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NO. 61 SUMMER 2018

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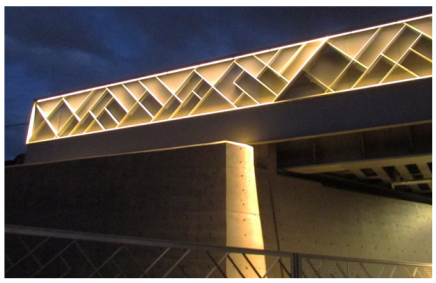

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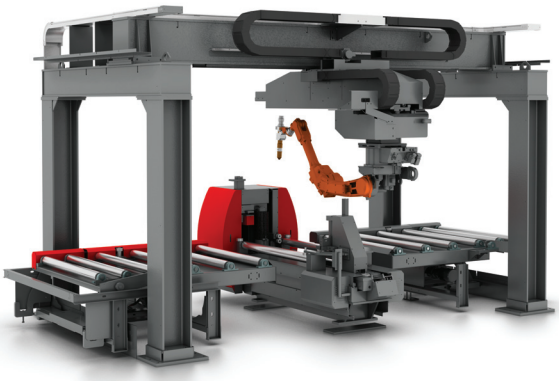

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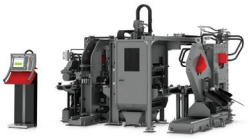

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ADVANTAGE STEEL

NO. 61 SUMMER 2018

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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:
Amazon's Spheres in Seattle, Washington

Photo courtesy of Supreme Steel

Marijuana legalization does not mean it is allowed in the workplace

Ed Whalen, P.Eng.
ewhalen@cisc-icca.ca

/cisc_icca

I AM ASSUMING YOU all have a company policy on drug use. What you may not have is a policy that clearly addresses the use and effects of marijuana use as it relates to the workplace. Whether or not you have a policy on the use of drugs, including alcohol, it is now time to either develop or update your existing policy to include marijuana.

According to the latest reports from the Liberal government, the target date for legalizing marijuana across Canada will happen in autumn of 2018. Provincial governments are scrambling to set up distribution channels, stock prices of licensed marijuana growers are increasing daily and even ex-police chiefs and RCMP officers have entered the marijuana business to profit from the expected boom. Legalized marijuana is coming whether you like it or not and your company should be ready now for that eventuality.

Even though marijuana will be legal, it doesn't mean that an employee can consume, ingest or smoke marijuana whenever they wish in the workplace. Without clear guidelines and rules in your company policy, you may be setting yourself up for a serious situation and liability.

FACT 1: Marijuana, like alcohol, is a mind altering drug that can not only pose productivity issues in the workplace; it can pose serious safety risks for the employee, to other employees and to the general public.

FACT 2: Unlike alcohol, marijuana is also an acceptable medical drug and as such may be required for a person to function properly. As a result, in some workplaces it may not be possible to ban marijuana entirely and some allowance may be required just like other medical drugs.

FACT 3: Marijuana can be smoked or consumed (edibles).

FACT 4: Testing and detection of marijuana and more important, impairment, is a bit more complicated than alcohol. The active ingredient (THC) used to detect marijuana use can show up for a day or more after use. Portable detectors available to police are not in wide-spread use or development and the determination of acceptable limits have not been determined. Like alcohol, marijuana impairment in most workplaces will be determined initially by behaviour.

So what should be the minimum considerations included in your drug policy that will now include marijuana? Here are some things to consider:

1. Review laws in your province for company requirements and restrictions relating to legal and non-legal drugs in the workplace.

2. Define clear DOs and DON'Ts (expectations) with respect to drug use (including marijuana) in the workplace.

3. Determine if you have "zero tolerance" limits or other limits with respect to drug levels in the body as it relates to certain or all jobs within your organization. This is especially important when medical marijuana is concerned. Can you allow a person that is required to take medical marijuana on the jobsite or in your shop for example?

4. Will you allow legal drugs (and which ones) at office events on or off the company premises?

5. Determine if non-medical drugs are physically permitted on company premises.

6. Have clearly defined outcomes in the event an employee is not in compliance with the company drug policy.

7. Determinization of the necessity and legality of drug testing.

8. A communication and training plan for management and all employees for the new company drug policy.

Much like alcohol and to some extent tobacco, there is a time and place for legalized drug use. Just because it is legal does not mean it is acceptable or safe in the workplace. AS

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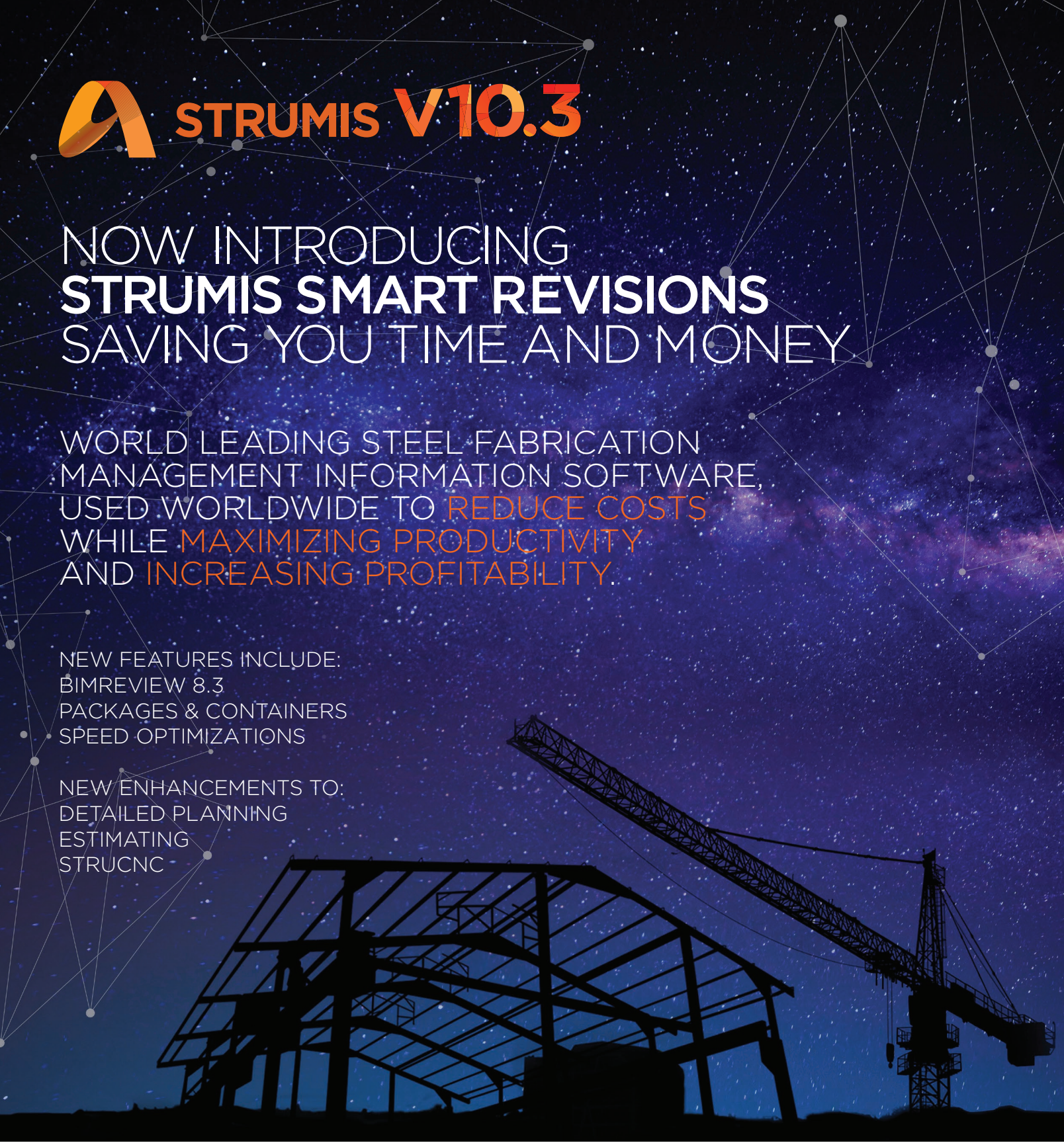

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Alfred F. Wong, P.Eng., F.CSCE
Director of Engineering

CISC provides this column as a 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 professional engineer, architect or other licensed professional.

Question 1a: I am designing a tension member in a highway bridge structure. Figure 1 shows the symmetrical splice with bolts in double shear. The member is a 20 mm thick plate, which is the inner ply as shown in Figure 1. It is wider at the splice. Because this is a slip-critical bolted joint S6 permits the fatigue stresses be calculated on the gross area for this Category B detail. Should it be the gross area at the wider or narrower part of the plate?

Answer: To satisfy fatigue limit state requirements, both the wider and narrower parts of the plate, in general, should be checked. The stress range to the left of the left end bolts, determined using the gross area of the wider cross-section, should be checked for "fretting fatigue" resistance, which is what you identified as a Category B detail. The narrower part of the member should also be checked for the applicable fatigue detail Category in accordance with CSA S6-14. Fatigue in the outer plies of the bolted splice should also be considered although it is beyond your question.

Question 1b: The tension member qualifies as a plain member and its base material satisfies Category A detail. Why must the permissible stress range in the plate member at the slip-critical joint be reduced to Category B?

