Newsletter

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Final Words

Message from the President

David Harvey, P.Eng.
SEABC President

SEABC Continues to Shine

As I go about my regular business, I never cease to be amazed by how good a job SEABC is doing. We continue to attract presenters with amazing stories to tell about structural engineering in our region. We see filled lecture theatres and hear from new presenters on a regular basis – the recent Walterdale Bridge Erection Procedures presentation is a case in point. Fabricators and suppliers are keen to present their technology to our members. SEABC is now a well-established communications element.

When structural engineers arrive here from other parts of the world, they quickly adapt to SEABC. Newcomers regularly appear at our monthly seminars and routinely register for some of the Certificate in Structural Engineering courses. CSE courses are ideal for kick-starting a structural engineering career, but are equally great for broadening horizons, refreshing knowledge and adapting to the Canadian market. The current courses are more comprehensive than the initial offerings which started in 2000, and many more instructors have emerged. With strong local support and increasing online enrolment, the CSE courses remain as popular as ever.

Having firmly established itself as a trusted partner and an association that delivers on its promises, SEABC enjoys great relations with several outside engineering organizations. From the get-go SEABC set up an agreement with IStructE to incorporate its Regional Group in British Columbia and deliver services for local Institution members. The two organizations working together may have influenced the strong growth in local IStructE membership over the past 15 years.

SEABC also has a longstanding agreement with our professional regulator, APEGBC, to collaborate on structural engineering matters. Issues have arisen and were successfully dealt with and several practice guidelines were prepared. Most noteworthy was the six-storey wood frame buildings guideline which was delivered in record time in response to a government mandate. When the seismic safety of school buildings became a political issue, the contribution of SEABC members to developing the seismic assessment and retrofit guidelines was significant. While years of engineering research were required, the award-winning seismic schools program is now 50% complete – a remarkable achievement of which everyone involved should be justly proud.

More recently, SEABC has been interacting with IABSE, the International Association for Bridge and Structural Engineering – a prestigious international organization headquartered in Geneva, Switzerland. We proposed to IABSE that SEABC host the 2017 fall symposium in Vancouver. Our proposal was accepted and we are now in the final run-up with the event to be held this September at the Westin Bayshore. Much dialogue was required between the two associations along with a visit last November from IABSE's CEO to tour the symposium venue.

The latest activity for the symposium organizing group was to agree the pricing structure for registration. An important win for SEABC was to agree discounted rates for members of SEABC and the other supporting organizations. While the pricing structure favours IABSE members, the SEABC rate reflects the value of membership. Strong member support enables SEABC to undertake educational activities, and in particular to organize the 2017 IABSE Symposium. Thanks to the careful work done by our team and our conference organizer, Melanie Fung, the registration costs are comparable with similar North American conferences, and slightly lower than the most recent IABSE symposia in Geneva and Stockholm. Work on the program content is next and the symposium itself is coming up fast.

Did we see all this coming when we launched SEABC is 2008? No, although the promise was certainly there. So, keep on supporting SEABC and let's see what else we can achieve!

2017 IABSE Symposium

Adam Lubell, PhD, P.Eng.
Read Jones Christoffersen Ltd
Symposium Co-Chair

Katrin Habel, Dr. Sc. Techn. P.Eng.
Associated Engineering
Symposium Co-Chair

SEABC will host the 2017 IABSE Symposium, a three-day technical conference preceded by a program of pre-conference workshops and the Annual Meetings of IABSE's technical committees and working groups. Technical Tours to local structural engineering projects will follow the conference.

For the Preliminary Invitation and more information, please see: www.iabse2017.org

We are regularly updating the symposium website with new information (www.iabse2017.org). Check out the Symposium promotional video on the website (also available at vimeo.com/157380662) and share the link with your colleagues and friends. Be sure to sign up for the mailing list to receive important announcement about the conference.

Technical Program

The Call for Papers for the Symposium closed in early November 2016. We received over 800 general submissions and the Scientific Committee accepted about 700 abstracts for further consideration. The deadline for paper submission is February 14, 2017, and then the Scientific Committee will get active in reviewing the papers. We are looking forward to an interesting and varied program at the Symposium next year.

Conference Program

The Organising Committee has progressed on confirming keynote speakers, pre-conference workshops and technical tours.

We are pleased to announce that keynote addresses will be presented by the following distinguished speakers: Dr. G. Michele Calvi, Director of the ROSE School in Italy, will discuss performance based design for seismic actions; Dr. Yaojun Ge, Professor at Tongji University in China, will present on recent long-span bridges in China; and Dr. Peter Irwin, co-founder of RWDI and Professor at Florida International University, will discuss trends in wind engineering for tall buildings.

Several pre-conference workshops will be offered during the period Sept 18-20, 2017. A Workshop on displacement based seismic design will be presented by Dr. G. Michele Calvi and Dr. Andre Filiatrault (Professor at the University of Buffalo). A Workshop on Cold Region Engineering will be presented by Adrian Gygax, Ed Hoeve and Leslie Mihalik. A hands-on Workshop for Young Engineers under 35 years of age will be offered in the area of Bridge Dynamics, led by Dr. Peter Taylor, Dr. Peter Irwin and Dr. Dusan Radojevic (COWI North America).

We are still finalizing other keynote speakers and workshops – stay tuned for updates over the next few weeks.

Post-symposium technical tours are also being organized. All tours will include engineers involved in the design or maintenance of the structures who will share their insights with the participants. Tours will include: A two day excursion on the Sea-to-Sky Highway to Whistler with planned visits to the Sea-to-Sky gondola, the Audain Art Museum, the Peak-to-Peak gondola, the Fitzsimmons debris barrier and other notable structures; a five hour paddle wheeler cruise on the Fraser River from New Westminster to visit some of the major bridges of the Lower Mainland; and a dinner cruise from the Westin Bayshore to False Creek and return with descriptions of significant buildings and bridges of Downtown Vancouver.

To help participants explore the many impressive structures around Vancouver and the region, the Organizing Committee is pursuing the idea of compiling information on recent, notable and historically significant structures. This will be provided to all conference attendees in the form of a printed or PDF-brochure for self-guided visits. We are currently preparing a template, and we will solicit input from all SEABC members. This brochure will be a fantastic means of promoting the

outstanding engineering in our City far beyond the IABSE Symposium, and we encourage all of you to participate in assembling the information.

