Volume 51 • August 2020

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Final Words

Grandview Heights Aquatic Centre Photo Credit: Hughes Condon Marler Architects

Message from the President

David Harvey, P.Eng.
SEABC President

Structural Engineering in a Pandemic

In the May 2020 Newsletter, I commented on the impact that the Covid-19 pandemic has had and how it has affected structural engineering. Three months later, we have seen that BC has fared relatively well to date and is cautiously easing restrictions. Despite this cause for optimism, the situation is much worse south of the border and in other parts of the world.

With government restrictions on workplaces reduced, many companies are opting to reopen offices to staff albeit with distancing and safety rules in place. Most seem to be taking a transitioning approach – gradually bringing back staff from remote working, largely on a voluntary basis. This seems sensible as it allows time for safety rules to be tested and for staff to adjust.

And not everyone will want to rush back. In a recent snap poll, I noted that over 50% of my colleagues declared that they were working more efficiently at home, a sizable number were "about the same" and only a small percentage considered that they were less efficient working remotely. Clearly, this will vary with individual circumstances and job descriptions.

Few, if any, will miss their daily commute, and we may well see some staff choosing a mix of office-based and remote working. If this becomes well established, in future, employers will need smaller offices with more staff-sharing workspaces. Less meeting rooms may be required, but given that structural engineering is essentially collaborative, in-person meetings will likely continue.

The pandemic has witnessed a major shift towards videoconferencing and a dramatic rise in the availability of webinars. In turn, our familiarity with remote conferencing has grown and it seems likely that usage of these convenient tools will continue. One distinct positive is that participation in on-line events has grown, often significantly. In-person meetings typically involve locals, whereas remote participation can be from anywhere with an Internet connection.

So how has this affected SEABC? At this point we have postponed plans for live presentations and may switch to webinars if the in-person restrictions extend into the fall. The Certificate Program will continue unabated as most courses on offer were previously available on-line. We are currently hoping that by next March, SEABC's Annual Dinner Meeting can be held in person, although travel restrictions may dictate a keynote speaker from Canada.

The demand for structural engineers continues through the pandemic restrictions although sectors are affected differently. While some projects have been temporarily shelved, others have been accelerated to take advantage of lower traffic. Key threshold pavement replacements have occurred at YVR while aircraft movements are limited.

Governments, keen to kickstart the economy, see public works as a means of bringing people back to work. Projects are being speeded up and new initiatives brought forward. The suppliers are back in business, many seeing healthy order books.

Having been less affected than other developed nations, Canada's experience contrasts with the UK which is still grappling with the pandemic and government restrictions that seem more arbitrary than well considered. There the major engineering firms have announced large-scale staff reductions in a bid to weather the storm.

The US picture is far from clear, with some states lessening restrictions while others are ramping them up. The current presidential election only muddies the picture with many unhelpful political statements being made. Australia has already been through its 'second wave' of restrictions which have been reported as worse than the first go around. Clearly, it is important for governments not to 'jump the gun'.

Long-term we are likely to see changes as a result of our recent unprecedented pandemic experience. Hospitals were heavily impacted, but not necessarily as expected. Distancing has been imposed in many facilities not designed for it. Articles are beginning to appear on designing with pandemics in mind – time will tell us how much we'll need to change.

Ronald Homer DeVall

Jeff Corbett,

P.Eng Struct.Eng

Perry Adebar, P.Eng.,

Director SEABC

Ronald Homer DeVall, December 7, 1943-June 8, 2020

The Structural Engineering Community of BC suffered yet another great loss with the recent passing of Ron DeVall.

Ron was a well-known structural engineer in BC and Canada from the technical leadership he provided to Read Jones Christoffersen Ltd. (RJC), and the writing of Canadian building codes, standards and guidelines that make our buildings safer in earthquakes.

After completing his civil engineering degrees at the University of British Columbia (UBC), Ron spent his entire career of over 40 years at RJC in Vancouver. He was the Engineer of Record on a number of notable projects that utilized innovative structural solutions such as Vancouver Library Square and Park Place (office tower); and as RJC's structural engineering technical lead, he developed technical standards, quality control guidelines and training protocols, many of which are still in use today. Ron also mentored generations of structural engineers at RJC.

And while Ron DeVall's technical contributions to RJC are sufficient for us to celebrate a distinguished structural engineering career, it is the additional contributions he made to Canadian building codes, standards and guidelines for the seismic design of buildings that make him truly deserving of distinction.

