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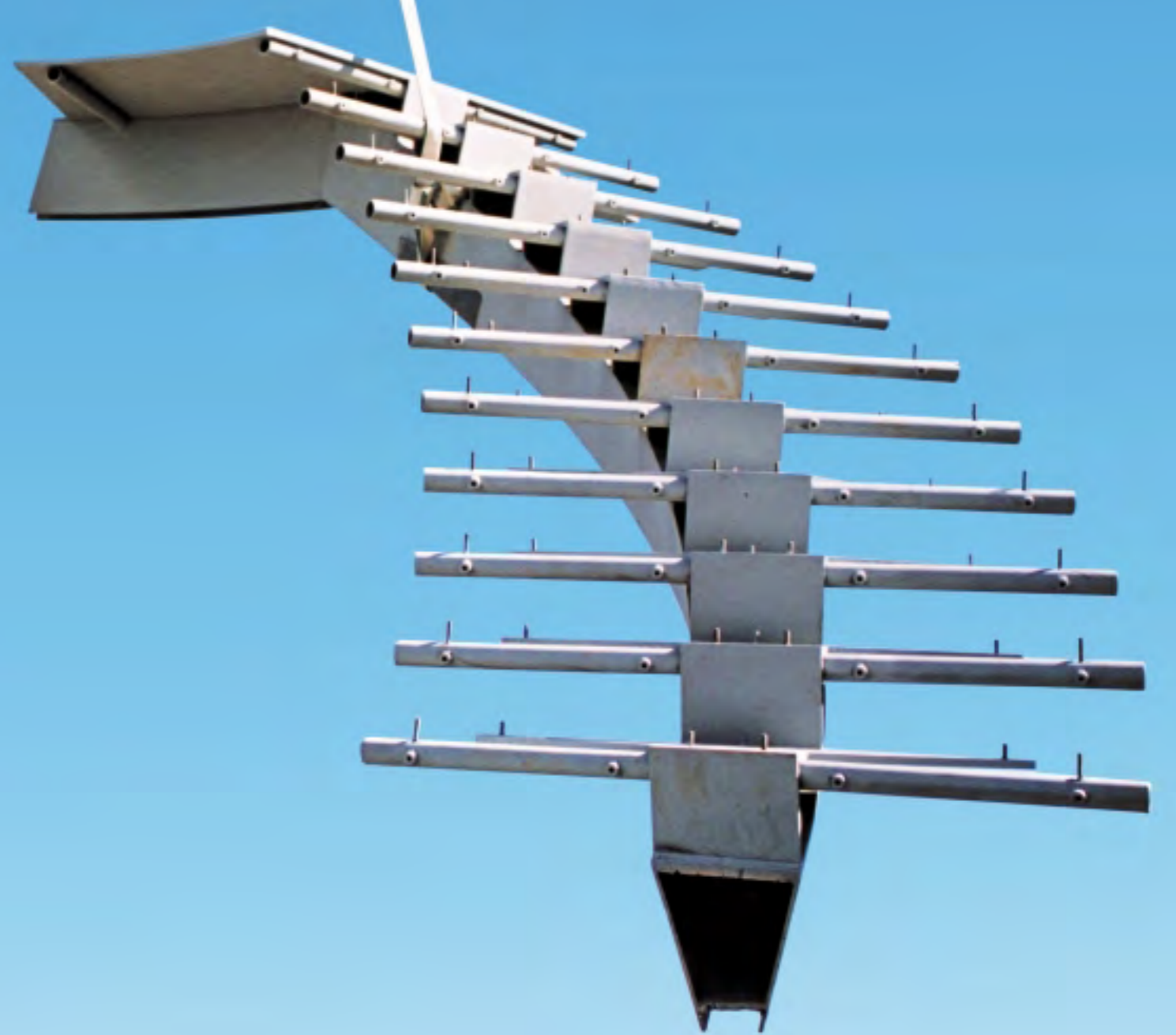
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***A Bridge Revisited***

***A Steel Building Rises***

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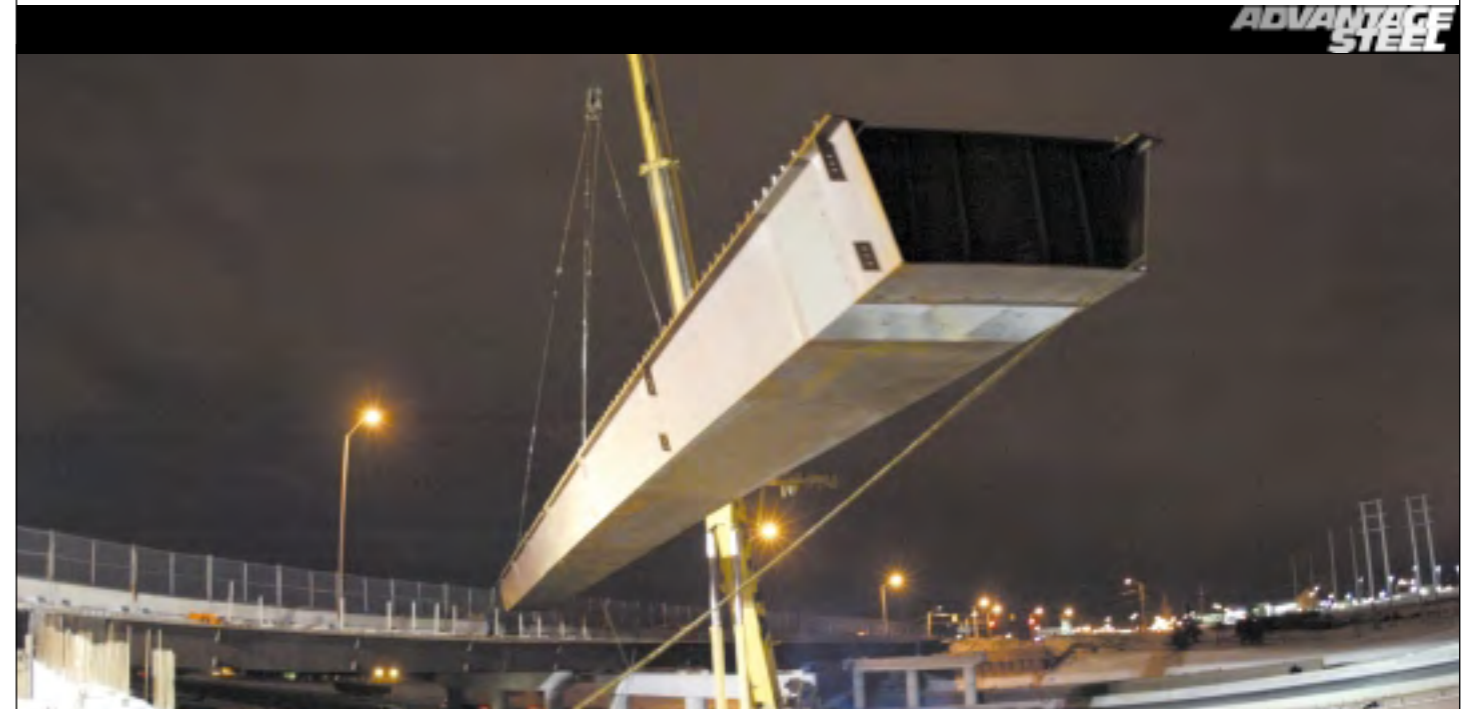
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### From the editor