Answer: Although the slip-critical joint design ensures a very low probability of joint slip at the FLS and SLS levels, local fretting occurs in the fretting area shown in Figure 1. In this small area, the outer plies see very little axial strains while the inner ply experiences very large strains. This large strain differential between the inner and outer plies causes repeated minute slips in this small area and can lead to fretting fatigue.

Question 2: CSA S6-14, in Clause 10.23.5, provides requirements for welding corrections and repairs to fracture-critical members but it forbids repair of base metal by welding at the producing mill. What is the difference?

Answer: Clause 10.23.5 of CSA S6-14 covers detailed procedures and specific requirements for the repair of fracture-critical steel members in highway bridge structures. The procedures for critical repairs must be approved by the engineer responsible for the bridge design individually before repair welding can begin. These requirements are impossible or very difficult to comply with at the producing mill.

Question 3: I am the engineer responsible for the design of connections in a steel-framed building whose seismic-force-resisting system is a limited-ductility concentrically braced frame ($R_d = 2$, $R_o = 1.3$). The upper bound connection forces corresponding to $R_dR_o = 1.3$ were omitted from the design documents. How do I determine these upper bound forces that serve to mitigate some of the large connection forces? Can they be obtained by multiplying the seismic component of the factored forces by the ratio R_dR_o /1.3 (i.e. 2.0)?

Answer: The structural design documents should provide the governing design forces for connections in the seismic-force-resisting system (See S16-14 Clause 4.2.2.l). The method you propose for calculating the upper bound force by the ratio of 2 is incorrect for several reasons. The most important of all is that, as stated in Clause 27.5.3.4, when the forces corresponding to R_dR_o = 1.3 are computed the redistribution of forces due to brace buckling shall be considered. AS

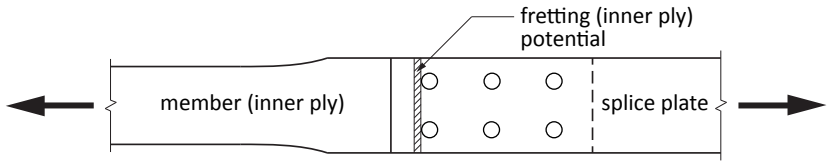

FIGURE 1

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.

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ON BEHALF OF THE Canadian Institute of Steel Construction (CISC) Education and Research Council (ERC), I am excited to have the opportunity to inform everyone on our recent developments and ongoing activities.

The ERC was created to advocate for the future growth and prosperity of the Canadian steel industry. Our main priority is to oversee the education and research activities within CISC, ensuring the development of advanced steel solutions to solve the most complex design and construction challenges. While doing so, we help position steel as the building material of choice.

As part of the ERC's mandate to foster innovation, the Research Committee endorses Canada's leading researchers at universities and technical colleges, who promote the use of steel in construction. Each year, applicants apply to the CISC for research grants valued at $100,000. Grants are awarded on the merits of the application and must demonstrate advanced research on topics that are of interest and importance to the steel industry. Since 1995, over 100 research grants, with a value of over $2.5 million, have been awarded to full-time members of engineering faculties from Canadian educational institutions. For the 2018-2019 academic year, I am pleased to announce that 18 strong applicants submitted their proposals.

We believe it's our corporate responsibility to support the leading research projects brought forth by the top Canadian students that are studying within the steel industry. By way of, the ERC provides funding for engineering and architecture students who demonstrate strong interest and commitment to studies related to steel construction. The GJ Jackson Scholarship awards $25,000 annually to a candidate in a graduate program with major emphasis on the study of steel structures. Additionally, the ERC strongly supports competitions for engineering and architecture students that challenge design and construction solutions with the use of structural steel. Additionally, the CISC also supports and hosts two annual events, CISC's Architectural Design competition and the CSCE-CISC Canadian National Steel Bridge competition.

We are the Canadian steel industry's main source for educational programs and resources for engineers, architects, educators and other steel industry stakeholders. The ERC selects and manages the creation of CISC courses that promotes the use of structural steel. Our various education programs include continuing education courses, professional development courses, seminars and CISC accreditation programs. The ERC is continually allocating resources to create courses based on industry needs and requirements. Recently, we conducted a survey about CISC's educational courses to get insight and receive feedback to ensure the ERC is meeting the needs of our industry.

Our initiatives are funded by our generous donors, including CISC, CWA Foundation, SSAB, Atlas Tube, Nucor-Yamato Steel, Gerdau, and Ironworkers International, however, in order for our structural steel industry to continue to grow, we need your support. Our goal is to ensure that we are continually working to build and sustain a robust educational and research sector. The success and the long term global competitiveness of the Canadian steel construction industry depends on your support. To continue the growth of innovation and leaders in the steel industry, the ERC is asking for donations. These donations are held in a restricted fund for education and research purposes only.

Please consider supporting the ERC, and in turn, support the future of the structural steel industry in Canada. AS

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Limit States Design in Structural Steel - History of a Textbook

Charles Albert, P.Eng.
Manager of Technical Publications and Services

LIMIT STATES DESIGN in Structural Steel has been the standard textbook for English-speaking students in Canada for 40 years. Co-authored by Peter F. Adams, Hugh A. Krentz and Geoffrey L. Kulak, the first edition was published by the CISC in 1977 and was based on CSA S16.1-1974 Steel Structures for Buildings, the first S16 Standard to feature Limit States Design. The cover is shown on Figure 1.

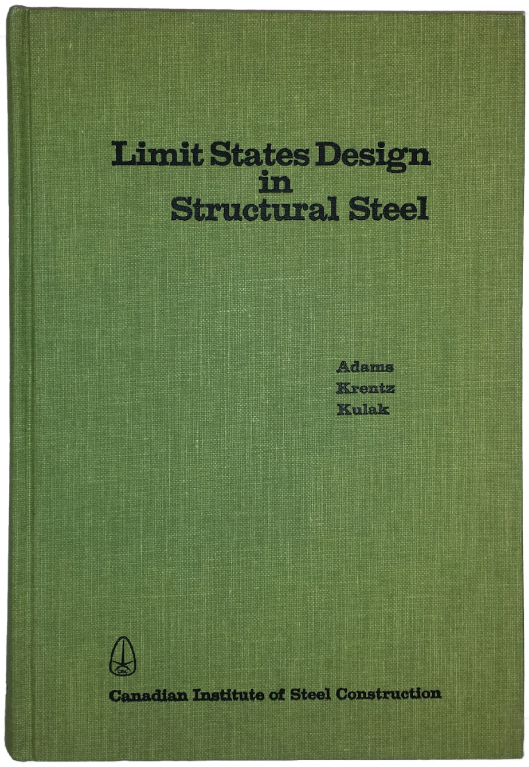

FIGURE 1: First Edition - 1977

A forerunner of the first edition, entitled Canadian Structural Steel Design and based on CSA S16-1969, was published by the same co-authors in 1973. Its preface stated: "Up to the present time, the teaching of courses in structural steel design in Canada has been complicated by the fact that a textbook referring to Canadian steel grades, structural sections, and design standards did not exist. When referring to the texts available, the student was faced first with the task of understanding the material and then interpreting this material in terms of Canadian standards and practice."

Over the years, the book has been intended mainly for a one- or two-term course in structural steel design at the third or fourth year university level. Besides undergraduate students, practicing engineers also find the text useful as an introduction to Limit States Design. The early editions covered topics such as structural steel, tension and compression members, the effective length concept, beams and beam-columns, composite design, plate girders, connections and building design.

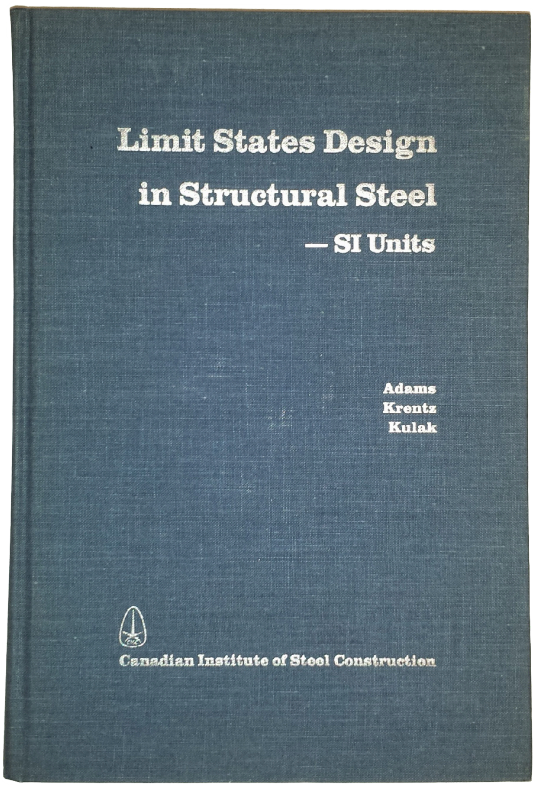

FIGURE 2: Second Edition - 1979

The first appearance of metric (SI) units was in the second edition published in 1979 (see Figure 2). In the fourth edition published in 1990, a new author, Michael I. Gilmor, replaced Hugh Krentz, and the chapter on the effective length concept was replaced by one on overall stability.

In the sixth edition (1998) authored by Kulak and Gilmor, a new chapter on fatigue was added. Although this edition was based on the same standard (S16.1-94) as the fifth, its purpose was primarily to reflect the growing use of grade 350W steel in Canada.