Ron served as Chair of the Canadian National Committee on Earthquake Engineering (CANCEE), which wrote the seismic design provisions in the National Building Code (NBC) from 1985 to 2009. That committee subsequently became the Standing Committee on Earthquake Design (SC-ED). Even after stepping down as a voting member of SC-ED, Ron remained one of the most active contributors to the work of the Committee up until he began to have health issues about one year ago. Ron also contributed to other parts of NBC as a member of the Standing Committee on Structural Design (1989 to 2011), Task Group on Structural Evaluation and Upgrading of Existing Buildings (1988 to 1997), and the Canadian Commission on Building and Fire Codes (2009 to 2012).

Ron made important contributions to the seismic design provisions in the Canadian Standard for concrete buildings CSA A23.3. Together with his friend and colleague Jim Mutrie, who passed away less than six months before him, Ron played an important leadership role in the development of the innovative "made in Canada" seismic design provisions for concrete shear wall buildings in the 1984 edition of CSA A23.3. Ron and Jim continued to play an important role in the further development of Clause 21 in the 1994, 2004, 2014, and 2019 editions of CSA A23.3.

In 2006, Ron was appointed by Engineers and Geoscientists of British Columbia (EGBC) to the Seismic Peer Review Committee for the development and implementation of the Seismic Retrofit Guidelines for BC Schools. For 14 years, Ron helped to ensure the innovative performance-based approach was defensible and well documented.

After hearing of his passing, engineers from across Canada paid tribute to Ron. They wrote about his unique technical abilities as a structural engineer and they wrote about him as a person:

> *"…. He has left a legacy that those who knew him, and indeed the entire community of engineers who benefitted from his work, will forever cherish."*

*"… He **had a way of taking complex issues and breaking them down in a way that could be understood and appreciated",***

"…The voice of knowledge, wisdom and integrity in earthquake engineering",

*"…. **A wonderful ability to express himself clearly and with humour",***

" …. His sense of humour and warmth also made him a great pleasure to spend time with,

" …. The perfect gentleman, not only during committee deliberations; but also in general with everybody",

"…. A prodigious intellect, an affable personality, and a sunny outlook. In his company, one experienced a sense of true affection and friendship."

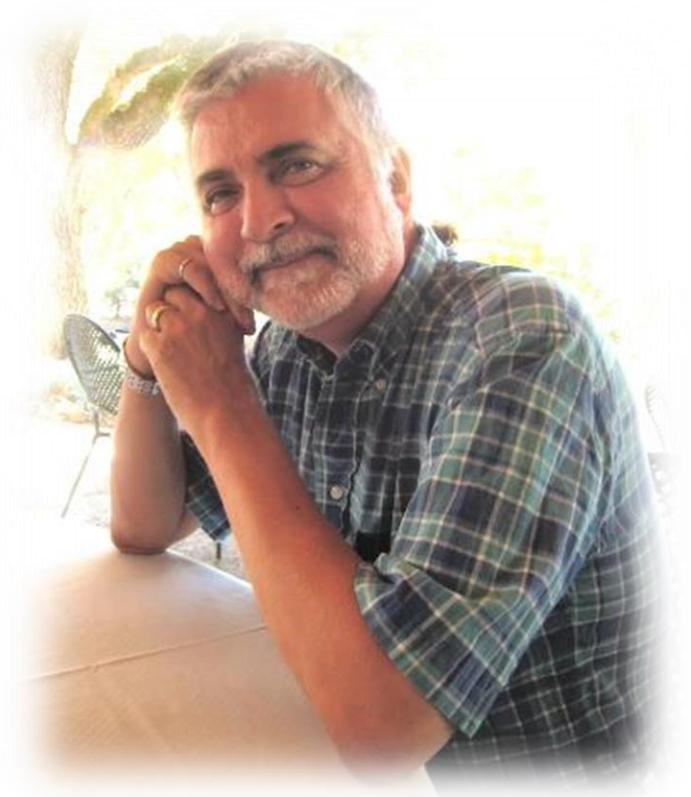
Ron DeVall passed away peacefully on the morning of June 8th after a brief battle with brain cancer. BC lost a great structural engineer, Canada lost an important contributor to codes and standards, and many of us lost a wonderful friend. But Ron's legacy will live on within RJC and the many RJC projects that he influenced, and in the significantly improved seismic safety of Canadian buildings because of the building codes, standards, and guidelines that he so strongly influenced during his career.