Perceptions often influence the choices we make in our lives. Two articles in this issue demonstrate that close examination of the specifics of the case at hand led to steel being the material of choice for both a bridge in Mississauga and the INRS building in Québec City. Both projects demonstrated that the structural steel solution provided a significant benefit to the owner.

Many other projects from across Canada have shown the various advantages of steel, and their designers and constructors have been honoured for their work by CISC's Regional Design Awards. Those projects are again featured in this issue. I invite you to discover the merits of each of these winning projects.

Michael I. Gilmor, P.Eng.

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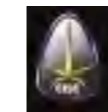
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Cover photo: Krentz Award Winner, courtesy of Michael Dickter/Magnusson Klemencic Associates  
Above photo: Mississauga Road box girder  
Below photo: Centennial Avena renovation



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Professional engineers, architects, structural steel fabricators and others interested in steel construction are invited to enquire about CISC membership. Readers are encouraged to submit their interesting steel construction projects for consideration for inclusion in this publication by contacting CISC.

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Sylvie Boulanger, P.Eng. Ph.D.  
sboulanger@cisc-icca.ca

**I'm considering integrating a steel shear wall to retrofit a 3-year old 12-storey concrete condominium building. My other alternative is adding a concrete wall on the perimeter of the footprint. Where can I get information?**  
- L.C.

The first resource you should consider to design a steel shear wall is Clause 20 of the new S16 i.e. CSA S16-01! To get an overview of the differences between the 1994 and the 2001 versions, read "Explanation of Changes in S16-01" by visiting, [www.cisc-icca.ca/S16-01\\_changes.html](http://www.cisc-icca.ca/S16-01_changes.html).

You should consider talking to Peter Timler, Executive Director, CISC Western Region. He has provided information to Canadian and American engineers on the topic and he has maintained involvement in current research projects. I have condensed a talk given by Peter, so I can send you a PDF file by email. You may also contact him directly at [ptimler@cisc-icca.ca](mailto:ptimler@cisc-icca.ca).

The Project Analysis Division (PAD) of CISC, supported by staff who are very experienced with economical steel framing concepts for buildings and bridges, provides resource information on various structural steel systems including, plate walls. However, we do suggest you contact with CISC staff in your region, as you did. The contact list is available at [www.cisc-icca.ca/contact.html](http://www.cisc-icca.ca/contact.html).

Since your project is in Quebec, you may want to contact Richard Vincent of Canam, who designed a building with a plate wall in Saint-Georges-de-Beauce. We have some written material on this building in a previous issue of Advantage Steel, as well as on other buildings. See the article entitled "Steel Plate Shear Wall Evolution in North America" on the web, which also refers to the retrofit of a library in Oregon: [www.cisc-icca.ca/advantage14.html#2](http://www.cisc-icca.ca/advantage14.html#2).

The engineers of the Oregon library retrofit project said that "one of the driving reasons for the selection of this lateral-load-resisting system was its unobtrusive application in the structure in particular, adjacent to unreinforced masonry walls. Within the confined work spaces, the steel-plate elements were arranged in easy-to-handle segments suitable for two welders".

There was also an article in Modern Steel Construction in the September 2001 issue, entitled 'STEEL PLATE SHEAR WALLS Now Performing on the Main Stage', Robert G. Driver, P.Eng. and Gilbert Y. Grondin, P.Eng. A new player in a leading role.

[www.aisc.org/MSCTemplate.cfm](http://www.aisc.org/MSCTemplate.cfm) (Click on Back Issues.)

Drs. Robert Driver and Gilbert Grondin, of the University of Alberta, are both continuing research projects on steel plate shear walls. In fact, in this latter article, there is reference to future work on finding appropriate solutions for using shear walls during the rehabilitation of buildings, e.g. how do you connect a shear wall to the existing structure so that it works adequately with the rest of the structure? Dr. Driver indicates that recent work was completed on the use of HSS collars around the concrete columns to improve seismic performance, and testing on more interface configurations is planned. You can contact him at [rdriver@ualberta.ca](mailto:rdriver@ualberta.ca).

**For my last project, I had specified CSA G40.21 350W for all W-shapes but the mill test certificate indicated that the steel was made to ASTM A572 grade 50 / A992. Is this acceptable for use Canada? – D.T.**

Good background to this question may be found in Advantage Steel Vol. 12 Fall 1999, "Steel for the 21st Century", available at [www.cisc-icca.ca/advantage12.html#9](http://www.cisc-icca.ca/advantage12.html#9).

W-shapes have not been rolled in Canada for the past four years; therefore, all W-shapes now come from foreign mills. ASTM A992 was developed to provide more desirable properties for seismic design applications. It is produced with more restrictive requirements than ASTM A572 grade 50, a steel long regarded as comparable to G40.21 350W. CSA S16-01 now includes A992 under Clause 5.1.3.

**What type of stainless steel should I be asking for in my specifications? The structure is made of small tubular sections, 60 mm in diameter, welded onto plates, then bolted. - S. C.-M.**

For all questions related to stainless steel, please refer to Nickel Development Institute (NiDI). The North American office is in Toronto. They can be reached at 416-591-7999. Their web site is [www.nidi.org](http://www.nidi.org).

I had the chance to contact the NiDi, and they told me that the Specialty Steel Industry of North America (SSINA) would also be a good reference, specifically as they have a section on "structural design information". Their web site is [www.nnsia.com](http://www.nnsia.com).