Registration and Hotels

As we confirm program details, the Organising Committee has been working hard to finalize all information for the Registration System. All fees have been set, and we believe that we have competitive rates for the Symposium and the associated Workshops and Technical Tours. A very favourable room rate has been negotiated at the Westin Bayshore Hotel for those that want to stay where the action is.

Stay tuned for news on the registration website and hotel information in February!

Corporate Sponsorship & Exhibition

The success of high-calibre conferences like the IABSE Symposium rely on the tremendous energy from our local volunteers and from the support of corporate partners and organizations. The Organising Committee has continued to focus on our sponsorship programs in recent months and we have secured both local and international sponsors to date. Our website is constantly updated to show confirmed sponsors as they come on board. Some categories of the tiered sponsorships are now sold out but many fantastic sponsorship opportunities at different price tiers are still available. Sponsorship of the Symposium will give your firm strong exposure to local, national and international delegates.

Our exhibition booths are also rapidly filling, with fewer than 10 still available.

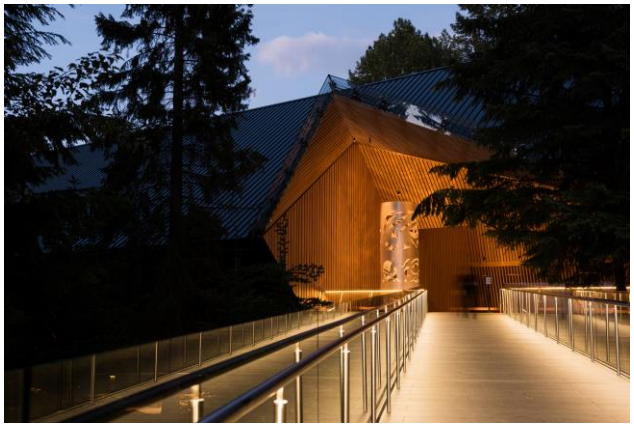
We encourage you to review our sponsorship brochure at www.iabse2017.org/images/PDF/IABSE2017-sponsorship-brochure.pdf. Please contact David Ellis, Chair of the Sponsorship Committee, if you would like to discuss these opportunities in further detail (sponsorship@iabse2017.org, 778-746-7426).

We are excited to welcome this high-quality international conference to Vancouver and we hope to present a program of great interest to SEABC members. Please contact us with any comments, suggestions or questions regarding the IABSE Symposium and stay tuned for updates in the next SEABC Newsletter.

Katrin: khabel@iabse2017.org

Adam: alubell@iabse2017.org

Photos of the post symposium technical tours that will be provided:-



Audain Art Musum – Photo credit Tourism Whistler

Sea-to-Sky Gondola – photo credit Tourism Whistler

VANCOUVER 2017 IABSE SYMPOSIUM

Committee Reports

Education Committee

Tejas Goshalia, P.Eng., P.E., S.E.

Director SEABC

The Walterdale Bridge in Edmonton, AB is getting a replacement. Erection of the new cable suspension bridge, commissioned to Allnorth and Acciona Pacer Joint Venture is currently under completion. A local team of Structural Engineers from Allnorth, under the direction of Dragan Majkic, served as the Erection Engineer of Record for the installation of the replacement bridge.

Nigel Brown, Project Engineer and Project Manager from Allnorth and Miriam Castrillo, the Technical Department Manager from Acciona, jointly presented an evening seminar on January 25th at UBC Robson Square articulating the key components of their design that resulted in the successful completion of the bridge's erection.

During the presentation, Nigel and Miriam outlined some of the key stages and procedures of the bridge's erection and construction. They highlighted the sensitivity of accurate surveying in light of ever changing river-water currents, temperature and environmental variations. They described the technical challenges involved since initially establishing the erection staging twin-barge on the river, to erecting the primary main arch. Then the delicate operation of transporting it to its destination, followed by the two-stage raising of the main arch in place between the river bank embankment structure and finally the aligning it to its final stable position within 15-25 mm accuracy.

With the main arch established, the suspended deck was cast-in-place. The bridge structure is over 206 metres in span, at 54 m height, with 2000 tonne of steel, 1600 cubic meters of concrete, 400 tons of reinforcing steel, 32 steel hangers and 14 additional hangers to support the shared-use path.

For those who could not attend the seminar, a copy of the presentation slides shall be posted on the SEABC events website at: www.seabc.ca/Walterdale_Bridge

A detailed report on the Walterdale Bridge can be found on page 11.

Replacement of the Walterdale Bridge

Nigel Brown and Miriam Castrillo

Walterdale Bridge Photo Credit: Steven Mackaay

Technical Committee

Kevin Riederer, M.A.Sc. P.Eng.,

Director SEABC

The Task group investigating the Seismic Design of Basement Walls has been very active over the past few months. The committee has completed the first draft the SEABC proposed for the Design of Below Grade Foundation Walls for Reduced Soil Pressure. The committee is meeting again this month for the next round of edits and the Education Committee will be hosting a seminar later this year to present the proposal to SEABC.

The Guard Design Task Group was not able to gain the planned momentum in 2016, however, efforts to update the Guard Design Guidelines published by SEABC will continue in 2017.

Anyone with interest in participating on a Technical Subcommittee is encouraged to contact SEABC. Any member with an issue or concern that they would like to have the Technical Committee consider is also encouraged to reach out to the committee.

Communications Committee

David Harvey, P.Eng., Struct.Eng.

Director SEABC

We much appreciate our members contributing articles or photographs to the newsletter describing their professional activities or interests. Working to inform readers about our engineering designs or research helps raise our professional profile, and may help inspire others to follow suit. Contributions from structural engineers are always interesting and we want to see more. Please keep forwarding us your submissions- we look forward to hearing from you. Kindly send information for publication to:

newsletter@seabc.ca

– We'll definitely try to include as many submissions as we can!

Interested in publishing? Do you like writing structural engineering news articles? Consider helping us edit the SEABC Newsletter. Let us know if you are keen to join our team.

