-426-1638
Chris Sargent, Grand Falls - Windsor, NL	709-489-9150
Joseph M. Sarkor, Kelowna, BC	250-868-1413
Ron Schmidt, Saskatoon, SK	306-668-0293
Michael D Simpson, Burlington, ON	905-331-7156
John A. Singleton, St. John's, NL	709-739-5500
Paul Slater, Kitchener, ON	519-743-6500
Lauchlin Smith, Edmonton, AB	780-409-3146
Terrence D. Smith, Toronto, ON	416 798 8770
Ralph E. Southward, Moffet, ON	905-639-7455
Ragavan Srinivasan, Red Deer, AB	406-596-8135
Steven Stelzer, Cote-Saint- Luc, QC	514-482-4989
Helene Theriault, Moncton, NB	506-875-0941
Bram Toomath, Vaughan, ON	905-580-4400
Darren B. Towells, Winnipeg, MB	204-227-1151
Mike L. Trader, Hamilton, ON	905-381-3231
Normand Trudel, Pierrefonds, QC	514-971-5484
Daniel E. Turner, Montréal, QC	514-344-1865
Aileme Unuigbe, Calgary, AB	403-668-6180
Vassily Verganelakis, Montreal, QC	514-342-3430
Stuart Veysey, Fredericton, NB	506-452-7000
Roger Vino, Surrey, BC	604-576-7369
Dave R.M. Vrkljan, Calgary, AB	403-241-2578
Brian Waddell, Cambridge, ON	519-267-6789
Michel Walsh, LaSalle, QC	514-364-0406
Andrew Watson, Kamloops, BC	250-374-2244
Kevin Wong, Markham, ON	905-305-6133
Daniela Xavier, Toronto, ON	647-774-3531
Chell K. Yee, Edmonton, AB	780-488-5636
Jinsheng Zhao, Calgary, AB	403-244-5029
Paul Zinn, Delta, BC	604-940-4050

TECHNICAL - INDIVIDUAL

Martin Kowalyk, Moose Jaw, SK 306-692-9594

NORTH AMERICA STEEL MILL PRODUCER

ArcelorMittal International Canada
Chicago, IL 905-320-6649
www.arcelormittal.com

Nucor-Yamato Steel Company
Blytheville, AR 870-762-5500
www.nucoryamato.com

Steel Dynamics, Inc. Structural and Rail Division
Columbia City, IN 260-625-8100
www.stld-cci.com