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Photos courtesy of John Sokolowski, Giffels Associates Ltd.



## A BRIDGE REVISITED

by J.K. Malmgren

**A** large number of the bridges that span Highway 401 in Ontario are constructed from structural steel but, particularly with the advent of public-private partnerships in road construction in the province, concrete has begun to make significant inroads into a sector that was once a steel domain. When the replacement of the Mississauga Road underpass was first specified by the Ministry of Transportation of Ontario, in fact, concrete was the prescribed material, but the efforts of the project engineers, Giffels Associates Ltd, working in conjunction with staff from the CISC, convinced the Ministry to revisit the project before it was put out for bid.

“The CISC assisted engineers at Giffels with design and costing information when they decided to look at alternatives to precast concrete that was recommended by others,” says Alfred Wong, Director of Engineering of CISC. “Following the comparison study, Giffels recommended steel and the Ministry agreed with their wise proposal.”

In the first instance, the comparison came down to money, and steel gained an immediate advantage.

“Based on the Ministry’s bid price database, a steel box girder structure was estimated to be \$300,000 (6%) cheaper than a prestressed concrete girder bridge for the same span arrangement,” says Brian Bridges, Manager of Bridge Engineering and Construction at Giffels.

Given that, the rationale behind the first recommendation comes into question, and it may be a case of steel being out of sight, out of mind.

“Construction of Highway 407 used concrete exclusively,” says Alfred Wong, pointing to the privately built toll highway. “Some people may have started to think that concrete was the future. But an actual comparison study may surprise them.”

The project saw the replacement of a four-lane bridge

with a steel box girder structure that would be not only wider to accommodate six lanes, but also longer in anticipation of future widening of the 401 below. In addition, the necessarily favorable cost comparison was abetted by another significant advantage that structural steel had over a concrete solution. Construction needed to accommodate busy daily traffic in all directions, necessitating the least amount of actual road closure possible. And again, structural steel proved the best solution.

“The total number of girder lifts was 18, one third of the number of lifts that would have been required for pre-cast concrete girders,” says Brian Bridges. “It significantly reduced the delays on Highway 401 for girder erection.”

The structure was designed in three spans, of 35.5 m, 45.0 m and 35.5 m respectively, and built in halves, two side by side sections, each three lanes and 37.5 m wide. Fabrication of the thirty girders, with a total weight of 665 tonnes, was completed by Central Welding & Iron Works in two stages. Because of the need to keep traffic moving, the original bridge was kept open while the first half of the new one was built.

“It was determined that the most efficient method to erect the west half of the bridge would be to install three sections of five per line with one lift,” says Stefan Thomsen of Central Welding & Iron Works. “This meant that the centre piece and two adjacent pieces were placed in one lift. The disruption to traffic, per lift, was less than fifteen minutes, and all traffic sensitive work was done between 11:00 p.m. and 5:00 a.m.”

Although the eastern half of the bridge had to be erected conventionally, where two pieces were spliced and erected so the sections cantilevered over the piers, because of the proximity of high tension power lines, the erection for each half took just five days.



Present Owner: Region of Peel and Ministry of Transportation Ontario  
Structural Engineer: Giffels Associates Ltd. General Contractor: Fermar Paving  
Structures Subcontractor: Soncin Construction Steel Fabricator: Central Welding & Iron Works

The split schedule helped overcome some of the construction time constraints. Fabrication for the project began in April of 2002 and the west half was erected by November. During the necessary construction break between December and May, the old bridge was demolished, and fabrication for the second half of the bridge was also completed. The total of 33 loads of structural steel and components added up to 11 500 fabrication man-hours at Central Welding & Iron Works, but the ability to divide the work and fabricate during a weather-driven break together with steel’s comparatively short erection time yielded the most efficient method.

Even given that steel was more cost effective and greatly reduced the need to slow or stop traffic, the one thing that may have tipped the scales was what steel’s inherent advantage over concrete is, was and always will be.

“It had to be cost effective and efficient,” says Alfred

Wong. “But traffic disruption during construction must be kept to the minimum.”

With just two piers supporting each of the three lane sections, the expansion of the 401 that is expected within the next 10 to 15 years can be easily accommodated. And the six box girders, which support a 225 mm reinforced concrete deck, have a web vertical height of 1.5 m, as compared to the 2.3 m height that a concrete structure would have required. This not only reduced the comparative cost of the approaches but made for a visually more slender structure.

The Mississauga Road bridge project was completed in June of 2003, on time and on budget and with a minimal disruption to traffic flow. The success of the project should go a long way to reaffirming the Ministry’s traditional practice – steel bridges span major highways in Ontario.

# A STEEL BUILDING RISES FROM A CONCRETE DESIGN

For more than a decade, plans had been in the works to build a new home for the Institut National de la Recherche Scientifique (INRS) in Quebec City. Not only the size of the project but the site itself changed in the ensuing years, but the original plan was to build a concrete structure.

"These buildings in Quebec City are usually built in concrete. That's what we're used to," says project architect Michel Valin, partner, Les architectes Beaudet et Valin. His firm was awarded the design contract for the \$23.5 million project in 2001, and the building it designed was definitely expected to be constructed in concrete.

The final site for the INRS project is near the centre of Quebec City in the St Roch district, and is indeed seen as part of the revitalization of that area. Taking up a full city block, the design needed to conform to some exacting standards set by the city as well as the client, the Université du Québec.

"The site is oriented in the east-to-west direction, about 120 m by 400 m," explains Valin. "The city wanted us to build very close to the property line, so the long walls are very flat."

As well, the building is being constructed above an existing three-storey parking structure, albeit one designed and completed just a year before, with a plan for the INRS project already coming into place.

"Because we had a parking structure under the building, the grid was predefined; therefore, we

developed a rigid grid on the upper floors," says Valin.

The building will house both relatively low-occupancy and heavily loaded classrooms. In addition, the laboratories needed tight environmental controls and extreme stability against vibration. The final design is almost two separate buildings. The five-storey south side, which has a high degree of exposure to the sun, houses the laboratories and has its own mechanical systems with 100% fresh air. The classrooms and administration offices are in the seven-storey north side, and the two are joined



by an 8.5 m-wide atrium.

"On the south side, there are large rooms with large windows and not too many people," says Valin. "On the north side are offices, and all of the windows face north or south into the atrium."