Young Members Group

Thomas Duke, EIT

As the New Year begins, the YMG has made several changes to the committee roster including the nomination of a new YMG chair. As our past chair, Grant Fraser, steps down, Stanley Chan has raised his hand to take over the leadership role. The YMG has grown substantially over the past two years under the exceptional leadership of Grant Fraser. Stanley Chan is honored to step up as the incoming YMG chair, after serving the YMG committee at various capacities since 2011. The continued success of the YMG would not have been possible without the full support of the SEABC board of directors, and contributions from the group of enthusiastic YMG volunteers. Stanley will continue to work alongside likeminded YMG volunteers to improve and expand the YMG's services.

Past Chair, Grant Fraser

Incoming Chair, Stanley Chan

Registration Assistance Seminar:

In November, 2016 the YMG held the recurring Registration Assistance Seminar. The seminar was led by Dr. Steven Kuan. Steven did an excellent job providing the audience with useful tips and advice for preparing their APEGBC P.Eng application using the new competency based system.

The SEABC YMG would like to thank Steven for taking the time to lead the seminar once again.

Steven Kuan presenting at the YMG Registration Assistance Seminar

Vancouver Island Branch

Thor Tandy, P.Eng, Struct.Eng, MIStructE

Branch Chair

Mission:

To provide a focal point for SEABC members on the Island to meet, discuss SEABC issues and to take benefit in the form of exchange items of technical interest.

2017 Branch Executive:

Branch Exec: Thor Tandy, Dan Weber, Dan Gao, Tyler Best
Inter-Branch Liaison as best we can: Meagan Harvey, Lee Rowley, and Ralph Watts

Branch Demographic:

- Members in the local Victoria, Gulf Islands area.
- A central Island group centred on the Nanaimo, Port Alberni area.
- A small North Island group.

Successful Events:

Since our last article, the executive has met a couple of times to update our goals and achievements however, there have been no events.

Proposed Events:

Following up on the executive meeting on January 24, 2017, the proposed topics have been revised:-

- Polystyrene Building Blocks: We would still like to present this but for now it will be postponed until a later date.
- Rubble Foundations: *"Improving Performance of Rubble Foundations in Seismic Zones"*. This will probably be of interest to those who are involved in Heritage and other past-century structures. The current opinion however, is that rubble foundations are probably likely to be upgraded with an integrated concrete wall/foundation so probably not a realistic

topic for presentation. Member opinion would be welcome.

- Rammed Earth: "*Ancient art seeking technical rationalization"*. The schedule is still for March but due to workloads will probably be postponed to April. Since this is but one of several alternative building materials, we will consider including a general overview of alternative materials such as Straw Bale construction.
- Non-structural components: – *"What Not To Do".* Case studies and acceptable solutions. Scheduled for May/June
- Social event(s): Apparently, a work in progress ☺ so member feedback would be good!
- Executive Meeting: Next meeting will be in March, 2017 (TBC). Our meetings are open so anyone wishing to attend and contribute is welcome.

We encourage members to submit comment to our executive on any matter that may concern or be of interest to structural engineers.

Contacts:

Victoria/Gulf Islands:	Branch Executive
Central Island:	Lee Rowley
North Island:	Ralph Watts
Okanagan:	Meagan Harvey

On the Web

Stephen Pienaar, P.Eng.

Webmaster

The SEABC website serves as a vehicle for the Communications Committee to keep members informed. Thanks to the selfless efforts of many volunteers, especially the Education Committee (multiple seminars) and the Young Members Group (several energetic activities), this was a relatively easy task.

2016 in numbers

- The year closed with a total of **804 active members**.
- We had an additional **226 non-members** that subscribed to the SEABC Newsletter.
- The Education Committee and Young Members Groups hosted a total of **12 seminars and tours** through the year.
- We broadcast **57 announcements** via **55,559 emails.**
- SEABC processed **807 credit card payments** for membership dues and events.
- We proudly host **71 listings** in the Directory of Structural Engineering Firms.
- Our website has **30 video recordings** of evening seminars and workshops.

Looking ahead at 2017 – SEABC website refresh

Work on a new SEABC website resumed and faltered again in 2016; there were significant integration challenges. The Board already has another plan in place to complete this work in coming months. The website refresh will achieve many goals: a fresh new look, upgrade of the back-end to facilitate volunteer involvement, and an overall improved members' experience.

Staying in touch

- If your firm is not yet listed in the Directory of Structural Firms, you are missing out. Add your firm at www.seabc.ca/corporate.
- Members-only access to video recordings and seminar handouts is available at www.seabc.ca/videos.
- Bookmark the SEABC home page for a quick glance at what is happening: www.seabc.ca.
- Follow us on Twitter: www.twitter.com/SEABC.
- Encourage non-member colleagues to join our mailing list: www.seabc.ca/mailinglist.

IStructE News

David Harvey, P.Eng.
Struct.Eng.

Director SEABC

After five years of representing the British Columbia Regional Group on the Council of the Institution, Bill Alcock has finally stepped down. A popular figure at Institution headquarters, Bill was elected to a three-year term on the IStructE Executive Board which he completed in 2016. Bill's Institution work drew much praise from other offshore representatives serving on the International Interest Group – the IIG ensures that overseas members are well catered for by IStructE. Bill really enjoyed his time in London, but typically of him, did not think he was doing anything special. Bill – we owe you a debt of gratitude for keeping the British Columbia flag flying strongly in London!

Bill Alcock

Lucas Epp

I would like to acknowledge the contribution of Lucas Epp – the other British Columbia Regional Group representative on the IStructE Council. Lucas was selected as one of two members of the Institution's Young Member Group to serve on Council last year. Lucas, thank you for representing local structural engineering in London and keeping international collaboration alive and well. I'm sure your passion for your profession and your 'cutting-edge' work at StructureCraft Builders were much appreciated in London.