A Memorial Award to Honour Two Great Structural Engineers

The Structural Engineering Community of BC lost two great structural engineers in a period of less than 6 months. Ron DeVall passed away on June 8, 2020, while Jim Mutrie passed away on December 23, 2019. Ron and Jim's friendship began while they were engineering students together at UBC and lasted more than 50 years. During their careers, they spent many hours, much of it together, improving Canadian building codes and standards so that buildings will be safer in earthquakes.

A UBC memorial student award will honour their technical excellence and their important accomplishments. For more information, visit:

www.memorial.support.ubc.ca/devall-mutrie



Committee Reports

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 of items of technical interest.

2020 Branch Executive:

Thor Tandy Dan Weber
Dan Gao Dean Hynes
Stephen Pienaar

Branch Demographic:

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

Recent Events:

1) Branch Webpage: The Branch now has a dedicated web link on the SEABC website. As the link is a new facility, we are currently in the process of finding and inserting content.
2) Executive Meetings: We meet every three months or so and we extend a warm invitation to join us. Please contact an exec. member if you would like to be notified.

Proposed Events:

Due to the COVID restrictions, gatherings are on hold until further notice.

1. Rammed Earth: *"Ancient art seeking technical rationalization"*. We plan to develop a web-based presentation.
2. Impacts of Long-Duration EQ's: Presentation on the impact of long-duration EQ's vs code design. VI is probably a beneficiary of such a talk. We plan to develop a web-based presentation.
3. Non-structural Components: – *"What Not To Do".* Discussions under way to make this a paper.
4. Proposed "Social" event(s):

a) Q&A events where networking and workshop/presentation of code issues that may be victim to mis-interpretation. We are reviewing this as a Zoom, or other web-based, meeting.

b) Events that will attract young members: follow up to intake numbers rising at both Camosun College and UVic.

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

Contact: Thor Tandy: vicpeng@telus.net

Technical Committee

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

Director SEABC

The Technical Committee is fairly quiet for the summer months. The Practice Guideline for the "Structural Condition Assessments of Existing Buildings" has been submitted to EGBC for final review. Members can look for the guideline to be published later in 2020.

Anyone with interest in participating on a Technical Subcommittee or task group 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

As many of you know, the Communications Committee publishes this newsletter. We also distribute information including upcoming event details, webinars and other notices via the SEABC DIARY emails. This key flow of information is important so that SEABC members are well informed and SEABC is seen as a trustworthy source.

Our committee members consist of Catherine Porter, Editor, along with volunteers, Stephen Pienaar, Webmaster, Mark Budd, Assistant Editor, and me. We are here to serve your needs. We hope you think we are doing a good job and if so, we do not expect to hear from you (no news is good news). If you think of something we can do better, please do let us know – your feedback can lead to improvement, that way we will get better. Currently our committee and our regular reporters write many of the articles; however, SEABC is a member-services organization and we welcome contributions from our members.

We value our readership which looks forward to receiving an interesting and relevant newsletter. If you can submit something for structural engineers to read – thank you, we need your support. Kindly send information for publication to:

newsletter@seabc.ca

Young Members Group

Amr Farag, E.I.T. M.Eng

This newsletter edition highlights one of BCIT's engineering teams as well as student led events funded by the SEABC YMG. The YMG has also been working hard to organize small site tours, meeting current COVID-19 guidelines, over the summer and in the coming weeks as well. An overview of this summer's tour is provided below.

British Columbia Institute of Technology Engineering Teams/Event Highlights

BCIT Troitsky Bridge Building Competition Team

This year, the BCIT Troitsky Bridge Building Team expanded on last year's design and improved their building process. A team member's summary is as follows,

"As a result of our improvements, we were complimented on our flawless construction and our bridge was able to carry 200kg more load than last year. At the end of the competition, we placed 5th out of 34 teams and was a judge favourite. The BCIT Troitsky Bridge Building Team would like to recognize SEABC as a platinum sponsor. We owe much of our success this year due to the funding that SEABC provided."