Starting with the seventh edition (2002) based on S16-01, Michael Gilmor was replaced by Gilbert Y. Grondin. Kulak and Grondin have remained the co-authors in all subsequent editions. The participation of a new author led to additional material on torsion, welding processes and procedures, and on the stability of members and frames. Significant changes to the National Building Code of Canada 2005 involving the companion load approach required an eighth edition (2006) of the text, which was still based on S16-01.

Now in its tenth edition (2016) and based on the current S16-14, the textbook features for the first time a full-colour laminated cover, rather than the cloth used in all prior editions. In this present edition, ASTM steel grades have been introduced into some of the design examples, as they are becoming more prevalent in today's expanding global market. The introduction of ASTM F3125, which regroups previous standards for high-strength bolts, is also featured.

As the authors mention in the preface, their intent "still remains to provide a reference document for the training of those who will be responsible in the future for the design of steel structures." In today's academic environment – despite the rapid evolution in teaching methods – Limit States Design in Structural Steel lives on as a mainstay for university students. AS

Seismic Corner will return in future issues.

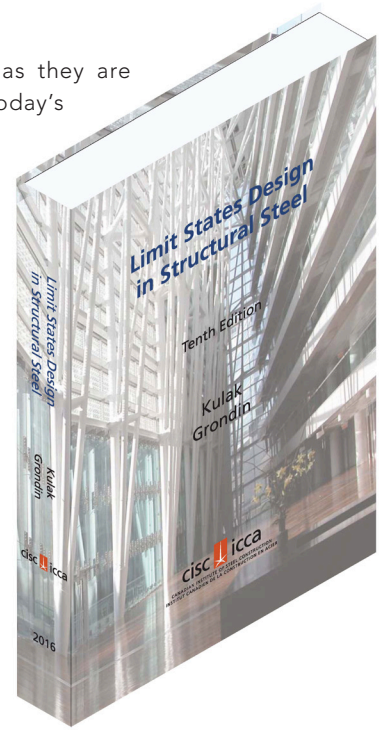

FIGURE 3: Tenth Edition - 2016

THE INNOVATIVE AND

At the heart of the Université De Montréal's future Outremont

By Hellen Christodoulou, Ph.D. Eng., B.C.L., LL.B., M.B.A.
Quebec Region Manager/Canadian Institute of Steel Construction (CISC-ICCA)

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DISTINCTIVE VISION

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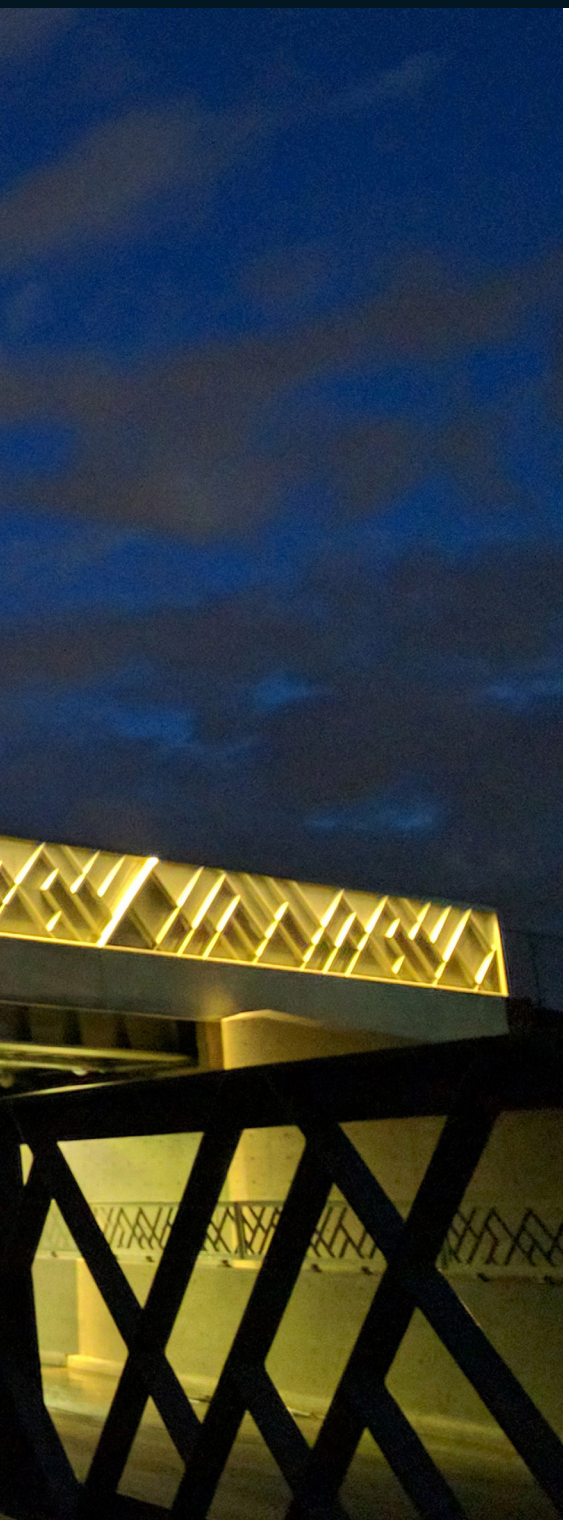


IN 2013, THE Université de Montréal, one of the main universities in the Montreal metropolitan area, began the construction of its new MIL campus in Outremont, located on the deserted grounds of the former Canadian Pacific rail yards. Before proceeding with the work, it was necessary to improve access to the site and move two tracks of the former railway network from the south to the north.

Wishing to demonstrate its architectural vision in an exceptional project, the city imposed exacting standards on the quality of the work and lighting. This goal will be realized by transforming a simple railway bridge into an object of beauty that everyone can admire.

The first stage of construction will be the creation of a new railway bridge that will allow for urban and institutional development in the cleared areas. The railway bridge will pass over the new street running between Durocher Avenue and the future extension of Outremont Avenue. It will be a steel single-span bridge on concrete abutments.

The type of structure was selected based on the following criteria:

- There must not be any obstruction between the traffic lanes of the boulevard beneath the underpass, which means that there must not be a central pillar, but rather a single longer supporting structure.
- Optimize as best as possible the boulevard decline and minimize the railway embankment elevation.
- Respect a minimum clearance of 5 m between the top of the boulevard and the underside of the overpass.
- Ensure that the simplest construction and installation methods are employed.

The final structural design for the bridge was chosen according to the following criteria:

a. Respect of visibility (factor K)

The borough of Outremont enforces a 40 km/h speed limit on its roads. The preliminary study, supplied for information purposes, was prepared using this speed limit plus a margin of 10 km/h as a safety factor.

After analyzing different bridge deck thicknesses and possible clearance heights of several profiles affecting the final level of the roadway, the K factor was calculated depending on the two reference speeds. Note that the K factor must be at least 12 for a speed of 50 km/h and 17 for a speed of 60 km/h. The final solution that was applied allows a K factor of 16.08.

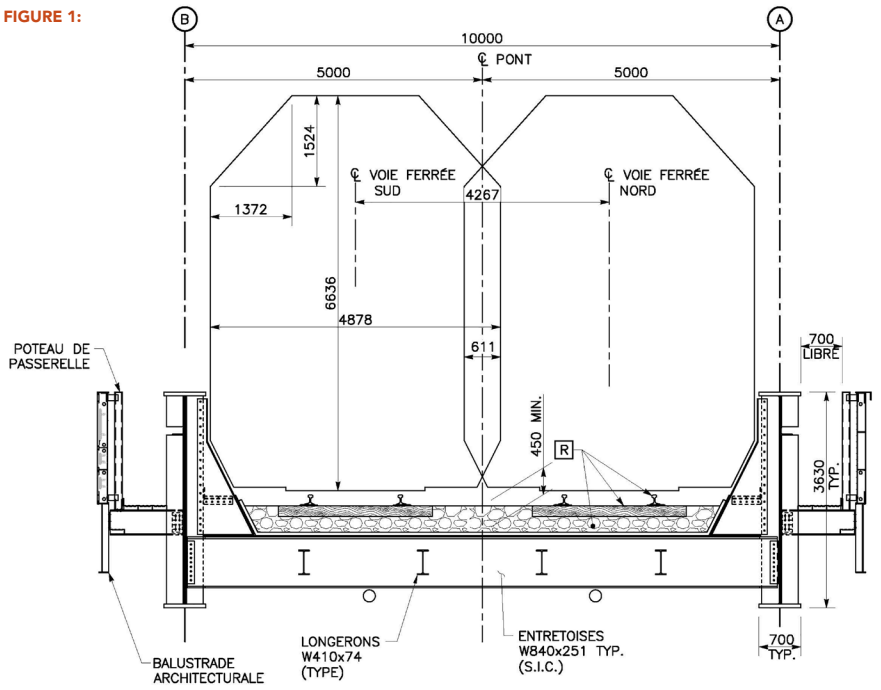
b. The geometry of traffic routes beneath the bridge and pedestrian footpath (sidewalk)

The layout and geometry of the bridge must allow the following:

- A sense of safety and comfort for all users (pedestrians, cyclists, and drivers),
- An unobstructed view for pedestrians and cyclists,
- Snow removal on the bike path and sidewalk.

The bridge's structure, lower-level passage, and supporting walls must be designed to create an agreeable and safe space for pedestrians, cyclists, and drivers travelling through the lower-level passage of the central axis. An innovative visual concept must be designed

FIGURE 1:



for these walls to make the lower-level passage and the outside areas adjacent to the supporting walls more user-friendly.

After analyzing the situation, the structure best suited to these compulsory criteria is a TPG deck (through-plate girder) which has been selected for the future railway overpass (see Fig. 1).