Several other individuals also serve the profession on various Institution panels. My role as the local Institution representative now goes back nearly twenty years, and I'm still involved with the Examinations and Professional Development panels – work I find fascinating. I really enjoy meeting members when they move to British Columbia; and also interviewing prospective new members and passing on my experience with IStructE. For 2017 I will assume the role of Regional Group representative on Council. My colleague Mark Porter continues to offer his specialist expertise, advising the IStructE Sustainable Construction Panel on sustainability and climate change matters.

Paul Fast has played a very valuable role by sitting on the Structural Awards Judging Panel for the past few years. Fast + Epp have submitted projects for the Structural Awards for over a decade and have enjoyed a number of wins and commendations. Most notable was Grandview Heights Aquatic Centre which last year won the prestigious Supreme Award – the first Canadian project to do so. Paul now has the distinct pleasure of judging the merits of other worthy structural designs from across the world.

Equally important, but maybe lacking the high profile of the Structural Awards, is the Papers Awards Judging Panel. The panel judges papers published in The Structural Engineer, as well as technical presentations given at IStructE headquarters. In addition, the panel judges prize-winning presentations from Regional Groups; and submissions for the Kenneth Severn Award from young members of 28 years and under. Duane Palibroda has sat on the Papers Awards Judging Panel since 2014, playing the very valuable role in teasing out the very best work for recognition.

Robert Jackson

Fast + Epp's strong representation at IStructE continues with Robert Jackson who has been selected by the Nominations Committee to serve as one of the Young Member Group representatives on Council for 2017. Last year Robert won both the Kenneth Severn Award, and the Institution's Young Structural Engineering Professional of the Year Award. Many congratulations, Robert, and enjoy your time on Council!

2017 Wood Design & Construction Solutions Conference

Vancouver Convention Centre – East , Vancouver, BC

28th Feb & March 1, 2017

Leading-edge expertise in wood design, construction, finishing and building science will inform and inspire British Columbia's building and design professionals at the upcoming 2017 Wood Design & Construction Solutions Conference on Tuesday, February 28 and Wednesday, March 1 at the Vancouver Convention Centre – East. The conference is presented by Wood *WORKS!* BC and the Canadian Wood Council, and is part of Wood Week BC, four events happening over 10 days on the latest trends and topics on wood design and construction with a range of educational and networking opportunities.

Building and design professionals from BC and across the continent will converge in Vancouver for what is expected to be the largest conference on wood design and construction in North America. Current trends and important new topics will be highlighted over two days, including mass timber and hybrid system design, transformative building technologies, recent innovations, off-site prefabrication, sustainability and fire and acoustic performance.

Why should you attend this dynamic learning event?

- Hear distinguished innovators and thought-leaders as speakers from Canada, US, Austria, Switzerland, New Zealand, Australia and the UK
- Learn more about current and compelling topics on innovations and trends in wood design and construction
- Gain proficiency with wood with new themed and curated seminar streams, and an expanded program which includes a dedicated seminar stream for contractors and builders
- Visit the interactive exhibit hall to consult with wood product experts
- Network during a welcome breakfast, lunches and an evening reception - exceptional opportunities to connect and collaborate
- Earn professional development learning credits

More information can be found at:- www.woodweekbc.com

Nominate a Colleague

David Harvey, P.Eng. Struct.Eng

Do you have a deserving colleague that has contributed strongly to the profession and/or the community? Is that person serving as a role model and inspiring others? If so, consider nominating him/her for the 2017 President's Awards, recently announced by APEGBC. The President's Awards are B.C.'s premier awards for professional engineers. To nominate an individual, you will need to prepare a letter of nomination, or support for a nomination, outlining that person's outstanding achievements.

The President's Awards include awards for meritorious achievement; community service; professional service; young professionals; and the R.A. McLachlan Memorial Award – BC's top award for professional engineers. Nominations must be received by Friday April 14, 2017. Full details of the awards and the nomination procedures are available at: www.apeg.bc.ca/For-Members/Awards

Nomination packages should be submitted on line. For further information or assistance on any aspect of the APEGBC President's Awards, contact Warren Mirko, Communications Officer at: wmirko@apeg.bc.ca

Walterdale Bridge

Dragan Majkic, M.Sc., P.Eng.
Allnorth

Pedro Adrados, Contractor Project Manager

Miriam Castrillo P.Eng., Contractor Technical Director

Dragan Majkic P.Eng., Erection Engineer of Record

Nigel Brown P.Eng., Detailed Design and Project Management

Koushan Sadeghi P.Eng., Detailed Design and Site Support

Bogdan Alexeyenko P.Eng., Modelling

Andy Chang P.Eng., Modelling and Detailed Design

The Walterdale Bridge Replacement Project was commissioned by the City of Edmonton in 2013. The detailed architectural design of the bridge was carried out by COWI International (Buckland and Taylor) and Dialog Design. ACCIONA-Pacer Joint Venture (APJV) was contracted to build the structure and Allnorth Consultants Limited (Allnorth) was hired by APJV as the Erection Engineer of Record for the project.

To this point, the installation of this bridge proved technically challenging as it entailed:

- Navigation of 1000 tonne assembly up the icy Saskatchewan River.
- Heavy lifts of 1000 and 2000 tonnes using strand jacks and lifting towers.
- Low tolerance alignment of large, stiff arch connections.
- Fine tuning of the deck elevation using hanger turnbuckles.

As the Erection Engineer of Record, Allnorth was responsible for the development of the erection procedures for the entire permanent structure, plus detailed designs for all temporary structures and equipment used in the installation. Allnorth also provided ongoing site support for the construction team and resolved construction issues as they arose.

The design for the Walterdale Bridge consists of two steel arches with a span of 206m. The arches incline towards each other at an angle of 13.5 degrees. Sixteen top struts and two deck support beams connect the two arches, giving the structure lateral stability. The composite deck has a length of 230m from abutment to abutment. The bridge deck is suspended from the arches by 32 steel hanger cables, and also bears on the arch deck support beams and abutments. Adjacent to the deck, the Shared Use Pathway (SUP), (a steel box girder with a trapezoidal section and a crescent shaped alignment), is suspended from the arch by fourteen additional hanger cables, and is connected to the deck by eight floor beam extensions. The overall bridge design is shown in Figure 1.

Figure 1 – Walterdale Bridge Rendering. Photo Credit - City of Edmonton

The construction of the bridge was performed in three main phases.