The bi-level design allowed for an overhang to shade the atrium from the brightest sun, but also necessitated building up to seven stories to achieve 17 000 m<sup>2</sup> of space that the client needed. But the height of the building was restricted to the equivalent of a six-storey building, implying thinner than usual floors on the north side.

All of this – the need for low vibration, the limited floor height, and a strong local tradition of building in concrete – would seem to work against any opportunity for structural steel beyond some small amount of



Owner: Université du Québec, Institut national de la recherche scientifique  
Architect: GLBV Joint Venture (Gagnon, Letellier, Cyr, Beaudet, Valin, Architects)  
Structural Engineer: BPR - Genivar Joint Venture  
Steel Fabricator and Erector: Supermétal Structures Inc.

architectural detailing. But structural engineers, BPR Groupe-conseil, who had been involved in the project almost since its inception, saw steel as a better solution, and began to campaign for a steel structure.

"The client associated concrete with reduced sound and vibration," says BPR project engineer Martin Lemyre. "We had to convince them that steel would be better."

Lemyre and his team saw challenges for a concrete structure that couldn't be overcome without tremendous expense, particularly with regard to seismic stability.

"The concrete design was difficult to achieve and very expensive," he says. "The concrete seismic shear wall would increase the cost substantially."

To overcome both the objections surrounding sound and vibration and the need for a lower floor height, the building was designed with a composite floor system consisting of a 165 mm-slab-on-deck.

"The steel composite deck actually reduced the floor thickness and allowed room for the mechanical systems," says Lemyre.

A major hurdle to overcome was the issue of fire protection, but the composite floor allowed for an elegant and relatively cost effective solution.

"The fireproofing is limited to the structural steel itself, with gypsum board covering the columns and main girders," says Lemyre. "And the beams are relatively small."

Even with the additional cost of fireproofing, the final cost of the design built in steel was much less than it would be using concrete, with virtually no impact on the aesthetics.

"The architectural aspect of the building is influenced by the layout – it would have been very much the same had concrete been used," says architect Valin.

The savings came first in simple material cost – even with 1000 tonnes of structural steel – the building would be cheaper.

"High quality steel is still cheaper than a lower quality concrete structure," points out Martin Lemyre.

For a project that had been on the books for approaching a decade, of perhaps more importance was the efficiency offered by a steel solution.

"When we finally started, we were on a very fast track," says Lemyre. "One of the advantages of steel is that you can erect in the late fall and winter."

In fact, steel fabricator

Supermétal Structures Inc was able to start the project before much of the other work had even been awarded.

"They issued construction documents in three separate lots; therefore, we could start well in advance," says Supermetal project manager Jean-Francois Leclerc. "We were 50% erected when they went out for tender on the building envelop and architectural detailing."

The jump that structural steel gave the project was abetted by allowing the other trades to function more quickly once Supermétal had finished.

"We achieved essential completion before Christmas," says Leclerc. "Then they could close in the building with temporary protection and pour the slabs."

Overall, the time, and therefore money, saving was substantial.

"It took 20 weeks to erect the structure," says architect Valin. "With concrete, it might have been 50% longer – or more."

And, even though the actual design changed only minimally, Michel Valin, who was at first hard to convince of the benefits of building the project with structural steel, sees an aesthetic advantage as well.

"This is a very big building, but it seem quite light," he says. It would have felt heavy in concrete."

Valin makes that comment in retrospect, with the building on the verge of opening its doors, but he acknowledges that the decision in 2002, one that seemed to fly against too many obstacles, had a much more practical rationale.

"When we finalized the choice between concrete and steel, the savings were figured to be around \$1 million," he says, pointing out that the final figure may be within 5%. "We saved money in two ways – by using steel instead of concrete and by saving time."



# QUALITY ASSURANCE PROGRAM INCREASES

## CREDIBILITY, PRODUCTIVITY, PROFIT

J.K. Malmgren

**A**n increasing understanding of the value of quality assurance program for almost any type of business or industry has led to an international marketplace that expects or even demands active participation from its members and suppliers. The steel industry is no different. Most if not all of the larger projects now undertaken include the involvement of ISO 9001:2000 certified companies, whether they're contractors, suppliers or the clients themselves, and fabricators are expected to meet their QA standards.

The CISC, understanding the need for quality and competitiveness within the steel fabrication industry, began work on a program that provided the benefits of a quality system with a focus on steel fabrication. In 2002, the CISC adopted the Steel Fabrication Quality Systems Guideline, a voluntary national program designed to promote quality in steel fabrication. The program parallels many elements found in ISO 9001:2000 allowing companies to progress to ISO certification in the future with minimal adjustment to their current system.

Working with Quasar, a division of the Canadian Welding Bureau that is an accredited quality systems registration organization, the CISC developed the Guideline by working from the framework of ISO 9001:2000, but tailoring it to meet the very specific needs of the industry, creating a system that focuses on maintaining quality by giving accountability to the people who are doing the work.

Since its inception, the voluntary national program has seen growing participation from fabricators across the country, and those who have undertaken to gain the CISC accreditation have found the process and the outcome of immediate and ongoing value.

"Back in the 1990's, we'd gone along the ISO path, but we'd never really formalized it," says Rob McCammon, president of Industrial Welding in Saskatchewan. "We thought it was overkill. But when this came along, it seemed like the perfect fit."

Like a lot of companies, Industrial Welding's first goal in putting a QA system in place was to increase

credibility and gain new business, particularly on the international front. While it was relatively new and not as widely recognized as the ISO standard, Industrial Welding found that the CISC accreditation gave them a system that met or surpassed the standards demanded by their clients.

"We were doing some work for Hitachi," says McCammon. "Their inspector came in, looked through our system and was very happy - he said it was similar to ISO."

Others in the industry had also tried different systems before they settled on the CISC system. In 2002, Empire Iron was bidding on work for Syncrude in Alberta, which was asking for ISO certification. The company had participated in the AISC program up to that point, but knew that it wouldn't be enough.

"At that time the AISC was more of a checklist, so we decided to move to ISO 9000," says Yasser Elmasri, Empire Iron's Quality Control officer at its Vancouver facility. "When we contacted Quasar, they suggested we try this, and we found that the program was quite similar to ISO. We decided to go that way, and they provided great support in implementing the system here."

The advantage of a system designed specifically for the industry has been felt immediately by the companies who've enrolled, particularly in the process of gaining the accreditation.

"CISC has a very good guideline, even for someone who hasn't had any sort of quality assurance system at all in place," says Industrial Welding's McCammon.