Given the significant dead loads (630 tonnes) and presence of two railway vehicles (Cooper E90), which account for approximately 1,520 tonnes, the main beams are of considerable size (3,650 mm in height, Figure 1) and are supported by a horizontal and vertical brace system.

Internal knee braces are incorporated in each of the main beams to support the top of the beam and the ballast platform.

The overpass, approximately 27.76 m long and 10.0 m wide, supports two railway tracks installed on a ballasted steel deck (the rails are attached to wooden crossbeams that rest in the ballast) to ensure that this section on the overpass has the same track conditions as the adjacent embankments (see Figure 2).

c. Total construction costs of project

Costs of tender: 9.5 million

d. CP design requirements

The overpass has been designed in accordance with the North American AREMA railway standard and adheres to the CP Design Guide.

1. Load and load combinations for design

- Standards: AREMA
- Canadian Pacific Guidelines
- Vehicle: Cooper E90

2. Elevation of top of rails at the centre of the bridge

The railway bridge is to be constructed and maintained by the City of Montreal and, in return, the ballast and rails resting on the bridge will be constructed and maintained by CP. Elevation to be observed at the bridge entrance is 63.84 m (entrance) and 63.65 m (exit) with a slope of approximately 0.7%.

3. Distance between the centre lines of the parallel rail tracks

The distance to be observed on the railway bridge between the centre lines is 14 feet (4,267 mm), which does not allow a dual-span bridge as the space between the two tracks is not sufficient to install beams. The bridge must be constructed as a single-span structure containing the two railway tracks.

FIGURE 2:

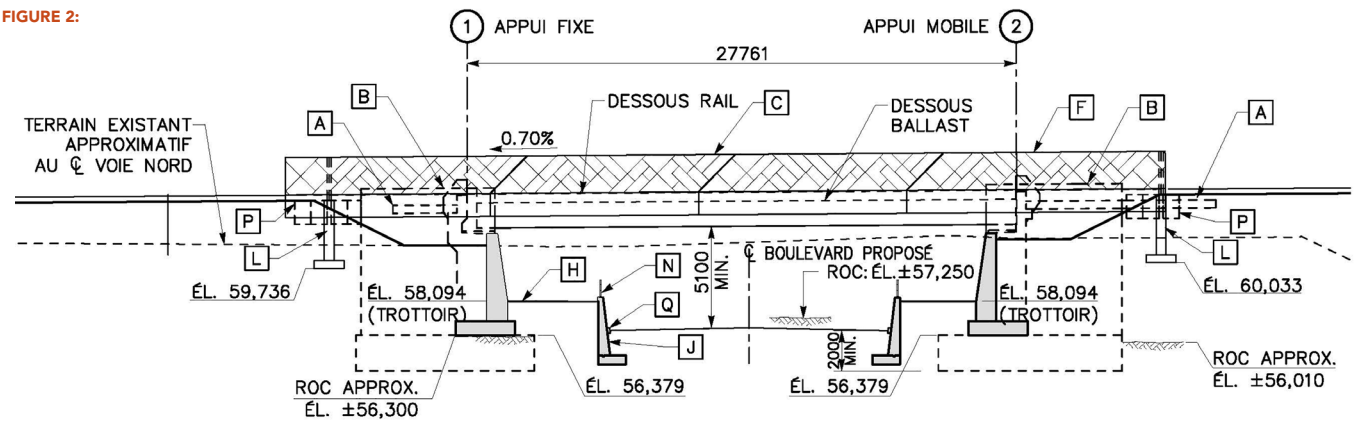


FIGURE 3:

4. Clearance height

CP has accepted that clearance beneath the structure will be reduced to 5.1 m provided that the City implements adequate signage in the vicinity to prohibit trucks or limit vehicle height.

Given the geometry of the railway trajectory in relation to the boulevard it crosses, the overpass deck has a pronounced angle of approximately 27.4°.

The weight of the rails, crossbeams, and ballast together with the loads of the railway vehicles are transferred onto the steel floor system, which is connected to crossbeams (braces) spaced at 700 mm, which in turn are supported by two main beams. For the two ends of the overpass, the layout of the braces, their dimensions, and their interconnections have been adjusted to take into account the specific load distribution resulting from this angle.

The ballasted tracks protect the overpass's steel floor system adequately against potential damages caused by derailed cars and protect the public on the street below from falling ballast or material coming from the railway or maintenance operations.

The detailed engineering company Genifab also participated in this project and generated a 3D model of the steel structure with details of the structural elements. Genifab also prepared drawings for erecting the steel structures on site.

For railway maintenance and inspection purposes, the deck is equipped with two inspection walkways, one on each side. With the assistance and collaboration of the architect, the designers replaced the walkway railings with two architectural balustrades. The overpass is supported by two reinforced steel abutments that are integrated in a unit with supporting walls rising from the sidewalks that extend along the street (see Figure 3).

"The architecture and lighting of the new bridge reflect both the movement and vital force that we associate with trains when they freely, and sometimes cruelly, transgress the orthogonal grid of the city. Formal geometries, raw materials, and light combine to celebrate the way architecture can convey the history at the heart of the university's new campus."

- **Peter Soland, urban designer,** OAQ, AAPQ, ADUQ, LEED Green Associate

The use of steel accentuates the structure's railroad history. The architectural balustrade will blend with and accentuate the features of the steel structure.

e. Integration of structure in the environment

The excavation work has reshaped the site's topography by integrating the abutments and the architectural supporting walls on which the new overpass rests. The architectural and environmental approach favours a structure that is both understated and striking, with the aim of integrating the structure in its environment, its history, and the future of its neighbourhood.

This project will make it possible to improve access to the eastern side of the site by constructing a passage beneath the new railway corridor to integrate the geometry and specific features of the new bridge. Likewise, it aims to reflect the objectives of consolidating the territory contained in the City of Montreal's urban development plan as well as municipal expectations for developing surrounding areas.

The incorporated artistic elements and the development plan define an area that is incongruent with the strict organization of the campus and the city in general. The geometry is inspired by the former oblique axis of the shunting yard. The interaction between concrete and landscape aims to alter your visual perception and phenomenological experience when approaching the bridge. It also allows to incorporate the intersecting pedestrian walkways leading to other points on campus. By increasing the number of pedestrian walkways alongside the railway structure, the plan creates a more dynamic urban environment that goes beyond a simple linear progression extraneous to the work of art.

The walls of the abutment and the supporting walls of the banks will be made of poured concrete. Particular attention will be paid to

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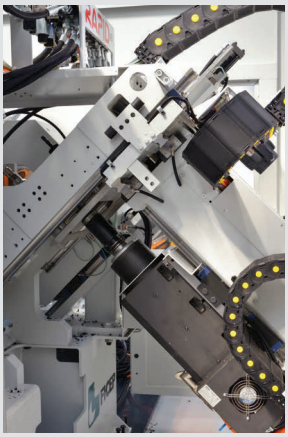

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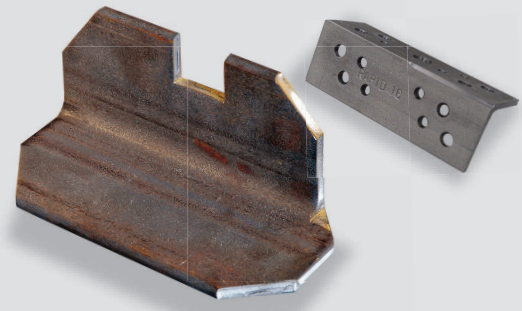

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"There is so much to learn about urban railway bridges, both for us as designers and for the public. A contemporary design engineer must dare to see railway bridges beyond their structural concept and functionality. Bridges need to be redesigned and imagined as integral elements of our cities, districts, and everyday lives. At the start of each design project, we need to remind ourselves that we have an opportunity to create something more than a bridge to carry trains."

- **Petrica Voinea,** Eng., M.Eng. Director, Asset Management, PJCCI (formerly SMi)

the architectural details, the aesthetic qualities of the surfaces, and the integration of steel elements reflecting the main structure of the bridge (see Figure 4).

SMi has teamed up with Civiliti for the architectural component and the lighting. This first collaboration between architects and designers from this Montreal-based company was a marked success for the new railway bridge. The new bridge earned them the Lighting award and Non Categorized award at the 10th edition of the Grands Prix du Design.

When designing this lighting system for the two balustrades and beneath the bridge, SMi's engineers gave equal importance to the lighting's design elements and to the bridge's safety features.

When creating the architectural plan, the designers chose to explore the potential of LED strips to create a strong light signature, making the structure a defining element of the future university campus. They were inspired by the series Wall Drawings by American artist Sol LeWitt and by the work of Krzysztof Wodiczko, a Polish artist whose highly political projections on public buildings brought him international acclaim in the 1980s.

Opposite the MIL Campus, the overpass comes alive at night when four ephemeral paintings evoking the four seasons are projected in alternating sequence onto the railing backdrop. This light choreography is generated by 135 LED bars, which are inserted diagonally in the structure of the railings, behind the perforated metal plates. The LED bars come in two different lengths, some measuring one metre, others 30 cm (see Figure 5).

The project, a true visual experience, illustrates how a simple tool can become an urban object evoking the admiration of the public. Using the poetry and subtlety of lighting, the designers aimed to mitigate the disruptive impact of a site that has been profoundly altered. In the elements they used, the designers also wished to evoke the long railway history that is currently disappearing from the landscape.