PROFESSIONAL - PROFESSOR

M. Shahria Alam
University of British Columbia, BC

Ahmed Alyousif
Conestoga College, ON

Charles-Darwin Annan
Université Laval, QC

Kaveh Arjomandi
University of New Brunswick, NB

Michael F. Bartlett
University of Western Ontario, ON

Tracy Becker
McMaster University, ON

Andre Begin-Drolet
Université Laval, QC

Geneviève Bérubé
Commission Scolaire de la Capitale/ CFP Neufchâtel, QC

Anjan Bhowmick
Concordia University, QC

Carisa Blancas
NAIT, AB

Richard Borger
Mohawk College, ON

Rocco Carbone
Mohawk College of Applied Arts and Technology, ON

Patrice Caron
College Montmorency, QC

Young-Jin Cha
University of Manitoba (Civil Engineering), MB

Constantin Christopoulos
University of Toronto, ON

Sreekanta (Sree) Das
University of Windsor, ON

Michael Dellar
Dawson College, QC

Serge Desbiens
Cégep de Jonquière, QC

Joe Di Cesare
Dawson College, QC

Robert G. Driver
University of Alberta, AB

Augustin Dukuze
University of New Brunswick, NB

Ahmed El Refai
Universite Laval, QC

Mamdouh El-Badry
University of Calgary, AB

Bob Fencott
Loyalist College, ON

J. Jill Ferguson
Assiniboine Community College, MB

Claude Ghazal
College Montmorency, QC

Faouzi Ghrib
University of Windsor, ON

Damien Gilles
Université de Montréal, QC

Antony Gillies
Lakehead University, ON

Riccardo Gioia
Concordia University, QC

Mohammad Givehchi
University of Toronto, ON

Yanglin Gong
Lakehead University, ON

Ryan Habkirk
Georgian College, ON

Ahmed Hamada
University of Waterloo, ON

Abdul Hameed
Sheridan College, ON

Jassim Hassan
Concordia University, QC

Khandaker Hossain
Ryerson University, ON

Rodney Hunter
SAIT Polytechnic , AB

Ali Imanpour
University of Alberta, AB

Emanuel Jannasch
Dalhousie University, NS

Heng-Aik Khoo
Carleton University, ON

Scott Krieg
Saskpolytech Kelsey Campus, SK

François Landreville
Collège Ahuntsic, QC

Jonathan Landry
La Cité Collégiale, ON

Abdul Nabi Lashari
Loyalist College, ON

Maura Lecce
Seneca College of App. Arts & Tech, ON

Frédéric Légeron
Université de Sherbrooke, QC

Yi Liu
Dalhousie University, NS

Alan Lloyd
University of New Brunswick, NB

Mitko Mancevski
Conestoga College, ON

Bahman (Ben) Marvi
EPIC College of Technology, ON

Brandon McCready
NAIT, AB

Bruce McGarvie
Vancouver Community College, BC

Terry McKenna
Holland College, PE

Magdi Emile Mohareb
University of Ottawa, ON

Phalguni Mukhopadhyaya
University of Victoria, BC

Bahman Noruziaan
Red River College of Applied Arts, Science and Technology, MB

Henry Ostermann
BCIT (British Columbia Institute of Technology), BC

Blaine Otteson
Saskatchewan Polytechnic, SK

Azzeddine Oudjehane
S.A.I.T., AB

Jeffrey A. Packer
University of Toronto, ON

Ronald Palma
Vancouver Community College, BC

Freddy Pina
University of British Columbia, BC

Gérard Poitras
Université de Moncton, NB

Patrick Poulin
Commission scolaire de la pointe-de-l'île, QC

Yves Rossignol
Université du Québec à Chicoutimi, QC

Sam Salem
Lakehead University - Civil Engineering, ON

Khaled M. Sennah
Ryerson University, ON

Lad Shaba
Northern College, ON

Andre Simoneau
University of New Brunswick, NB

Brian Sinclair
University of Calgary, AB

Nino Sirianni
St. Clair College - South Campus, ON

Ken S. (Siva) Sivakumaran
McMaster University, ON

Al Smith
NAIT, AB

Mauricio Soto Rubio
University of Calgary, AB

Gary Stroich
NAIT, AB

Min Sun
University of Victoria, BC

Michael J. Tait
McMaster University, ON

Lucia Tirca
Concordia University, QC

Kyle Tousignant
Dalhousie University, NS

Robert Tremblay
Ecole Polytechnique, CGM Dept., QC

Alexandra Trovato
NAIT, AB

Martin Turgeon
La Cité Collégiale, ON

Reza Ushaksaraei
McMaster University, ON

Scott Walbridge
University of Waterloo, ON

Jeff Walker
Cambrian College of Applied Arts and Technology., ON

Lydell Wiebe
McMaster University, ON

Gordon Wight
Royal Military College of Canada, ON

Lei Xu
University of Waterloo, ON

Tony T. Y. Yang
University of British Columbia, BC

Maged Youssef
University of Western Ontario, ON

STUDENT

Jesse Adamson
University of Manitoba, MB

Mohamed Afifi
McGill University, QC