"QUASAR provided assistance when we were preparing our manual, they did the initial audit and helped us address the non-conformances."

The tailored CISC program can definitely come into place quickly.

"From the time we decided to go with the CISC system to the time we got our certification was about six months," says Ray Cloutier, quality assurance and safety supervisor with Eskimo Steel in Alberta. "It was really pretty easy."

Once in place, the accreditation has helped these and other companies enrolled in the program to gain or

keep business, but the advantages of a finely tuned quality assurance program extend beyond that. The necessary reporting and record keeping forces companies to examine every aspect of their business, and provide an opportunity to make positive change.

"To manage well, you first need to be able to measure," says Empire's Elmasri. "Now we're measuring our performance, and by measuring it, we'll be able to manage it better."

And the step by step system of reporting gives the kind of checks and balances that prevent small fabrication errors from becoming costly long term mistakes.

"If we get a non-conformance report on a job, we can take immediate action to reduce it," says Elmasri. "Instead of waiting until the end of the project, within a week or two we can react and make changes."

That may translate to immediate savings on a given project, and also to a growing trust both externally and from within. Empire Iron sets up random inspections at various frequencies depending on the project - with Syncrude, it began with 100%, and with almost zero errors it worked the savings down to 10% by the end of the fabrication process. And the system is built to create long term records that can be used to build a better business.

"The best thing is that it forces you to document things in an organized manner," says Eskimo Steel's Cloutier. "You can see ways that you can actually improve the company."

It also forces you to look at errors, particularly repeated errors, from a broader perspective.

"We have achieved cost savings by learning from mistakes," says Elmasri. "We also have a management review, where we have a weekly meeting to deal with production issues, quality control issues and safety issues. This gives us more control over the fabrication process."

By its very nature, the program forces everyone in the company to be more accountable, and it would be reasonable to expect some resistance at the production level, particularly from longer term staff, but for these companies that just hasn't been the case.

"By having production staff sign the drawings, we give them a sense of pride in their work," says Elmasri. And staff understand the value of ensuring that the work goes out the door right the first time.

"Nobody likes to get a call back on something they built," says Industrial Welding's McCammon. "You just have to rip it up and do it again."

Overall, the CISC's Steel Fabrication Quality Systems Guideline program has given each of these companies as much or more than they hoped for going in.

"Our goals were to reduce work hours, reduce back charges and reduce non-conformancy," says Yasser Elmasri. "We've achieved that."

The advantages gained have made it difficult to consider doing business without it.

"Every year, we revisit it, see if we should go to ISO, but we just haven't had to," says Eskimo Steel's Ray Cloutier. "This program has met our needs completely."


CISC's accreditation is coming to be more widely recognized and accepted by contractors and developers, and is also having a positive impact on the companies that are certified. In the longer term, the more fabricators and suppliers that become involved in the program, the stronger the program becomes. And a strong program equates to a stronger, more viable structural steel industry, in Canada and beyond.



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# WHAT'S COOL, WHAT'S HOT, WHAT'S NEW!

## CISC Steel Fabrication Quality Systems Guideline

To date, the following CISC Fabricators have implemented the Quality Systems Guideline and have also been audited and registered by Quasar:

- Benson Steel Limited, Bolton, Ontario
- Empire Iron Works Ltd., Delta, BC
- Eskimo Steel Limited, Sherwood Park, Alberta
- Industrial Welding (1990) Co. Ltd., Saskatoon, Saskatchewan
- Les Aciers Canam, Division de Le Groupe Canam Manac, Laval, Québec
- M&G Steel Ltd., Mississauga, Ontario
- Precision Steel & Manufacturing Ltd., Edmonton, Alberta
- Spec-Sec Incorporated, Rexdale, Ontario
- Spencer Steel Limited, Ilderton, Ontario
- Supermétal Structures Inc., St. Romuald, Québec
- Supreme Steel Ltd., Edmonton, Alberta
- Weldfab Limited, Saskatoon, Saskatchewan

subjects and is aimed at graduate students. Featuring practical design information and illustrated by numerous solved examples, both volumes will be of considerable use to practicing structural engineers as well. This book is based on the most recent codes and standards including CSA S16-01 "Limit States Design of Steel Structures". For further information, visit "Publications" on CISC's website ([www.cisc-icca.ca/publications](http://www.cisc-icca.ca/publications)).

## CISC Handbook of Steel Construction – 8th Edition

Watch for the printed version of the CISC Handbook of Steel Construction, 8th edition. The new edition is near completion and will be available in July 2004. Once completed, the new 8th Edition of the Handbook will be available for an introductory price of \$150.00. Prepaid orders for the 8th edition of the handbook are now being accepted. For further details, visit [www.cisc-icca.ca](http://www.cisc-icca.ca).

## Alan Lock - Atlantic Regional Marketing Director

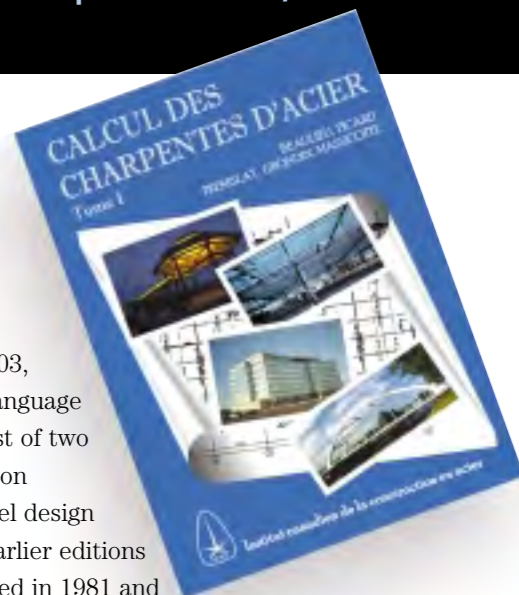
Alan Lock, P.Eng., recently joined CISC as Atlantic Regional Marketing Director. In this position, he will oversee and implement CISC Marketing efforts in the provinces of Nova Scotia, New Brunswick, and Prince Edward Island.

Alan Lock graduated from the Technical University of Nova Scotia (now part of Dalhousie University) in 1969 with a Mechanical Engineering degree, and in 1970 he received his Masters of Engineering degree from the University of Alberta.

Since graduation, and for the past 30 years, he has worked in sales, marketing, production, construction and general management with major national steel fabricators across Canada. In early 2004, Alan joined CISC as a part-time regional director for the Atlantic Region.