BCIT Troitsky Bridge Building Team

BCIT Professional Night 2020

The 12th annual BCIT Professional Night was a huge success. Organizers witnessed an overwhelmingly successful attendance with over 250 students and industry professionals attending. The event gives the BCIT Civil Engineering students a casual atmosphere to socialize and network with industry professionals. One of the organizers explains the success behind this year's event:

"Normally, it is very difficult to get civil students to attend an optional event (or volunteer) due to their immensely busy schedules. However, this year with the help of faculty, no big deadlines or midterms were placed immediately following Professional Night, which greatly boosted the attendance."

BCIT Professional Night 2020

New Fast + Epp Home Office Tour

In July, the YMG organized two separate tours of Fast + Epp's new home office. The erection of the mass timber hybrid structure was completed earlier that month showcasing an elegant design with leading-edge technology. Both tours, limited in number to abide by COVID-19 guidelines on site, were led by Fast + Epp's project engineer, Tobias Fast, who provided the attendees with an extensive site tour and overview of the structure. Attendees were encouraged to ask questions as they toured the site. For more information on Fast + Epp's Home Office see the report by Kerri Kwong in this newsletter.

A socially distant tour for members of the YMG

On the Web

Stephen Pienaar, P.Eng.

Webmaster

Summer is here, and that means that SEABC volunteers are taking a well-deserved break. This is self-evident when seeing only a single advertised event on the website:

September 2020 Term of the Certificate in Structural Engineering Program:
The upcoming term offers four courses via live interactive webcast, see CSE Program article by Shannon Remillong on page 13 for more details.

Courses will run between September 8 and December 3. Registrations close on September 7.

Photo of the Month

Thanks to generous and talented SEABC members and local professional photographers, we are dressing up the SEABC website with a beautiful new photo every month. The photo lights up the home page and forms a header image for other web pages.

We recognise current and upcoming contributions:

- "Banff Elementary, Banff AB", by Chelsea Olson.
- "Cat on its Perch, Vancouver Post Office", by Vincent Andruk.

Both images were among an amazing array of entries for the 2019 SEABC Photo Competition and are displayed on the following page.

Want to contribute photos?

If you would like to feature a photo on the SEABC website, then please reach out to contact: webmaster@seabc.ca.

Photo requirements:

- Theme: Structural engineering, e.g. building, bridge, or structural detail.
- Local context: Structure located in British Columbia or designed by a SEABC member.
- Size: Landscape orientation with horizontal resolution of 2,000 pixels or more.

We will credit your firm (or you, if an individual) on the SEABC home page together with a link to your website.

seabc.ca/photo-of-the-month

Sincerely,
Stephen Pienaar, P.Eng
SEABC Webmaster

Photos of the Month

Banff Elementary, Banff AB, by Chelsea Olson.

Cat on its Perch, Vancouver Post Office, by Vincent Andruk

IStructE News

David Harvey, P.Eng.
Struct.Eng

As at home, much has changed this year for the Institution, headquartered in the embattled UK, slowly emerging from four months of a Covid-19 lockdown that has placed severe restrictions on a densely populated island. The country as a whole has been hard hit, but the Institution has responded nimbly by closing its offices and switching staff to home-based working. Already committed to on-line delivery of its CPD offerings, IStructE quickly switched most of its normal in-person regional and headquarters technical meetings to on-line events and 'business as usual' was (more or less) maintained. For committees too, meetings moved on-line to keep Institution business alive and well.

This year's July Chartered Membership exam was postponed to September 7 to (hopefully) be held at a less restricted time of year. Unfortunately, that is on Labour Day in North America, so the challenge for local candidates will be arranging for invigilation.

One of the interesting findings was that the total of meeting and events was down slightly from last year – not all presentations and meetings could instantly switch to on-line delivery. However, those that took place did see increased participation, especially regional events that suddenly became available to the worldwide membership, many taking advantage.

The 2020 July Council Meeting was collapsed down to a Council Briefing held using Zoom. This drew 70 attendees and most of the Council from across the world, myself included. CEO Martin Powell indicated that IStructE was faring well – membership had held up and applications for membership were matching 2019 levels. The Institution had increased investment in distance learning materials which is helping to keep activities going and will pay off in the long run. Other changes are that the current elected

IStructE CEO Martin Powell

Board and Council members will, subject to their agreement, see their terms extended into 2021. Other key news of interest to members is that there will be no change in subscription rates for 2020.