Sylvester Agbo
University of Alberta, AB

Megan Alain
Université de Sherbrooke, QC

Zohra Alaoui
University of Waterloo, ON

Mohanad Albatta
Carleton University, ON

Mohammed Ali
University of Alberta, AB

Luther Ali-Pauni
Université de Sherbrooke, QC

Geneviève Allard
École de Technologie Supérieure (ETS), QC

Spencer Arbuckle
University of Waterloo, ON

Sergio Arevalo
University of Alberta, AB

Antoine Arsenault
Université Laval, QC

Abolfazl Ashrafi
University of Alberta, AB

Stephen Atkinson
University of Waterloo, ON

Mathieu Aumond
École de Technologie Supérieure (ETS), QC

Nicholas Baguma
Collège Ahuntsic, QC

Moad Bani
University of Alberta, AB

Augustine Banson
Université Laval, QC

Saleem Baraty
University of Manitoba, MB

Durlabh Bartaula
University of Alberta, AB

Thierry Béland
École Polytechnique de Montreal, QC

Clara Bénard
École de Technologie Supérieure (ETS), QC

Gabriel Bernard
École de Technologie Supérieure (ETS), QC

Miguelangel Bilotta
University of Alberta, AB

Jared Bobor
University of Waterloo, ON

Brandon Boles
McMaster University, ON

Ugo Brunet-Richer
École de Technologie Supérieure (ETS), QC

John Patrick Cardozo
University of Saskatchewan, SK

Olivier Charest
École de Technologie Supérieure (ETS), QC

Yu Chen
University of Waterloo, ON

Christie Corrigan
University of Waterloo, ON

James Craxton
University of British Columbia, BC

Mohammad Darwish
University of Alberta, AB

Arjie De Guzman
University of Saskatchewan, SK

Maria Luisa DeLorenzis
University of Waterloo, ON

François Déry
Université Laval, QC

Joël Desbiens
Université Laval, QC

Samuel Deschesnes
École de Technologie Supérieure (ETS), QC

Quinn Desrochers
University of Manitoba (Civil Engineering), MB

Jean-Michel Desroches
École de Technologie Supérieure (ETS), QC

Nicolette Dhillon
McMaster University, ON

Florian Madalin Dinta
Collège Ahuntsic, QC

Mark Draaistra
McMaster University, ON

Linda Duch
University of Manitoba (Civil Engineering), MB

Benedict Egbon
University of Alberta, AB

Naveen Emmanuel
Conestoga College, ON

Naier Faheem
University of Manitoba (Civil Engineering), MB

Mathieu Fokwa Soh
Ecole de Technologie Supérieure, QC

Jordan Fong
Ryerson University, ON

Nicolas Franklin
University of Waterloo, ON

MEMBER AND ASSOCIATE PRODUCTS/SERVICES DIRECTORY

Patrick Fronda
Ryerson University, ON

Anne-Sophie Gagné
Université Laval, QC

Pier-Luc Gagnon
École de Technologie Supérieure (ETS), QC

Michael Gibbs
University of Saskatchewan, SK

Rafael de Jesus Gonzalez Mariscal
University of Alberta, AB

Bryan Gosselin
École de Technologie Supérieure (ETS), QC

William Gourgues
Université Laval, QC

Michael Guevarra
University of Manitoba (Civil Engineering), MB

Odin Guzman Sanchez
University of Alberta, AB

Cangyu He
Red River College, MB

Brandon Hutchings
Red River College, MB

Shota Inoda
University of British Columbia, BC

Sara Jafarzadeh
Ryerson University, ON

Edouardo Jarbeau
University of Alberta, AB

Nasim Kalali
Ryerson University, ON

Renjithkrishnan Kamalasanan Nair
Conestoga College, ON

Parasdeep Kanda
University of Manitoba (Civil Engineering), MB

Supawee Khailor
University of British Columbia, BC

Muneeb Khan
Ryerson University, ON

Jason Kiritsis
Ryerson University, ON

Longco Ko
University of British Columbia, BC

Rajesh Kumar
University of Alberta, AB

Edward Labonté
École de Technologie Supérieure (ETS), QC

Alexandre Lacombe
École Polytechnique, CGM Dept., QC

Rémi Legendre
Université Laval, QC

Yu Yan Li
University of Manitoba, MB

Brenden Lie
McMaster University, ON

Kayla Lindsay
Lakehead University - Civil Engineering, ON

Geoffrey Liu
University of Waterloo, ON

Jimmy Luc
Ryerson University, ON

Melissa Luo
University of British Columbia, BC

Timmy (Han Song) Luo
University of British Columbia, BC

Adam Mahamat Ali Ahmat
Université de Sherbrooke, QC

Hilary Mak
University of British Columbia, BC

Michael Menssa
University of Saskatchewan, SK

Hossein Mohammadi
McMaster University, ON

Arash Mohsenijam
University of Alberta, AB

Pedram Mortazavi
University of Toronto, ON

Robert Moser
University of Saskatchewan, SK