## Calcul des charpentes d'acier, Volume 1



Published in December 2003, this French-language text is the first of two new volumes on structural steel design and follows earlier editions which appeared in 1981 and 1991. Volume 1 treats fundamental topics and is intended primarily for undergraduate students, while Volume 2 (not yet available as of press time) discusses more advanced

# 2003 CISC STEEL DESIGN AWARDS FOR EXCELLENCE

## WINNER ARCHITECTURAL CATEGORY

### Electronic Arts Stair Renovation

Electronic Arts Inc., like many consumer-driven companies, strives to foster a working environment that encourages interaction and communication between employees. The company believes that this concept is imperative to the success of the business and, as a result, decided to revamp its offices in downtown Vancouver to reflect this objective.

Architects at Musson Cattell Mackey Partnership designed an open-concept stair system to interconnect four floors of the company's office space. Large sheets of glass, 13ft in length, wrap around the staircase and prefabricated curved steel spines frame the structure. The bending and fabrication of the steel spine was a difficult task that required careful planning and execution. The increasing radius profile made every section of stringer unique and it was imperative that the curvature of the steel frame match the complex design.

"The intention was to create an open and inviting connection between the floors that would also serve as a focal point," recalls Mark Thompson at Musson Cattell Mackey. "We designed a light, and unobtrusive glass stair structure that twists and bends into precise complex shapes and steel was the most logical framing support solution."

Connection locations and measurements varied from floor to floor and four 40' x 45' openings were cut into the existing concrete slabs to facilitate the stair installation. Structural steel members were then added to support the floating landings and surrounding area. It was extremely important that these heavy

steel members lined up perfectly with the stairs and were strong enough to support the surrounding glass tower.

As in most cases in today's busy world, there were tight timeline challenges to which the team had to work. As a result, steel erection was on an around-the-clock schedule. In total, 12 steel spine assemblies were brought to the site. They were then hoisted up to the top of the building and installed through a hole in the roof that opened up to the erection location.

The Electronic Arts glass stair creation represents a true example of the innovative use of steel through efficiency in design and creativity in erection to achieve an aesthetically pleasing result. Steel was the logical structural choice, given the need for a relatively lightweight solution in this major office tower in downtown Vancouver.



**Owner:** Electronic Arts  
**Architect:** Musson Cattell Mackey Partnership Architects  
**Structural Engineer:** Read Jones Christoffersen  
**General Contractor:** PCL Constructors Canada Ltd.  
**Steel Fabricator, Detailer and Erector:** George Third & Son

BRITISH COLUMBIA

BRITISH COLUMBIA

ENGINEERING CATEGORY

Centennial Arena Renovation Project

Centennial Park Arena in the picturesque little town of White Rock, British Columbia needed to undergo some considerable renovation and repair work. Engineers from the firm of Fast + Epp were commissioned to first survey the existing structure and then develop a restoration plan.

Predominantly a wood structure, the arena showed significant signs of decay and deterioration. In fact, many of the exterior portions of the glulam roof beams were suffering considerable degrees of rot. In 1999, an effort was made to rectify the problem. There were many awkwardly

placed rods and compression struts that restricted movement in hallways and interfered with bleacher sightlines.

After reviewing the building, three renovation and demolition possibilities were considered and a steel truss solution appeared to be the ultimate answer.

“When you’re dealing with budget constraints, it makes things a little more challenging for everybody,” says Duane Palibroda of Fast + Epp. “For this renovation, using the steel truss solution proved to be the most cost effective solutions for our client.”

This project is an excellent example of how steel can effectively enhance or transform an existing structure. The

original roof beams were converted to a hybrid wood steel truss system, which enabled the removal of all rotting materials and problematic elements that restricted the owner’s full use of the space.

Faced with a

tight construction schedule, the team was able to install the entire steel truss assembly within a two-week period because of the ideal design concept and the carefully coordinated efforts of the contractor and steel fabricator. Most of the steel truss connections were fabricated offsite and onsite welding was limited to two connection details per truss. The existing frame remained intact during the entire installation, which eliminated the need for a temporary support system. This also saved a considerable amount of time and expense and kept other functional areas of the building free from obstructions.

The arena manager has commented that the staff and visitors are both delighted with the new look and are pleased to have the functionality of their old arena back.

**Owner:** The Corporation of the City of White Rock

**Architect:** Busby + Associates Architects

**Structural Engineer:** Fast + Epp Structural Engineers

**General Contractor:** Dominion Fairmile Construction Ltd.

**Steel Fabricator, Detailer and Erector:** George Third & Son



KRENTZ AWARD WINNER

Seattle Library Project

Scheduled to be completed in May of this year, the new Seattle Public Library is expected to draw more than 8,000 visitors daily, to the new facility. This fascinating looking structure was appropriately designed to resemble a stack of books and is located on Fourth Ave, in Seattle, Washington.

The new library is being constructed using over 4,500 tonnes of steel. Structural steel has two distinctive and innovative functions within this structure. Not only will it carry the weight of the building through conventional columns but it will also support lateral loads, such as wind and earthquake movement. In addition, the unique architectural expression of the building is achieved primarily through the use of steel.

With over 362,000 sq ft of space, the library will have separate areas for each function, including spaces for books, reading areas and for other changeable uses. There are also 49,000 sq ft of

convenient underground parking space for the library’s patrons.

The Seattle Central Library was designed to operate as a functional, user-friendly building that offers educational and literary services all within a mix of formal and informal spaces. This imaginative, extraordinary structure stands out as an icon to its nearby residents, visitors, and to over 320 staff members who will run the new library.

**Owner:** Seattle

**Central Library**

**Architect:** The Office for Metropolitan Architecture & LMN Architects

**Structural Engineer:** Magnusson Klemencic Associates

**General Contractor:** Hoffman Construction Company

**Steel Erector:** The Erection Company, Inc.

**Steel Fabricator and Detailer:** Canron Western Constructors Ltd.



ALBERTA

STRUCTURAL CATEGORY

Foothills Medical Centre Parkade Expansion

Similar to many organizations in urban centres across Canada, the Foothills Medical Centre in Calgary, Alberta realized a significant parking challenge when it came to providing staff and patients with ample space for their vehicles. In 2002, the Calgary Health Region, on behalf of the medical centre, approached the structural engineering firm, Stantec Consulting Ltd. and construction contractors at CANA Management Ltd., to request assistance in determining the centre’s options for expansion.