1. Arch installation.
2. Traffic deck installation.
3. SUP installation.

The three main objectives for the development of the procedures used to install the permanent structure were:

- Safety and structural stability at every stage of construction.

Figure 2- Beginning of Navigation Procedure – November 17th

- Completion of the permanent structure within the constraints established by the design drawings and contract documents.
    - Final geometry.
    - Hanger cable tensions.
    - Minimizing locked in stresses in bridge components.
- Minimizing all potential risks to both schedule and budget.

Phase 1 – Arch Installation

The procedure developed for the first phase of construction was moderately technically challenging. Each arch was fabricated in 21 individual segments. Each segment had a length of around 10m, and the heaviest weighed 120 tonnes. Joints with higher final elevations were designed to be bolted, while those closer to the roadway were designed to be fully welded for aesthetic reasons.

Initially, the midspan of the arch was assembled downstream from the final bridge location. This midspan was 86m in length, and weighed approximately 1,000 tonnes. During assembly it was fully supported by temporary towers. Once assembly was completed, bowstrings running the length of the midspan were tensioned until an arching action resulted in the entire midspan being supported by skid shoes located at each end of each arch.

When the load was transferred to the skid shoes, the assembly towers were removed from the area beneath the arch. Two barges with modular flexifloat systems were gathered and arranged at the end of the assembly area. The barges, plus the skid shoes and bowstrings were operated by a highly experienced team from ALE Heavylift.

The next step was to skid the assembly down the rails and onto the barges. A tower was installed at the centre of each of the barges. Each tower was connected to the arch by a moment connection and the bottom of the tower was a pinned connection to the barge. This configuration minimized the potential of the barge overturning, and allowed for more efficient barge dimensions. The transfer of the load onto the barges is shown above in figure 2. Once the assembly was fully supported by the two barges, a system of winches attached to each barge was activated to pull the assembly upriver. Each barge was fitted with two main winches, with a capacity of 20 tonnes each, and two auxiliary winches of 5 tonnes each for stability. The procedure to move the arch from its initial assembled location to the final crossing alignment took approximately one week.

Substantial sized barges were required for buoyancy to accommodate the 1,000 tonnes. Due to changes in the construction schedule, challenges associated with the water depth and ice on the river were encountered during navigation. These challenges were mitigated by trial runs and the presence of a dredging machine throughout the operation. When the assembly reached its final location, it was lowered onto pilecap supports at the ends of each arch.

Stump arches on the berms at the final crossing location were also being assembled during the midspan assembly. Four lifting towers were located at each of the four corners of the first midspan. These towers supported the stump arches plus lifting strand jacks with a capacity of 860 tonnes each.

Figure 3 - First Heavy Lift - 1000 tonnes, 85m length

Two heavy lifts were required to complete the arch. The first midspan, with a weight of 1,000 tonnes was lifted 20m. At that height, each end of each arch was bolted to the adjacent, previously assembled 30m long stump arches. The first heavy lift is shown above in Figure 3.

At the time of the first heavy lift, the first upper bowstring was still in place. To maintain the geometry of the arch throughout construction, a second, lower bowstring was also required along the full length of the second midspan. The tension was traded from the upper to the lower bowstrings to prevent the permanent structure from being overstressed, and to keep the arch within the geometric limits established by the temporary structures.

The lift of the second assembled midspan involved the lift of 2,000 tonnes with a height of 20m. When the lift was complete, adjacent segments were temporarily connected using an internal bolted splice. The baseplate connection to the foundation was left incomplete to this point to allow for precise alignment of the connection. A rocker plate was installed beneath the baseplate to allow for adjustments in alignment of the stump arches with the second midspan.

Jacks were used to adjust the slope of the lower section and to facilitate installation of the connection. Smaller jacks and strongbacks were also used to bring the splice into torsional alignment locally.

Once this connection was complete, the permanent welded connection was applied. While the splice was being completed, the baseplate of the arches were grouted, and the anchor rods were tensioned.

The permanent structure of the arch was completed with the baseplate connection and the last splices. The lifting strand jacks and bowstrings were then removed, ending the first phase of construction.

Phase 2 – Deck Installation

During the second phase of construction, the deck was installed in two parts:

- In the first part, the steel substructure of the deck was installed on towers on the berms where possible. Once the installation was completed, the assembly was elevated to be attached to pre-cut cables suspended from the arch. The hanger cable pins were then installed, the support from the towers beneath was removed, and the deck was suspended from the arch.
- In the second part of the installation of the deck, cranes located on the berms lifted steel components into place for cantilevered installation over the river. After each cantilevered bay was assembled, a cable stressing assembly, (designed and provided by Freyssinet), pulled the deck and the lower hanger fork towards each other to install the hanger pin. As each bay was completed, the erection fronts from the north and south side approached each other at the centre.

In its final condition, lateral stability of the bridge deck is provided by the concrete slab. Until the concrete could be placed, the deck was laterally supported at quarter points, and a temporary lateral bracing system was provided beneath the deck.

At each stage of construction, the geometry of the permanent structure was checked. This check involved a survey of the location of each of the hanger pins and the profile of the edge girders of the deck. This geometry was compared to the anticipated geometry of the structure based on a non-linear staged model, which was constantly adjusted to match the conditions on site.

The north assembly was initially installed 40mm north of its design position to ensure simple installation of the key segments. To complete the final connections of the key segment, jacks at the north abutment pushed the north half of the deck south to align properly.

All formwork and rebar for the concrete deck was placed simultaneously with steel installation, behind the construction front. When the steel installation was complete, all remaining formwork and rebar was installed. The alignment of the deck in the vertical direction was confirmed to be within the previously established project tolerances. The lateral alignment of the deck was adjusted slightly by applying jacks at the lateral supports at the edges of the berms, as well as at the deck support beams. The concrete of the deck was placed once the deck alignment had been determined as acceptable. The completed bridge deck is shown below in figure 4.

Phase 3 – Shared Used Pathway (SUP) Installation

The crescent shaped, trapezoidal steel box girder will be assembled adjacent to the deck in the third and final phase of construction which will occur in the spring of 2017.