One key postponement this year is that the 2020 Structural Awards will be combined with the 2021 Awards. The Institution considered various alternatives and opted for and held next year as a dual celebration. There will also be greater exposure of all Structural Awards entries, not just shortlisted projects. All told the 2020-21 Structural Awards will be considerably scaled up from previous events.

The Council Briefing was very enjoyable – I was delighted to be able see the council members distributed across the world working hard to keep the Institution on track despite all the challenges.

The AGM followed shortly after the Council Briefing. Several members joined the Council to vote on the AGM motions required for UK-registered charities. The AGM was ably chaired by 2020 President and 2021 President-Elect Don McQuillan.

IStructE President Don McQuillan

Fast + Epp Home Office Erection Complete

Kerri Kwong Fast + Epp.

The erection of Fast + Epp's mass timber hybrid Home Office located on 7th Ave and Yukon St. in Vancouver, BC was recently completed in early July. The four-storey superstructure was erected in just four weeks using CLT floor and wall panels, glulam beams and steel posts. Exterior wall panels including the firewall at the property line were pre-clad with membrane and insulation.

The new office building, which will also act as the firm's 'living laboratory' for new ideas and testing, features a resilient design that prioritizes employee health and safety. Leading-edge earthquake-resistance technology, Tectonus, is applied for the first time in North America – where the device connectors act as shock absorbers, 'snapping' the building back into position without damage after a significant earthquake and allowing for immediate return to occupancy. These Tectonus devices are installed at the base of the CLT shear walls and will be left uncovered as part of the design aesthetic, along with exposed timber as the interior finish.

In other areas of the building, an automated/remote-controlled electro-chromatic glazing system will be used on the south and west elevations, allowing for tint levels to be adjusted according to the natural daylight to reduce energy costs and optimize comfort. For an economical floor system, the firm is testing 105mm thick CLT panels with 50mm concrete topping using accelerometers to assess vibration performance.

As mass timber continues to gain recognition both locally and throughout North America as a viable construction typology with positive environmental and schedule benefits, Fast + Epp is thrilled to be on the forefront and push boundaries on the possibilities of mass timber. The building is anticipated to be move-in ready within a few months.

In the meantime, Fast + Epp has been hosting private site tours organized through SEABC Young Members Group. Attendees were led by Fast + Epp's project engineer, Tobias Fast, who provided an overview of the structure as they toured the site.

Learn more about Fast+Epp Home Office

The new Home Office mid-build

A tour of the new building for YMG

Introduction to the Structural Design of Piers

Robert Bourdages, P.Eng.

LEED AP

Throughout my career, my co-workers and I have worked mainly on the design of buildings. Recently I have had the chance to work on piers – structures that have unique load and performance requirements.

Piers are structures that run approximately perpendicular to the shore, as opposed to wharves that run parallel.

Piers must be able to resist a variety of loads, such as environmental loading (earthquake, wind, waves, currents), berthing, mooring, and occasionally, very heavy gravity loads.

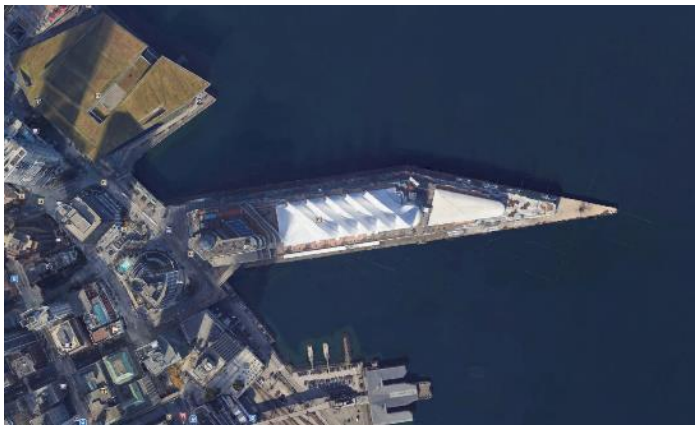
Piers have geometry that is typically repetitive: stringers that run the long direction supported by cross beams (pile caps) and piling. Piles lengths generally vary as the depth to the mud line increases away from the shoreline. Cleats or bollards are placed at frequent intervals to accept ship's mooring lines. Fenders piles are placed at in areas where berthing occurs to dampen impact loading.