The existing garage was originally designed for a single-level concrete expansion however, installing this heavy material required the use of a large crane and the costs associated with transporting this machine proved the concrete solution to be prohibitive. On the other hand, the structural steel system appeared to be considerably easier to erect using conventional cranes, which would take-up less space and cause minimal disruption

to the busy functional hospital operation. “Our research concluded that using structural steel for the parking garage expansion would be the most cost-effective solution for the centre”, recalls Mark Hames, chief engineer at CANA Management Ltd. “We were also able to consider building a two-level addition because of steel’s lightweight quality.”

It was determined that the existing foundation’s bearing capacity could carry a two-level, structural steel addition. In addition, after a pricing comparison confirmed that two storeys would produce the lowest cost per parking stall, the project was contracted to CANA Management Ltd. and the steel production was awarded to Collins Industries Ltd.

Fabrication began in August 2002, and the complete two-level expansion erection was completed on schedule and under budget in December 2002. The parking lot was opened to staff, patients and visitors of the medical centre on February 3, 2003.

**Owner:** Calgary Health Region Foothills Medical Centre  
**Architect:** Graham Edmunds Cartier  
**Structural Engineer:** Stantec Consulting Ltd.  
**General Contractor:** Cana Management Ltd.  
**Steel Fabricator, Detailer and Erector:** Collins Industries Ltd.



ARCHITECTURAL CATEGORY

One Executive Place

Standing eight-storeys high, the One Executive Place’s steel framed building offers a pleasing, sleek and modern-looking appearance to the many staff and visitors who arrive there daily.

Many unique architectural components give this building its signature design, including the curved glass façade that stretches across the front of the building, a free standing curved steel-galvanized canopy that compliments the façade and an all steel galvanized trellis, featured on the seventh floor patio.

The design and construction of the Executive Place building wasn’t all smooth sailing. In fact, the design team faced many challenges that needed to be addressed before construction could begin. Height restrictions had members of the team originally thinking that concrete might be the only solution. However, it was also important to keep the structure as light as possible due to poor onsite soil conditions, as well as meet strict vibration control specifications

enforced by the Alberta Building Code for many government leased properties.

After some review, it was determined that the height challenge, weight restrictions and vibration control could be better overcome with a steel only solution. The ‘dead-load’ or complete weight of the conventional steel structure was significantly less than the other concrete and composite steel systems that were reviewed, which also reduced the overall foundation costs for Beca International.

The development team concluded that a steel frame was the most economical solution for the client and could be erected in a time efficient manner to meet tight schedule deadlines. The building was

completed in February 2003 and is the new home to many Canadian federal and provincial government agencies, an engineering firm and other professional offices.

**Owner:** Beca International  
**Architect:** Poon McKenzie Architects  
**Structural Engineer:** Wiebe Forest Engineering Ltd.  
**General Contractor:** Clark Builders Ltd.  
**Steel Fabricator, Detailer and Erector:** Moli Industries



ONTARIO

ENGINEERING CATEGORY

Prince Edward Viaduct Safety Barriers

The Prince Edward Viaduct stretches over one of the busiest highways in Toronto, Ontario, and had unfortunately become a frequent site for suicide occurrences. As a result, a national competition was commissioned for teams

to submit a safety barrier design to prevent further incidents. The winning design would be constructed on the viaduct.

The Luminous Veil design was chosen as the winning project, and was submitted by Dereck Revington Studio and Yolles. The Luminous Veil is predominantly a steel structure that not only functions as a deterrent, but also preserves the aesthetic appeal and historical heritage of the viaduct and surrounding area.

Hollow structural steel (HSS) frame supports were attached to the existing bridge's framework at 6.4 m intervals. These supports extend upward at an angle from both sides of the bridge. HSS sections extend inward to support fabricated curved steel plate

beams, approximately 4.5 m above the bridge's sidewalk. Steel rods, 8 mm in diameter and spaced apart at 127 mm, are attached to these beams, and stretch down approximately 5.2 m. The bottom ends of the rods are connected to anchors on the outside of the existing guardrail.

The design team needed to carefully consider designing a barrier that would be large enough to serve its intended purpose, as well as to cause the least amount of increased weight on the existing bridge. Steel's lightweight quality, and ease of fabrication, served its purpose for this structure.

Completed in the Spring of 2003, this transparent and open-concept veil is seen by thousands of commuters who cross over or pass under the viaduct landmark on a daily basis.

**Owner:** City of Toronto  
**Artist:** Dereck Revington Studio  
**Structural Engineer:** Yolles Partnership Inc.  
**General Contractor:** Bridgecon Construction Ltd.  
**Steel Fabricator and Detailer:** Mariani Metal Fabricators Ltd.  
**Steel Erector:** Spark Steel Erectors Limited



ARCHITECTURAL CATEGORY

The Canadore College Aviation Campus

You're cleared for landing but keep an eye out for the bright new steel Aviation Campus at the Jack Garland Airport in North Bay, Ontario. The large curved entrance structure at Canadore College's new campus is just one of many unique features exuded by this building and noticeable to staff, students and to the pilots who arrive and depart from the airport daily.

Reminiscent of an airplane's nose, the structure to the left of the entrance doors is actually a student lecture hall and host for in-house education forums, as well as many third-party private events. The rest of the building houses classrooms, workshop rooms, and a large column-free aircraft hangar.

Previously, aviation schools were housed in remote, old industrial buildings throughout the city of North Bay and the Canadore College of Applied Arts and Technology realized it was time to build a new campus. One of the main objectives for the new updated and modern facility was to build a structure that would

compliment the mechanical and assembly-like functions of the building as well as resemble aircraft vehicles.

"We needed to use colours and surfaces that would compliment the building's location and purpose", recalls Paul Stevens, senior principal at ZAS Architects Inc. "Steel was selected because of its lightness, expressive detail and skeleton-like qualities."

After reviewing a variety of structural

options, it became apparent to the design team that structural steel would be the most ideal material for this building.