Using the same approach as the steel arch, the SUP girders were fabricated in 25 individual segments. These will be welded together prior to completion. The fabrication was complicated due to the complex geometry of the girders.

The SUP will be initially assembled on temporary towers above the berm, a similar process as that was used for the traffic deck. Once the portion of the SUP structure above the berms is complete, it will be jacked up to connect to the floor beam extensions of the deck and the hangers.

High capacity cranes will then lift portions of the pathway into place above the river. Floor beam extensions, hangers, and the splice to the previously installed structure will be completed prior to releasing the segments from the crane at the end of each lift.

When the full length of the SUP is installed, handrails, asphalt on the deck, and bituminous coating on the SUP will be installed on the bridge deck and SUP.

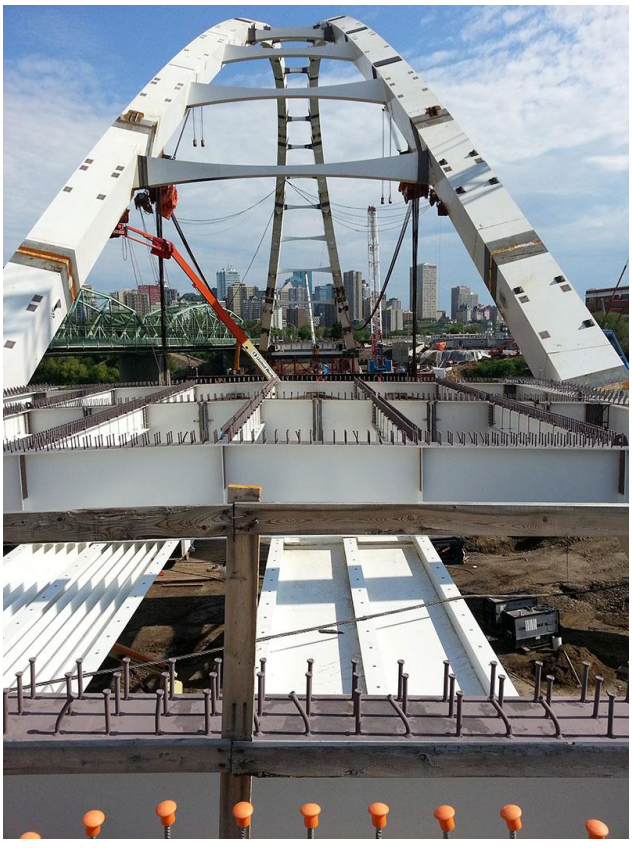
Figure 4- Completed Steel Arch and Traffic Deck with Hangers Tuned

Once all permanent weight has been installed on the structure, the fine tuning of the cables can commence. The turnbuckles will be adjusted to change the unstressed length of the cables using cable tensioning equipment similar to that used for the installation of the hangers during deck installation. This adjustment will bring the geometry within the tolerances established by the design drawings and contract documents.

In addition, changes to the unstressed lengths of the cables will change the tension distribution between cables. This will allow for the cable tension tolerances to be met.

The bridge is anticipated to be completed in 2017.

Walterdale Bridge and Deck Hangers



Bridge Deck Construction

Ariel View During Bridge Deck Construction

Owner – City of Edmonton
Owner's Representative – ISL Engineering
Arch Designer – COWI International
Deck and SUP Designer – Dialog Design
General Contractor – ACCIONA Pacer Joint Venture
Erection Engineer – Allnorth Consultants Limited
Heavy Lifting Subcontractor – ALE Heavy Lift

2017 Executive Board - Candidate for Elections

Perry Adebar, Ph.D., P.Eng., University of British Columbia

Professor in the Department of Civil Engineering at the University of British Columbia, Perry has served as a Director of SEABC for four years. If elected, he will continue to serve in that capacity.

Stanley Chan

A design engineer with Read Jones Christoffersen Ltd., Stanley is the incoming chair of SEABC's Young Members Group. He has been involved with the Young Members Group since 2011. If elected, Stanley will serve as a Director.

Paul Fast, P.Eng., Struct.Eng.

Managing Partner with the firm he founded, Fast + Epp Structural Engineers, Paul has served as a Director of SEABC for seven years. If elected, Paul will continue to serve in that capacity.

Tejas Goshalia, P.Eng., SE

A Senior Associate with Stantec, Tejas has served as a Director of SEABC for four years and currently chairs its Education Committee. If elected, Tejas will continue to serve as a Director.

Adrian Gygax, P.Eng, Struct.Eng.

A Principal with with his own firm, Gygax Engineering Associates Ltd., Adrian has served as a Director of SEABC for seven years. If elected, Adrian will continue to serve in that capacity.

David Harvey, P.Eng., Struct.Eng., President

A Principal with Associated Engineering, David was a founding Director of SEABC. David currently chairs the SEABC Communications Committee and is currently serving as President. If elected, David will continue to serve in that capacity.

Kian Karimi, Ph.D., P.Eng., P.E.

An Instructor at British Columbia Institute of Technology's School of Construction and the Environment, Kian is an incoming Director of SEABC. If elected, Kian will serve in that capacity.

Cameron Kemp, P.Eng., LEED® AP, Past President

A Principal and Chairman of Omicron Canada Inc., Cameron was a founding Director of the SEABC. Having served five years as SEABC President, Cameron is currently Past President and if elected, will continue to serve in that capacity.

Kitty Leung, P.Eng., Struct.Eng.

Manager, Structural Engineering, with WSP Canada Inc's Vancouver office, Kitty has served as a Director of SEABC for two years. If elected, Kitty will continue to serve as a Director.

Surinder Parmar, P.Eng., PMP

Manager- Portfolio Capital Projects with BC Hydro, Surinder was a founding Director of the SEABC and has served as Secretary/Treasurer since its inception. If elected, he will continue to serve as a Director.

Kevin Riederer, P.Eng.

Project Structural Engineer with Read Jones Christoffersen Ltd., Kevin has served as a Director of SEABC for two years and currently chairs the SEABC Technical Committee. If elected, Kevin will continue to serve as a Director.

Andrew Seeton, P.Eng.