The project of the Université de Montréal's future Outremont campus goes far beyond the activities of a university. It embraces urban community life by offering a new living space that will serve both the university community and the residents of adjoining neighbourhoods. AS

FIGURE 4:

FIGURE 5:

PROJECT TEAM

MANUFACTURER: CENTRAL WELDING & IRON WORKS **DETAILER:** GENIFAB CONSULTANTS **CONSULTANT:** LES CONSULTANTS SMI

CONTRACTOR: ROXBORO EXCAVATION **OWNER:** VILLE DE MONTRÉAL (MAJOR PROJECTS) **ARCHITECT:** CIVILITI

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FEATURE

STEEL CONNECTS ED TO THEIR BELOVED RIVER

By Gillian Thomson, DIALOG, Edmonton

Photo credit: DIALOG

MONTONIANS VALLEY

Photo credit: DIALOG

THE NORTH SASKATCHEWAN River Valley is the birthplace of the City of Edmonton and the province of Alberta. The surrounding river valley that runs through the middle of Edmonton is the largest urban parkland in North America—22 times the size of New York's Central Park. The top of the river bank, which is home to Edmonton's downtown, is cut off from the river valley and trails system below by an unfortunate network of roadways, a steep slope, and an elevation change of 50 m.

The large elevation difference and steep slopes of the river valley are part of its great beauty, but also make access difficult for users with mobility challenges. The City of Edmonton has long sought to better connect the public between downtown and the North Saskatchewan River Valley. The Mechanized River Valley Access project was born to address this challenge—rich in the potential to engage every Edmontonian and visitor, regardless of mobility, in an elegant and organic narrative with the ribbon of nature through the city.

At the mercy of the steep slope and road network, DIALOG explored dozens of orientations and sections that allowed the project to engage with the surroundings while respecting the existing slope. The strategic use of steel components made it possible to achieve the design goals and overcome some of the construction challenges that were posed by the steep slope.

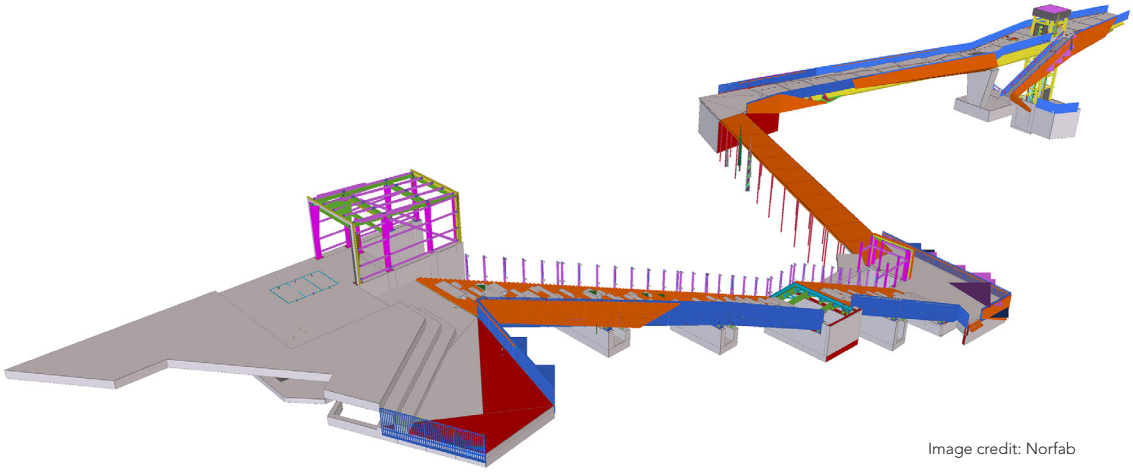

Image credit: Norfab

Not only a major infrastructure and accessibility project, this is defined by its emphasis on placemaking and improvement of the public realm. It's both an entrance to and a focal point in Edmonton's river valley.

THE JOURNEY

The River Valley Access project is about connecting downtown Edmonton to the North Saskatchewan River and the network of valley trails. It is also about enjoying the journey. More than just a funicular, the experience from downtown Edmonton (top) to the river valley (bottom) is highlighted below in six key moments that comprise the journey.

PROMONTORY

At the top of the bank, a promontory acts as an extension of 100 Street and provides panoramic views of the valley. This urban plaza integrates passive and active zones for those waiting for the funicular or taking in the view. Generous steps connect visitors to the edge of the overlook with plenty of space for programming special events, stretching after running stairs, or watching the sun set. The promontory is the connecting place for downtown, the funicular, and the urban stairs.

This is the first place users see the galvanized steel found throughout the project. Cost-effective and lightweight galvanized steel railings provide weather protection, and are low maintenance. The funicular's top landing is its home base during rest and houses the mechanical equipment. The canopy at the top landing is galvanized steel framed with glass and wood cladding. The AESS steel carries the galvanized materiality and aesthetic, and provides a lightweight structure with weather protection for the funicular cabin.

FUNICULAR AND URBAN STAIRCASE

A funicular—essentially an inclined elevator—runs from the promontory to a promenade mid-way along the valley slope. This allows people in wheelchairs, cyclists, parents with strollers and people of all abilities to traverse the steep slope easily (and free of charge). The funicular hugs the edge of the slope, supported by steel rails, providing dynamic views overlooking the picturesque river valley.

Parallel to the funicular is a broad urban staircase. Wide and welcoming, the steps provide a direct connection to the river valley but are also a destination. Integrated seating provides places to rest and play. The stairs hover above the natural grade of the valley slope where indigenous plantings assist with the mitigation of soil erosion.

The stairs are supported using galvanized steel stringers. These lightweight components simplified

PROJECT TEAM (RELATED TO STEEL)

CLIENT: CITY OF EDMONTON **PRIME CONSULTANT, STRUCTURAL ENGINEERING, ELECTRICAL ENGINEERING, MECHANICAL ENGINEERING, ARCHITECTURE, LANDSCAPE ARCHITECTURE, PLANNING:** DIALOG **PRIME CONTRACTOR, CONSTRUCTION MANAGEMENT:** GRAHAM CONSTRUCTION **STRUCTURAL STEEL FOR URBAN STAIR, FUNICULAR CANOPIES, RAILINGS:** NORFAB MANUFACTURING **STRUCTURAL STEEL FOR THE BRIDGE, ELEVATOR SHAFT, AND STAIR TO LOOKOUT:** SUPREME STEEL, EDMONTON **GALVANIZING FOR NORFAB AND SUPREME:** DAAM GALVANIZING

erection and assembly. Construction access was limited with only two lift points at the top and bottom of the stairs because of the steep slope. Considering this and other site constraints, the stair construction would have been further complicated had the components been concrete. The stair stringers, fabricated by Norfab Manufacturing, have varying geometrical and loading requirements to accommodate the architectural aesthetic and varying urban stair geometry.

PROMENADE

The steps and the funicular land on a pedestrian promenade that takes advantage of an existing bench on the valley slope above the road network. A Kebony wood boardwalk takes pedestrians along the middle of the river bank over to a pedestrian bridge, and is adjacent to a wide lawn park area. The boardwalk and urban stair foundations are steel screw piles, a cost-effective solution that allowed lightweight equipment to install them on the challenging, steep slope.

> "Collaboration and coordination on design issues and model sharing was excellent. DIALOG's design team was open to suggestions for design modifications to suit constructability. These frequent meetings were integral to achieving design goals and schedule."
>
> - **Kevin Huot,** General Manager, Norfab

Playful, eye-catching public art was incorporated into the benches. The art entitled Turbulent by Jill Anholt is a reflection of the river's active current and was selected as part of a national public art competition. The waves are made of steel to support people sitting and playing on them, while maintaining a slim, graceful form.

PEDESTRIAN BRIDGE AND LOOKOUT

The spacious pedestrian bridge provides safe passage over Grierson Hill Road. People rise above traffic on a gently sloped bridge with benches and rest areas for wheelchairs along the way. The galvanized steel railings are prominent here, with architectural Kebony cladding incorporated into the railings.

The bridge is unconventional because it only has two girders. The design team addressed the redundancy challenge by raising the clearance to be higher than nearby bridges to this site and by exceeding typical traffic and pedestrian bridge clearance requirements. The notch-tough, weathering steel girders (fabricated by Supreme Steel) are supported on a concrete pier and a steel elevator shaft. Steel bracing is used to laterally support the compression flanges, and to stabilize the girders during erection and the following winter, until the precast concrete deck was made continuous.

The south end of the bridge gently rises up to cantilever out to a 19m high lookout over the river's edge. Frederick G. Todd, an early twentieth century landscape architect, is the namesake of the lookout with an immersive, panoramic vantage point in the river valley he helped to protect.

ELEVATOR AND TRAILS

To complete the journey, a glass elevator and stairs connect to the river valley trails below. The elevator is another essential component in creating barrier-free

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access to the river valley. The elevator shaft supports the bridge laterally and vertically and continues the galvanized aesthetic. Steel allows the bridge to be supported without needing bearings, as the whole elevator shaft moves longitudinally with temperature changes. The steel shaft also supports glass all around for a visually lighter structure, and maintains river valley views through the glass elevator door along the journey.

The lower plaza is another gathering space along the way that features bike parking, benches, and other distinct views of nature.

In only five minutes—or longer, if you linger along the way—one goes from the vibrant urban core to nature and the river valley. The project does more than simply meet the City of Edmonton's goal of providing universal accessibility to the river valley. It provides an intuitive, graceful experience that residents and visitors can enjoy throughout all seasons.