Reza Mousapour
University of Alberta, AB

Ahmed Mowafy Saad
University of Alberta, AB

Joyceline Nathaniel
University of Waterloo, ON

Shuxian Nian
University of Waterloo, ON

Navid Niazkar
Concordia University, QC

Terdkiat Noomor
University of Waterloo, ON

Austin Oleksyn
University of Saskatchewan, SK

Aaron Omelan
University of Saskatchewan, SK

Joshua Omolewa
University of Alberta, AB

Isaac Orah
University of Manitoba, MB

Marc-Antoine Ouellette
École de Technologie Supérieure (ETS), QC

Erl Gerard Pakingan
University of Saskatchewan, SK

Renato Palma
University of Manitoba (Civil Engineering), MB

Justin Park
University of Alberta, AB

Harsh Vrajeshkumar Patel
University of Alberta, AB

Jean-Sébastien Paul
École de Technologie Supérieure (ETS), QC

Marina Pelletier
Université Laval, QC

Daly Penner
University of Manitoba (Civil Engineering), MB

Charles Pépin
Université Laval, QC

Manu Peringelil
Conestoga College, ON

Melanie Perreault
University of Waterloo, ON

Tina Pham
University of Waterloo, ON

Alex Pulvermacher
University of Saskatchewan, SK

Timothy Quijano
University of Waterloo, ON

Ahmad Rahmzadeh
University of British Columbia, BC

Neenu Raphy
Conestoga College, ON

Michael Roclawski
University of Waterloo, ON

Danny Romero
University of Alberta, AB

Mohammad Mahdi Sabouri Ghannad
Ryerson University, ON

Olga Savkina
University of Saskatchewan, SK

Mitchell Schoffro
McMaster University, ON

Yurichorong Seo
University of Manitoba (Civil Engineering), MB

Feras Sheitt
McMaster University, ON

Samuel Sherlock
University of Waterloo, ON

Prabin Shrestha
University of Alberta, AB

Shumsun Siddique
Lakehead University - Civil Engineering, ON

Kathie Soucy
École de Technologie Supérieure (ETS), QC

Taylor C. Steele
Stantec Consulting Ltd, NB

Bradley Stephen
McMaster University, ON

Davis Su
University of British Columbia, BC

Justine Tanguay
Université Laval, QC

Timothy Tenhage
McMaster University, ON

Marc-André Thibault
École de Technologie Supérieure (ETS), QC

Nastassja Thorsten
University of Manitoba (Civil Engineering), MB

Paige Tkachuk
University of Saskatchewan, SK

Rishitkumar Trivedi
Conestoga College, ON

Mikaël Turcotte
Concordia University, QC

Philip-Paul Vachon
École de Technologie Supérieure (ETS), QC

Samuel Vallières
Université Laval, QC

Jonathan Vandenberg
University of Manitoba (Civil Engineering), MB

Jordan Verville
École de Technologie Supérieure (ETS), QC

Rei Vila
University of Waterloo, ON

Yuan Wang
Université de Sherbrooke, QC

Jordan Weening
McMaster University, ON

Furong Wen
University of British Columbia, BC

Chandler White
University of British Columbia, BC

Hayden Wong
University of Waterloo, ON

Hye Won (Hana) Yang
University of British Columbia, BC

Kailey Zeran
McMaster University, ON

Hao Zhang
University of Alberta, AB

INDEX TO ADVERTISERS

ADVANTAGE STEEL

NO. 67 SUMMER 2020

Publisher
Michael Bell
michaelb@mediaedge.ca

Editor
Elyce Mankewich
elycem@mediaedgepublishing.com

Sales Executives
April Hawkes, Derek de Weerdt, Jack Smith, David Tetlock, Dawn Stokes

Senior Graphic Designer
Annette Carlucci

Published by:
MediaEdge
MediaEdge Publishing Inc.
33 South Station Street
North York, ON M9N 2B2
Toll-Free: 1-866-480-4717 ext. 229
531 Marion Street
Winnipeg, MB Canada R2J 0J9
Toll Free: 1-866-201-3096
Fax: 204-480-4420
www.mediaedgepublishing.com

President
Kevin Brown
kevinb@mediaedge.ca

Senior Vice-President
Robert Thompson
robertt@mediaedge.ca

Director, Business Development
Michael Bell
michaelb@mediaedge.ca

Branch Manager
Nancie Privé
nanciep@mediaedgepublishing.com

PLEASE RETURN UNDELIVERABLE COPIES TO: CISC-ICCA
445 Apple Creek Blvd, Suite #102
Markham, ON L3R 9X7
Telephone: 905-604-3231
Fax: 905-604-3239

PUBLICATION MAIL AGREEMENT #40787580
ISSN 1192-5248

Anything is possible.

Feature Walters is a single source provider for custom fabrication and installation of mixed materials projects.

Progressive architects and engineers rely on us to create the unique elements that define leading-edge architecture.

FEATURE WALTERS

www.featurewalters.com