A senior structural engineer with Glotman Simpson Consulting Engineers, Andrew was a founding Director of the SEABC and former chair of its Education Committee. If elected, he will continue to serve as a Director.

John Sherstobitoff, P.Eng.

A senior structural engineer specializing in earthquake engineering and a Principal with Ausenco, John has been an SEABC Director for two years. If elected, John will continue to serve as a Director.

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Certificate in Structural Engineering Program

Shannon Remillong,

CSE Program Co-ordinator

In Memory of Dr. Mahmoud Rezai, P.Eng.,Struct Eng.

Sadly, our friend and colleague, Dr. Mahmoud Rezai passed away suddenly December 8, 2016. Mahmoud was a devoted supporter of the Certificate in Structural Engineering program since its inception in 2001.

During the CSE infancy period, when many of the courses needed strong industry support to put together, Mahmoud was always the first to step up to help by teaching a course, substituting for others, and designing courses to allow for a broader audience participation and reaching out to the larger sector of the industry.

He was definitely an unsung hero of the CSE program, a key cornerstone member to help build the CSE program to the wide recognition and success that it has reached today.

His willingness to give back and selflessly contribute to the spreading of structural engineering knowledge is a strong example for all of us to follow.

To commemorate Mahmoud's outstanding contribution to the education of the structural engineering profession, the Certificate in Structural Engineering program established the "Mahmoud Rezai Scholarships" that will be awarded annually to our outstanding students.

Mahmoud's contributions expanded beyond the CSE program and he was an outstanding practicing structural engineer. Our profession will greatly miss him but his legacy will remain.

The January term has begun with record registration numbers at our new location, UBC Robson Square. This location offers a high calibre classroom setting and the latest internet technology for those connecting via live webcast, it's a great success.

Save the Date!

Saturday, May 27, 2017 Structural Health Monitoring (SHM) - One-day seminar at UBC Robson Square.

The Structural Health Monitoring (SHM) one-day seminar is intended for engineers and focuses on both the theory and the practical use of the SHM for civil engineering structures.

- It examines the basic principles of measurement and data processing; the use of low-cost and long term seismic and environmental monitoring systems to keep civil engineering infrastructure under constant surveillance; and assessing the structural health in real-time.
- SHM provides quantitative means to implement and develop sustainable maintenance and rehabilitation schemes and programs for structures such as bridges, buildings, tunnels, and dams.
- The seminar will cover the concepts of rapid post-disaster assessment of instrumented civil infrastructures.

Please check the SEABC Certificate Program webpage late-March for more details regarding seminar registration. An email reminder will go out to SEABC Members beginning of April 2017.

This year's Mahmoud Rezai Scholarships will be awarded to three outstanding students who have taken a minimum of 2 courses over 2 consecutive years, with the highest grade point average. The students who have accomplished this goal between 2015 and 2016 are: Jackson Pelling, Emmett Burke and Jared Walls. Congratulations guys!

The Executive Committee would also like to congratulation Mehrdad Jahangiri who recently graduated from the SEABC Certificate Program, successful completing 12 courses. He will be awarded a certificate at the upcoming SEABC AGM held on March 1st.

Registration Inquiries and Requests/Suggestions: Please contact Shannon Remillong, Certificate Program Executive Assistant, at email: courses@seabc.ca

CSE Board of Directors

John Pao, M. Eng., P.Eng. Struct.Eng, Bogdonov Pao Associates Ltd. (Chair)

Shannon Remillong (Executive Assistant)

Farshid Borjian, M.A.Sc., P.Eng., C.Eng., M.I.Struct.E., Struct.Eng.

Svetlana Brzev, Ph.D., P. Eng. British Columbia Institute of Technology

Anthony El-Araj, P.Eng, PE, LEED AP, Glotman Simpson Consulting Engineers

Andreas Felber, Ph.D., P.Eng.,(on temporary leave), BC Hydro

Darrel Gagnon, M.Sc., P. Eng., Buckland & Taylor

Chris Jacques, P. Eng., MIStructE, LEED AP, Read Jones Christoffersen Ltd

Bishnu Pandey, Ph.D., P. Eng., British Columbia Institute of Technology

Carlos Ventura, Ph.D., P.Eng., University of British Columbia

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Waskesiu River Pedestrian Bridge

Project: Waskesiu River Pedestrian Bridge

Location: Prince Albert National Park, Saskatchewan.

Owner: Public Works and Government Services Canada

Engineer: Associated Engineering

Fabricator: Rapid-Span Structures Ltd.

Mark Your Calendar

Upcoming SEABC Seminars

SEABC AGM and Dinner

Date: March 1st 2017

Venue: Sutton Place Hotel, Vancouver, BC

Time: 5:30-9:30pm – Dinner at 6:00pm

More Information: See flyer at end of newsletter

IABSE Symposium

Date: September 21st-23rd, 2017

Venue: Westin Bayshore Hotel, Vancouver, BC

More Information: www.iabse2017.org/

Upcoming Industry Events

APEGBC: Student and Industry Night

Date: Wednesday March 1st 2017

Venue: Earth Sciences Building Atrium, University of British Columbia, Vancouver, BC

Time: 6:30 – 9:30pm

Cost: Free

Registration: www.apeg.bc.ca

APEGBC: NEGM: Popsicle Stick Bridge Competition

Date: Sunday March 5th 2017

Venue: Capilano Mall, North Vancouver, BC

Time: 11:00am – 3:00pm

Cost: Free

More Information: www.apeg.bc.ca/getmedia

APEGBC: Speaking as a Leader

Date: Thursday March 9th 2017

Venue: Vancouver, BC

Time: 9:00am – 4:30pm with continental breakfast at 8:30am

Presenter: Mr Demetrios Nicolaides

More Information: www.apeg.bc.ca/Events/

2017 Wood Design & Construction Solutions Conference

Date: 28th February and 1st March, 2017

Venue: Vancouver Convention Centre East, Vancouver, BC

Time: 7:00am registration, 7:45-3:45 Exhibit Hall open, 8:00am-4:45 Seminars in session.