COLLABORATION WAS KEY

Mechanized River Valley Access is a unique project that DIALOG, Graham Construction, the City of Edmonton and all trade contractors are especially proud of. Norfab Manufacturing and Supreme Steel valued the constant collaboration with DIALOG throughout the process. The design team worked with them early in the process to incorporate recommended modifications to suit constructability. "Collaboration and coordination on design issues and model sharing was excellent. DIALOG's design team was open to suggestions for design modifications to suit constructability. These frequent meetings were integral to achieving design goals and schedule," explained Norfab's general manager, Kevin Huot. Integrating all the glazing and Kebony timber connections along the promenade and urban stairs presented some design challenges that required thorough detailing, precise fabrication and skillful erection. "Projects like this are demanding but very rewarding when you can step back and enjoy the completed product," remarked Greg Van Halst, president of Norfab.

Since the elements of the journey are so distinct in function, materiality and consistent design details are important for continuity. This could only be achieved through collaboration amongst DIALOG's integrated design team, Graham Construction, the fabricators and all trade consultants. DIALOG's Sean Brown, project manager and structural engineer, puts it best: "Using steel as a material allowed us to achieve the goals of our design and overcome construction challenges. The collaboration between designers, constructors, and fabricators made the project stand out. The attention to detail throughout and innovative use of materials provides an enjoyable experience for all Edmontonians between downtown and our incredible river valley." AS

BY THE NUMBERS

- **Pedestrian bridge:** 50.0 m main span – 19.4 m span – 19.0 m cantilever
- **Funicular track:** 66.0 m long along a 23.5 degree grade from horizontal
- **Funicular top speed:** 2 metres per second
- **Length of lookout cantilever:** 19 m (60 feet)
- **Height of lookout above river bank:** 19 m (60 feet)
- **Total stairs if walking from the river valley trail to the promontory:** 250
- **Total travel time if taking funicular and elevator:** about 5-6 minutes, depending on wait times
- **Public art:** "Turbulent" by Jill Anholt – selected as part of a national public art competition

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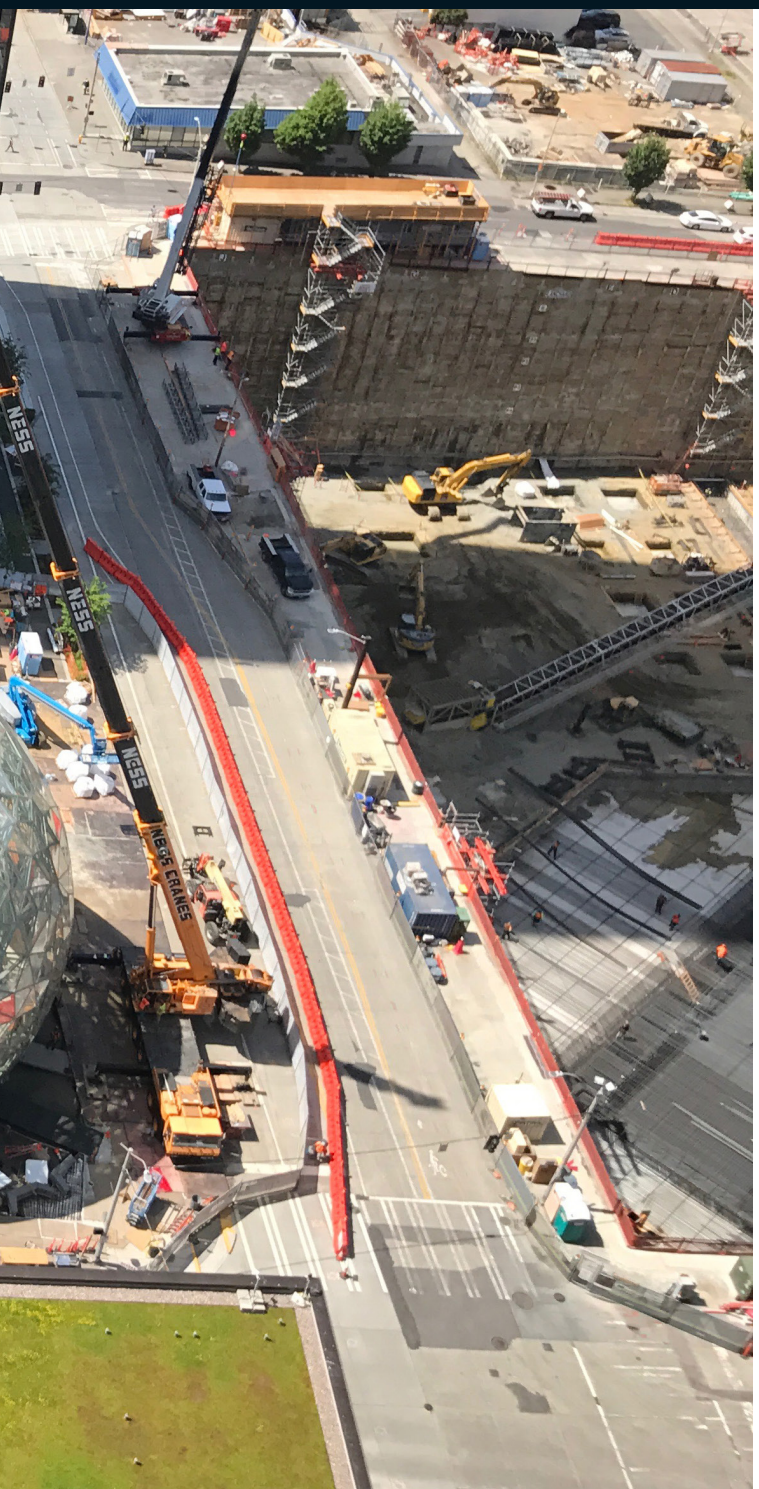
AMAZON'S SPHERES A NEW LA

Combining collaboration, creativity and craftsmanship

By Neil Kaarsemaker, CISC Regional Manager for Alberta & Saskatchewan

NDMARK ON SEATTLE SKYLINE



WHEN AMAZON BEGAN work to develop their urban campus in the Denny Regrade area of Seattle, they sought to make a statement. They wanted to redefine the very nature of the modern workplace in the same way their company has redefined Internet retailing. "We wanted to do something that was not only great for employees, but for the city as a whole. It's all about our pioneering spirit, our being inventors," said John Schoettler, Amazon's real-estate director. (*Seattle Times,* January 03, 2017 – Angel Gonzalez) The crown jewel of the six-building complex that spreads across three city blocks are the three dome structures that have become known as The Spheres. Their striking design and dramatic appearance have created a tremendous buzz across Seattle's downtown and throughout the global architectural community. When people think of Seattle's landmarks – those buildings that define a city skyline – they will add The Spheres to that list.

The original project design called for a conservatory-styled structure to provide a refreshing and inspiring environment for Amazon employees, drawing on the tradition of Europe's grand Victorian gardens such as London's Kew Garden or Paris's Luxembourg Gardens. Just as these gardens brought a sense of the countryside to workers who had flocked to the cities during the industrial revolution, The Spheres were designed to provide a nature-infused refuge of creative space for the workers of today's fast-paced, high energy era of technologically driven change.

Dale Alberda, Principal at the architectural firm in charge of the project, NBBJ, said, "Amazon brought up the idea of a conservatory." So, the architects came up with several ideas, many of them traditional. But the night before one of the presentations to Amazon, the architect had an inspiration. "I drew a dome because we didn't have any. They immediately gravitated to that." It was a surprise to the city's design review board, which previously dealt with a more square vision. "I was a little astonished," said Gundula Proksch, the UW professor who sat on the review board. "This is a very sculptural, expressive building." From the point of view of the cityscape, the new design offered clear advantages: it was striking and interesting, much more so than many of the buildings going up around it. It's a landmark "breaking the relentlessness of towers," Proksch said. (*Seattle Times,* January 03, 2017 – Angel Gonzalez)


Photo credit: Supreme Steel

"This project could not have been completed without the input from the fabricator, detailer and erector."

- **Jay Taylor,** Senior Principal MKA

Their client liked the idea, so the design team set out to determine the best approach to construct the dome design. It soon became apparent that the best approach was to use the geometry of a Pentagonal Hexecontrahedron. "A geometric shape called the pentagonal hexecontahedron forms The Sphere steel frame. The Spheres' shape is based on one of 26 known subsets of Catalan solids named for the Belgian mathematician who first described them in 1865. The building consists of elongated pentagonal modules that appear 180 times across the three spheres. By connecting each angle of the module to a centralized hub, the architects created a fluid yet modular pattern that could be repeated throughout the building." https://www.seattlespheres.com/explore-the-building

It was the extensive consultation both prior to and during construction between architect NBBJ, structural engineer Magnusson Klemencic Associates (MKA), and the fabricator team consisting of: Supreme Steel; Angle Detailing, the steel detailer; and the erector, The Erection Company, that was crucial to the success of the design and construction process that brought The Spheres to life. They needed to figure out the most efficient way to detail, document, fabricate, transport and erect the steel that would form the structural frame of the dome shape and meet the logistical demands of shipping the assemblies to site and make the erection process possible. Jay Taylor, Senior Principal with MKA, said, "this project could not have been completed without the input from the fabricator, detailer and erector. There needs to be a willingness to participate in the design process by the contractor, steel sub-contractor team, architect and structural engineer." He described the work of the fabricator, detailer and erector as "top notch from top to bottom."