**Owner:** Canadore College of Applied Arts & Technology  
**Architects:** Larocque Elder & ZAS Architects Inc.  
**Structural Engineer:** Halsall Associates Ltd.  
**General Contractor:** D.J.Venasse Construction Ltd.  
**Steel Fabricator and Detailer:** Central Welding & Iron Works



QUEBEC

JUNIOR ARCHITECT OR ENGINEER CATEGORY

Gino Pelletier – Abitibi Consolidated

In an effort to recognize the talent of a new generation of engineers, a new category was added to the list of Québec

Region steel design awards. This category is aimed at young architects and engineers (less than 30 years old) who have made an original contribution to a steel construction or steel research

project. Gino Pelletier, a 29 year old engineer who was mentored by Martin Lemyre from BPR Groupe-conseil in Québec City, was the first person to win in this category and accepted his award at the 2003 award ceremony. "I was used to receiving nominations during my studies, but that doesn't happen often at work. It's the first time. It certainly is a pleasure and an honour", admitted Gino to journalist Raymond Prince of Constructo newspaper, last October.

The jury was impressed with the responsibility that Gino assumed for the industrial addition to the Abitibi-Consolidated plant in Alma. The judges commented that he was rewarded for "an advanced integration of information technologies in a complex industrial design process that was subjected to a fast-track schedule."

**Junior Engineer:**  
 Gino Pelletier - BPR Groupe-Conseil  
**Engineering Sponsor:**  
 Martin Lemyre - BPR Groupe-Conseil  
**Steel Fabricator :**  
 Éric Bouchard - Constructions Proco inc.



COMMERCIAL AND INSTITUTIONAL CATEGORY

Agrandissement du Palais des Congrès de Montréal

The extension of the Palais des Congrès in Montreal was aimed principally on offering highly functional and operational equipment. The notions of integration, multi-use and interactions were at the heart of all development activities for Palais des congrès. Steel was the only material that provided economy, flexibility, resistance and rigidity of the elements to be erected. Built in part over the Ville-Marie autoroute, the extension required trusses which were considerably deep and consisted of long spans (from 45 to 52 metres), so that the roof rested on the top chords, and the exhibition floors were supported by the bottom chords. In virtue of these benefits, the jury leaned towards this project for "Its state-of-the-art technology, a successful transition between old and new and a structural expression adapted to the difficult site conditions."

**Architect:** Le Consortium TDS inc., Les architectes Tétrault Parent Languedoc et assoc., Saïa et Barbarese Architectes, Aedifica  
**Independent Architectural Consultant:** Hal Ingberg Arch.  
**Structural Engineer:** Dessau-Soprin inc. (div. Bâtiments)

**Contractor:** Le Consortium GBC inc., Gespro, Groupe Eacon, Divco Propriétaire, Palais des Congrès de Montréal  
**Steel Fabricator:** Mométal inc., Nico Métal inc., Constructions Proco inc., Structures Yamaska inc., Les Aciers Canam  
**Erector:** Montacier



QUEBEC

INTERNATIONAL CATEGORY

**Boston University Arena Complex**

For this project, the architect was committed to the lightness of the interior

decor, which is in contrast with the imposing dimensions of the sports centre. To succeed, many structural elements were architecturally expressed through

the use of steel's strength and slenderness. Moreover, the use of glass and interior façades accentuate the impression of spatial elegance. The jury voted in favour of this finalist for "Its curved and inclined shapes, expressing lightness and brilliance, through long clear spans."

**Architect / Engineer:** Cannon-Design  
**Structural Engineer:** Le Messurier Consultants  
**Contractor:** BM/WBI Partnership  
**Owner:** Trustees of Boston University  
**Steel Fabricator:** Supermétal Structures inc.  
**Steel Detailer:** Dessin Structural B.D. Inc.  
**Supplier:** Amcan Produits Filetés Inc.



ONTARIO

ENGINEERING CATEGORY



**Project Name:** Bridge 205: NTB Inbound, Airport Departures Level  
**Owner:** Greater Toronto Airport Authority  
**Structural Engineer:** GTAGA, Joint Venture of Holmes & Narver and UMA Engineering  
**General Contractor:** Bot Engineering  
**Steel Fabricator and Detailer:** Canam/Structural, Division of the Canam Manac Group Inc.  
**Steel Erector:** Spark Steel Erectors Limited

QUEBEC

COMMERCIAL AND INSTITUTIONAL CATEGORY



**Project Name:** Hôtel de Ville de Baie-Saint-Paul  
**Architect:** Anne Carrier Architectes  
**Structural Engineer:** Génivar Groupe-Conseil  
**General Contractor:** Qualité Construction (CDN) Ltée  
**Owner:** Ville de Baie-Saint-Paul  
**Steel Fabricator:** Poutrelles Delta Inc.

QUEBEC

INDUSTRIAL AND BRIDGES CATEGORY



**Project Name:** Passerelles "Rendez-vous à la Rivière"  
**Architect:** Paul Baillargeon architecte  
**Structural Engineer:** Le Groupe Canam Manac  
**Contractor:** Les Aciers Canam  
**Owner:** Corporation Rendez-vous à la Rivière  
**Steel Fabricator:** Les Aciers Canam

2003 JUDGING PANELS

2003 CISC STEEL DESIGN AWARDS FOR EXCELLENCE

**British Columbia**

Al Hepburn, Colborne Architectural Group  
 Lisa Sorensen, C.Y. Loh Associates Ltd.  
 Norm Hotson, Hotson Bakker Architects  
 Sylvain Boulanger, BoldWing Continuum Architects  
 John Pao, Bogdonov Pao Associates Ltd.

**Ontario**

Ben Burke, Quinn Dressel Associates  
 Jack Diamond, Diamond and Schmitt Architects Inc.  
 David Morgan, Dunlop Architects Inc.  
 Clarence Nichols, Hatch Associates  
 Peter Sheffield, Peter Sheffield & Associates Ltd.  
 Richard Young, Robbie / Young + Wright Architects Inc.

**Alberta**

Bob Kachuk, Supreme Steel Ltd.  
 Randy Alford, C.W. Carry Limited  
 Mike Payne, Waiward Steel Fabricators Ltd.

**Québec**

Alain Bergeron, arch., ABCP, Montréal  
 Jean-Luc Dion, ing., Ivanhoé Cambridge, Montréal  
 Yves Gauthier, ing., SNC-Lavalin, Montréal  
 Josée Harvey, arch., Josée Harvey Arch., Québec  
 Ghislain Savard, ing., TecSult, Québec

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Legend: \*sales office only S – structural P – platework J – open web steel joist

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Legend: \*sales office only S - structural P - platework J - open web steel joist

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Legend: B-buildings Br-bridges P-platework J-open web steel joist \*sales office

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