More Information: www.eventbrite.ca/e/wood-design

Final Words

Editorial Information

The SEABC Newsletter is published by the Structural Engineers Association of British Columbia. The current and past issues are available on the SEABC website at www.seabc.ca.

The Newsletter is edited and managed by the SEABC Communications Committee.

- Committee Chair: David Harvey
- Newsletter Editor: Catherine Porter
- Webmaster: Stephen Pienaar

Submissions are welcomed and all SEABC members are encouraged to actively contribute to the Newsletter. Submissions, letters to the Editor, questions and comments can be sent to: newsletter@seabc.ca.

The Committee reserves the right to include or exclude submitted material and in some cases edit submitted material to suit overall space requirements. If content is not to be edited, please advise so at submission time.

SEABC Board of Directors

President:	David Harvey
Past President:	Cameron Kemp
Secretary / Treasurer:	Surinder Parmar
Other Directors:	Perry Adebar, Bill Alcock, Grant Fraser, Paul Fast, Tejas Goshalia, Adrian Gygax, David Davey, Kitty Leung, Andrew Seeton, Kevin Riederer, John Sherstobitoff
Committee Chairs:	
Education:	Tejas Goshalia
Structural Practice:	John Sherstobitoff
Technical:	Kevin Riederer
Communications:	David Harvey
Young Members:	Grant Fraser
Branch Chairs:	
Vancouver Island:	Thor Tandy
Okanagan:	Meagan Harvey

Advertising

Pre-paid rates per edition:

- $270 (quarter page), $360 (half page) or $450 (full page) plus GST. Rates include a banner advert on the Events page of the SEABC website.
- 50-word “Available for Employment” ads are free.

Please address advertising enquiries to: newsletter@seabc.ca.

Please support our advertisers!

SEABC Annual General Meeting, Dinner & Presentation

Date:	**Wednesday - March 1, 2017**
Venue:	**Sutton Place Hotel, 845 Burrard Street, Vancouver**
Time:	**5:30pm**
Cost:	**$60+GST (SEABC Members), $120+GST (Non-Members)**
AGM:	**Address from SEABC President and 3-course dinner**
Keynote:	**Sam Price, MA FREng FICE FIStructE HonFRIBA Founding Member of Price & Myers, London, UK**
Registration:	**www.seabc.ca/agm or use attached mail-in form**

Keynote Presentation:

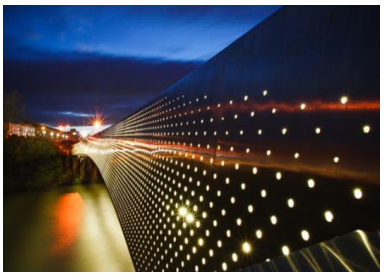
A Unique Structural Engineering Perspective

Price & Myers projects cover an unusually wide range - both in size and type. The firm's diverse portfolio displays an amazing contrast of aesthetics and outstanding structures together with latest technology and traditional crafts, applied to everything from outstanding modern designs to the refurbishment of ancient monuments - all done with a class of signature Sam Price influence.

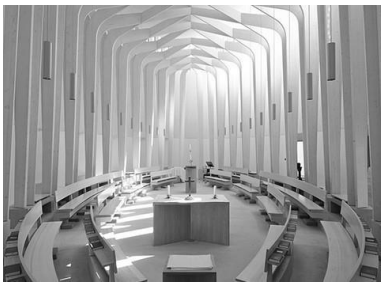
Sam's notable works range from the ultra-elegant expressive form of the new Bishop Edward King Chapel at Oxfordshire; through the creation of a modern landmark from the ancient ruins at Astley Castle in Warwickshire; via a classic three-storey residence with its dramatic grand staircase in Queens Drive London; to the breathtaking 55m stainless steel Meads Reach Footbridge in Bristol - all simply stunning. He embraces 'new build', restoration and adaptations; each treated attentively with an apparent simplicity that often belies the complex engineering lurking beneath propelled by a unique Perspective best described as: curious, thoughtful and rigorous, from first principles, creating sophisticated construction solutions integrating structural mechanics and architectural design with scientific knowledge and techniques from diverse fields including aerospace engineering, computer programming, and digital manufacture.

Join us as we explore this valued Perspective – a masterful expression of Sam's art!

Queen's Ride Staircase



Meads Reach Footbridge



Bishop Edward King Chapel

Sam Price is a Consultant and Founder Member of the esteemed structural engineering firm Price & Myers. An ex-Arup engineer, Sam co-founded his own practice in 1978.

Regarded internationally as a leading engineer, Sam is very much the master craftsman known to leave his distinctive stamp on everything he touches. Sam is a Fellow of the Institution of Structural Engineers, the Institution of Civil Engineers, and the Royal Academy of Engineering. He has taught regularly at Cambridge University and at the Architectural Association in London.

Structural Engineers Association of British Columbia

Mail-in Registration Form: AGM, Dinner, & Presentation March 1, 2017

You can also register online!
www.seabc.ca/agm
(secure credit card payment via PayPal)

Contact Information:

Name of Company or Individual _____
(Receipt will be issued in this name to email provided below)

_____ _____ _____
Street Address | City, Province | Postal Code

_____ _____
Telephone | Email (receipt will be issued to this email address)

Registration Fees:

REGISTRATION DEADLINE February 22, 2017

	Name(s) of Attendee(s)	SEABC Membership Number (Required for Member discount)	SEABC Member $60	Non-Member $120	Fees
1.			☐	☐	$
2.			☐	☐	$
3.			☐	☐	$
4.			☐	☐	$
5.			☐	☐	$
6.			☐	☐	$

Check one box per attendee

Three-course plated dinner is included.
Please indicate any special dietary requirements.

SUBTOTAL: $_____

ADD 5% GST $_____

TOTAL (PAYMENT ENCLOSED) $
Cheque payable to SEABC

Please make cheque payable to SEABC
Mail this form and cheque to:
SEABC
#201-288 West 8th Avenue
Vancouver, BC V5Y 1N5

Contact: agm@seabc.ca

Registration will be confirmed via e-mail. Registration cannot be guaranteed if received after February 22, 2017.
An administration fee of $25 will apply to any cancellations received by February 22, 2017. No refunds given after February 22, 2017.