The structure was reverse engineered with constructability the key consideration. This discussion led to the Catalan design approach of five-sided steel assemblies that would be fabricated in Supreme's Portland facility and loaded five at a time onto trucks for the 2.5-hour drive north to Seattle. In a video produced by Supreme Steel's Portland-based fabrication team (https://www.youtube.com/watch?v=TepMUfMpdzk) they describe how they broke this project down into its key elements and worked methodically and systematically to execute the fabrication plan. Mike Eckstein, Supreme general manager, commented, "We do complex projects, but this is a step above." Other staff commented that The Spheres were "like nothing we have ever done," and "this is going to be a one-of-a-kind building; a showpiece."

Dan Wyland, Project Manger and Estimator, described the challenge of fabricating the Catalans when he said, "The most excited we are about working on this is that everything is different. The welding is different, the pieces are all rolled and twisted, there is nothing straight on it according to a normal building. The challenge was to bring all this together."

The fabrication process was a combination of technological innovation, selective outsourcing, logistics, scheduling and attention to detail. There were some 24,960 individual parts that needed to be ID stamped, tracked, sorted and assembled to bring the complex design to life in a manner that would ensure a perfect fit when the assemblies arrived on site and erected to form The Spheres. The tubes that formed the spine of the Catalan assemblies needed to be bent to very specific tolerances as each piece formed a distinctive part of the overall design. The sub-assembly


Photo credit: Supreme Steel

PROJECT TEAM

OWNER: AMAZON **ARCHITECT:** NBBJ – SEATTLE **STRUCTURAL ENGINEER:** MAGNUSSON KLEMENCIC ASSOCIATES, SEATTLE, WA **FABRICATOR:** SUPREME, PORTLAND, OR **ERECTOR:** THE ERECTION COMPANY, ARLINGTON, WA

parts were carefully catalogued and stored on pallets to ensure that all the requisite parts for each of the 247 Catalan assemblies were stored together to make the fitting and welding of each assembly proceed efficiently and in the proper sequential order.

Richard Wambold, Plant Superintendent, described how the project team at Supreme Steel implemented a Leica laser-guided assembly process that tracked the work on each Catalan assembly to ensure it conformed precisely to the digital project model. The design drawings contained no dimensions. These details were recorded in the model and the fabrication process relied exclusively on the data in the model. Specific jigs were designed for each of the sub-assembly pieces with the aid of Leica Geosystem tracking equipment. This allowed the assembly process to be tracked in the shop and at erection phase. The success of this project required that each Catalan assembly would fit exactly into its designated place in The Sphere. Each Catalan has 10 connection points, which then had to correspond to an additional 10 connection points for their adjacent assembly. Any deviation to the connections would have a ripple effect across the entire structure. To further amplify the need for accuracy in fabrication and assembly was that 2/3 of the assemblies had to be completed prior to the beginning of the erection process to maintain project schedule.

The completed Catalans had to appear seamless and smooth when they were delivered for erection. Each assembly had to appear like it was one piece of steel to create the desired look of The Sphere. The AESS requirements were specified as Level 4, the highest level due to the high visibility of the steel exoskeleton throughout the structure. This drew on the highest level of craftsmanship from the fitters and welders. The team at Supreme undertook extensive and very careful grinding of the connections with a finishing application of bondo to achieve the extremely smooth finish required. Each individual weld had to be inspected and tracked to ensure it met not only structural requirements but also the AESS guidelines.


Photo credit: Supreme Steel

Levi Wambold, Paint Supervisor for Supreme Steel, describes the work required to achieve the smooth, consistent and seamless appearance on each assembly in the project video. "This project pushed our team to perform at the top of their game," said Levi. Meeting the demands of this project required a high degree of accuracy and a commitment to craftsmanship by all the fitters, welders and painters. David Sadinsky, Project Architect for NBBJ, described the fabrication and finishing work of Supreme Steel as the same that you would see in aerospace manufacturing and major transportation tunnels. Very high praise indeed.

The attention to detail was continued in the transportation logistics of the super-sized loads from Portland to Seattle between midnight and 5 a.m. to arrive on site ready for erection. The erection process was tracked by the same Leica laser tracking system to ensure each assembly was connected in the correct location in the model to ensure the dramatic spherical shape was achieved. A testament to the precision and craftsmanship of the fabrication and erection team was that only three shims were used in the erection process.

The completed structure exceeded the expectation of the owner, architect and engineer. David Sadinsky of NBBJ summarized it well: "We created a legacy structure in our backyard and hometown that will be iconic, the new standard for distinctive work spaces." Creativity and collaboration combined with craftmanship created a landmark. Amazon has achieved its goal of a Victorian style conservatory within their downtown campus that met their desire to transform the modern workplace and make a statement to their employees and community. AS

HEAVY METAL

14-storey addition to The Britt a perfect example of steel's many

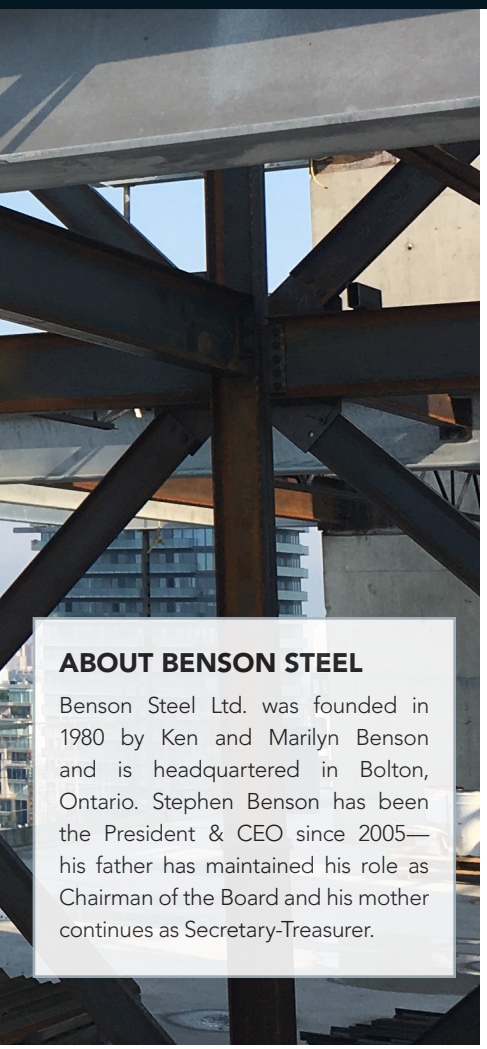
By James Peters

ACCORDING TO some highly trusted sources—like comedian Rick Mercer—Toronto had more construction cranes on its horizon than any other city in North America last year. To illustrate, Mercer filmed a recent sketch in the Big Smoke with a focus on ironworkers, featuring The Britt as a backdrop. The Britt is a condominium conversion at Bay and Wellesley and up until just a few years ago, went by a very different name—the iconic Sutton Place Hotel. The Sutton was originally a 30-storey structure and a very famous Toronto landmark, often playing host to actors, entertainers and other celebrities in its storied rooms.

The word "conversion," of course, barely describes the scope of the undertaking at the new complex, which called for the addition of 14 more floors—no small matter on any construction site, not to mention in the heart of downtown Toronto.

As the project's steel fabricators, Benson Steel had a big role to play in the successful completion of the build. President & CEO Stephen Benson explains, "Lanterra Developments wanted 14 additional floors on top of the hotel to broaden the availability of residences and meet marketplace demand. The developer rightly chose steel to frame the addition—for all of its well-known advantages, such as strength, weight and flexibility.

advantages



ABOUT BENSON STEEL

Benson Steel Ltd. was founded in 1980 by Ken and Marilyn Benson and is headquartered in Bolton, Ontario. Stephen Benson has been the President & CEO since 2005—his father has maintained his role as Chairman of the Board and his mother continues as Secretary-Treasurer.

Naturally our company is always pleased to be a successful bidder, but this project was very special because of its legacy, its prominence and frankly, all of the challenges inherent in a build of this nature."

And challenges there were. In addition to the obvious demands of downtown construction logistics—such as getting new materials in and debris out, there were multiple problems to overcome in the

ABOUT THE BRITT

Described on its website as the place where London chic meets Toronto energy, The Britt is anchored on an eight-storey podium, providing the foundation for the point tower and a warm and welcoming streetscape below. Truly offering spectacular views of the city, the facade is cloaked in iridescent blue glass and graceful lines of stone and steel.

The ground floor is abundant with amenities and the lobby features marble-faced portals leading to the reception area and lobby lounge off the main level. One of the primary visual focal points in the new residence is the grand and evocative staircase. True to its legacy, the lounge provides a collection of photographs preserved from the original Sutton Place Hotel featuring actors and celebrities who were once guests at the Sutton—a nostalgic connection to the building's acclaimed history.

"It took a lot of teamwork from all of the various trades and disciplines involved to pull this one off. We felt that we really provided some value engineering along the way and helped the owners and the project engineer with the redesign..."

- **Stephen Benson,** President & CEO, Benson Steel

building itself. Benson says, "Because of the hotel's age, it was necessary to reinforce some aspects of the basement structure with steel—and the parking garage as well—to bring it up to code and to support the additional weight of another 14 floors."

And as anyone who has even built a backyard shed can tell you (not to mention the chaos behind the scenes of an enormous construction project), things can easily go "off target" unless all aspects are well supervised and communication is clear, smooth and consistent.

"It took a lot of teamwork from all of the various trades and disciplines involved to pull this one off," says Benson. "We felt that we really provided some value engineering along the way and helped the owners and the project engineer with the redesign—such as the reinforcement in the basement and the transfer slab on the 30th floor—to name a couple of the most important revisions."

Value engineering is another way of saying value-added, except for construction projects. Benson says, "It's a method where project partners will collectively refine the engineer's base design and find ways to economize—without compromise.

With The Britt, we were able to do just that, which streamlined the project timeline and also helped the owners with a price issue they'd been dealing with based on earlier project estimates. All in all, we felt it was very much a win-win project." In the end, Benson Steel contributed a list of 15 items that were value engineered—all making their way into the design and completion of the building.

Some of the biggest improvements the company made were in the existing 30-storey tower. The team added walls and framing around the existing elevator shafts and lined them with Hilti bolts for supporting angles. Benson says, "We re-engineered the bolting system and eliminated about half of the bolts originally specified—which was a huge time and cost saving." Benson's company also re-engineered the high-strength steel originally specified—another large time- and cost-saving.

Benson concludes, "Lanterra was exceptionally well-versed in their discipline as a builder and very cooperative and instrumental in problem-solving and moving the project ahead in a timely fashion—through a difficult build. Along the way and in the end The Britt was truly a pleasure to work on." AS

PROJECT TEAM

ARCHITECT: PAGE AND STEELE ARCHITECTS **CLIENT:** LANTERRA DEVELOPMENTS

ENGINEER: JABLONSKI AST AND PARTNERS **ERECTORS:** NORWOOD ERECTORS, SKYHIGH ERECTORS, E.S. FOX CONSTRUCTORS **FABRICATOR:** BENSON STEEL LIMITED **GENERAL CONTRACTOR:** LANTERRA CONSTRUCTION MANAGEMENT **OWNER:** LANTERRA DEVELOPMENTS

NEWS

MANITOBA'S BILL 218, THE PROMPT PAYMENTS IN THE CONSTRUCTION INDUSTRY ACT, PASSES SECOND READING

Manitoba's Bill 218, the *Prompt Payments in the Construction Industry Act,* has passed its second reading with a unanimous vote!

At this time, there is no system that protects contractors and subcontractors in Manitoba from delayed payments. Bill 218 will finally put our tradespeople at ease while strengthening the construction industry. The Bill proposes payment obligations ensuring that all those involved in a construction contract will be paid within reasonable time frames. If not, the defending contractor or subcontractor will have the right to dispute resolution.

Manitoba is now the second province to come forward and introduce a form of prompt payment legislation, with Ontario's Bill 142 receiving Royal Assent in December 2017.

All parties in Manitoba, including the Liberal, NDP and PC parties, demonstrated an understanding of the issues that arise due to delayed payments, as well as their sympathy for those affected by it.

Bill 218 was introduced by PC MLA Reg Helwer of Brandon West at the beginning of this year. We are pleased to see all parties on board and look forward to the progression of the construction industry in Manitoba.

CISC MANITOBA'S NETWORKING EVENT BUILDS BICYCLES FOR LOCAL CHARITY AND CELEBRATES SUSTAINABLE STEEL

CISC Manitoba hosted Sustainable Communities; Sustainable Construction, a steel recycling networking event on April 19 at the Canadian Museum for Human Rights in Winnipeg.

This unique event not only inspired and educated the local steel industry on regional and national steel recycling initiatives, but also encouraged attendees to give back to their community–and to have fun doing it!

By partnering with Winnipeg Repair Education and Cycling Hub (WRENCH), a local non-profit organization, this event allowed people to network and learn about steel's sustainability while building bikes for charity. CISC Manitoba welcomed guest speakers to share their expertise and wealth of knowledge on sustainable development in the construction industry.

Through this event, 16 bicycles were uniquely refurbished by attendees and donated to WRENCH.

ONTARIO'S BILL 194, FAIRNESS IN PROCUREMENT ACT, RECEIVES ROYAL ASSENT

Ontario has passed Bill 194, *Fairness in Procurement Act, 2018*, which will restrict procurement opportunities for companies from states in the U.S. that have or will pass the *Buy American Act.*

Currently, Texas and New York have put in place legislation geared at iron and steel. Regulations have already been proposed to protect Government entities that enter contracts with suppliers from these two states.

This is a great win! The CISC has been advocating for this type of procurement policy for some time. We are happy to finally see it come to fruition in Ontario.

FYI: PSPC IS PROVIDING PAYMENT DISCLOSURE ON FEDERAL CONSTRUCTION CONTRACTS

Public Services and Procurement Canada (PSPC) is continuing to ensure that the workers and tradespeople who make up the Canadian construction industry are being given a fair opportunity to succeed.

PSPC is making records available to the public, detailing when payments will be made to prime contractors working on federal construction projects worth $100,000 or more.

The objective is to provide transparency to the subcontractors working on these projects, ensuring that they are informed about when they should be expecting payment for a job. This allows organizations and individuals employed by prime contractors the opportunity to defend themselves appropriately when faced with delayed payments.

The Government of Canada is continuing to demonstrate their dedication to creating a level playing field between prime contractors and subcontractors in the construction industry. While there is still more

work to be done, we are finally starting to see the changes that our tradespeople deserve!

The CISC is looking forward to the future developments of provincial and federal prompt payment legislation.

CISC STEEL BRIDGE CERTIFICATION STANDARD – 3RD EDITION, 2018, IS NOW AVAILABLE FOR DOWNLOAD

The CISC has prepared this Standard in recognition of its interest in meeting the quality requirements of its customers. It is designed to assess the Fabricator's Quality System and provide a level of assurance that the company performing the fabrication has processes and personnel in place to better enable it to conform to the contractual and regulatory requirements. This Standard addresses the special processes and requirements of steel fabrication for highway and railroad bridge structures.

This Standard shall be used by bridge fabricators who wish to have their operations CISC Certified.

CSA S6 Canadian Highway Bridge Design Code now requires bridge fabricators to have a bridge-specific audited and certified quality management system. CISC Bridge Certification is recognized by CSA S6-14 as meeting this requirement.

Available in electronic format only.

NEW CISC MEMBERS AND ASSOCIATES (SINCE FEBRUARY 2018)

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University of Victoria, BC

Consultant Company:
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Vancouver, BC

STEELDAY 2018 – SEPTEMBER 28, 2018

CISC is pleased to present SteelDay 2018 – an annual national event that exhibits the versatility, performance and sustainability of steel and its various innovative applications.

This exciting event provides architects, engineers, general contractors and community members with accessibility to the latest happenings in the structural steel industry. SteelDay events are scheduled across Canada with opportunities to tour facilities and jobsites, attend educational seminars, network and witness how the structural steel industry is contributing to build Canada.

For more information and to attend a SteelDay event near you, visit www.steelday.ca! AS

EVENTS

THE CANADIAN STEEL CONFERENCE SEPTEMBER 19 – 21, 2018

The CISC is gearing up to host the Canadian Steel Conference in Halifax, Nova Scotia, this fall. This annual event is packed with multiple business development, educational, networking and social events to enjoy over the course of three days.

This year we are offering several branding opportunities for our sponsors, including delivering introductory remarks at different events and exhibiting in our tradeshow.

Take this opportunity to profile your organization and showcase your products/services to over 300 attendees from the Canadian steel industry, including consultants from leading engineering and architect firms.

For more information and for sponsorship opportunities, visit www.canadiansteelconference.ca!

COMMON CODES AND STANDARDS FOR DESIGN AND CONSTRUCTION OF STEEL STRUCTURES

Current Status and Future Publication Targets

Code/Standard/Supplement/ Commentary/Referenced Document	Current Edition	Next Edition/Revision	Publication Target
National Building Code of Canada (NBC)	NBC 2015	NBC 2020	Dec. 2020
NBC Structural Commentaries (Part 4 of Div. B)	NBC 2015 Str. Comm.	NBC 2020 Str. Comm.	2021
CSA S16 Design of Steel Structures	CSA S16-14	CSA S16-19	Sep. 2019
CISC Commentary on CSA S16 (Part 2 of CISC Handbook of Steel Construction)	CISC Handbook 11th Edition[1] 3rd Printing[2]	CISC Handbook 12th Edition	2020
CISC Moment Connections for Seismic Applications	2nd Edition[3]	3rd Edition	Sep. 2019
CSA S6 Canadian Highway Bridge Design Code	CSA S6-14	CSA S6-19	Sep. 2019
CSA S6.1 Commentary on Canadian Highway Bridge Design Code	CSA S6.1-14	CSA S6.1-19	Sep. 2019
CSA G40.20/G40.21 General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel	G40.20-13 G40.21-13	TBA	
CSA W59 Welded Steel Construction (Metal Arc Welding)	CSA W59-18	TBA	
CSA W47.1 Certification of Companies for Fusion Welding of Steel	CSA W47.1-09 (R2014)	TBA	
CSA S136 North American Specification for the Design of Cold-Formed Steel Structural Members	CSA S136-16	TBA	
CSA S136.1 Commentary on CSA S136	CSA S136.1-16	TBA	

[1]CISC Handbook of Steel Construction - 11th Edition includes CSA S16-14, its Commentary, CISC Code of Standard Practice - 8th Edition (new), and design and detailing aids in accordance with CSA S16-14

[2]3rd Printing of Handbook has been updated to reflect changes introduced in CSA S16-14 Update No. 1 released in Dec. 2016

[3]Adopted in S16-14 by reference

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www.leroux-steel.com

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www.pacificsteel.ca

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