A pier design team requires specialists with expertise in the following disciplines and loading criteria:

- Global warming: the potential sea level rise over time
- Tidal data: Mean Higher High Water, Mean High Water, Mean Seal Level, Mean Low Water, Mean Lower Low Water.
- Wave and current loads: Significant wave height, period, and current speed
- Design vessel: displacement, overall length, beam (width), laden draft
- Corrosion
- Bathymetric survey (topography of sea floor), and dredging
- Geotechnical investigation to establish the pile design criteria which may include loads from slope instability, lateral spreading from liquefaction, and post-seismic downdrag.
- Environmental: establish the presence of any contamination and remediation
- Crane Loads and geometric requirements to serve a variety of ships
- Vehicular loading – heavy truck loading is common
- Exceptionally high gravity loads. 50 Kpa can be required if containers are to be stacked
- Berthing: Approach velocity and angle; minimum fender energy
- Mooring: Line pull and range of motion
- Temperature loads
- Cost estimating
- Planning

Reference documents that support the design of piers include The United Facilities Criteria (UFC) 4-152-01 available public use and published by the US Department of Defense; and ASCE 61-14 Seismic Design of Piers and Wharves.

Structural engineers experienced in building design can adapt to working on other types of structures with guidance from engineers with relevant experience and of course the application of the basic principles of structural design.



Canada Place, Vancouver BC (Google Earth)

Certificate in Structural Engineering Program

Shannon Remillong,
CSE Program Co-ordinator

Registration for the **September 2020 term** is currently open through the SEABC website: seabc.ca

The following courses will be offered in September 2020:

- E5-1 Seismic Design of Concrete Buildings
- E12 Design of Steel Structures for Seismic Resistance
- C6 Dynamic Analysis of Structural Systems
- E1 Masonry Design

Course details are available through Certificate in Structural Engineering Program website: seabc.certificate-program

Registration is now open until Monday, September 7th. SEABC Members will receive a discounted rate, and additional early-bird registration savings apply until Friday, August 14th.

Course delivery:
September 2020 courses will be held **ON-LINE ONLY** and **NOT** at the UBC Robson classroom venue.
Courses are once a week for 2 hours at either 4:00-6:00 PM or 6:30-8:30 PM PST.
Courses are 13 consecutive weeks.
Courses are $650+GST

Important Dates:
Registration opens: Monday, July 13.
Early-bird deadline: Friday, August 14.
Registration closes: Monday, September 7.
First lecture: Tuesday, September 8 and Thursday, September 10.
Last lecture: Tuesday, December 1 and Thursday, December 3.
Withdrawal Deadline: Monday, September 21 (minus administration fee).

Courses fill up fast so make sure to register early and take advantage of the savings!

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

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Temporary Stability of Structures – Reader's Response

Adel A. Elgabry, Ph.D., P.Eng., P.E., S.E.

Good Morning Robert,

Hope all is well. I am writing regarding your recent article in SEABC News May 2020 – Temporary Stability of Structures – COVID – 19. I would like to present a comment as a bridge structural engineer. Thank you for a great article. The issue of seismic hazard during construction phase is an important subject. The only bridge code that I am aware of that discusses this issue is Eurocode 8 – BS EN 1998-2:2005 - Part 2 - Bridges – Design of Structures for Earthquake Resistance.

Annex A (Informative) recommends probability of exceedance that does not exceeds 5% during the bridge construction period. For a construction period of about 3.5 years, the corresponding earthquake return period is about 70 years. This is in-line with the presented values in your article. I attached the cover page and Annex A of the Euro Code.

Thanks again for a useful article. Have a good and safe day.

Best Regards,
Adel

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 1998-2:2005+A2

September 2011

ICS 91.120.25; 93.040

Supersedes ENV 1998-2:1994

Incorporating corrigendum February 2010

English Version

Eurocode 8 - Design of structures for earthquake resistance - Part 2: Bridges

Eurocode 8 - Calcul des structures pour leur résistance aux séismes - Partie 2: Ponts

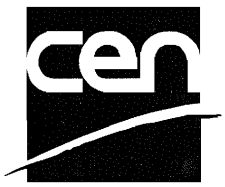
Eurocode 8 - Auslegung von Bauwerken gegen Erdbeben - Teil 2: Brücken

This European Standard was approved by CEN on 7 July 2005.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

Ref. No. EN 1998-2:2005: E

ANNEX A (Informative)
PROBABILITIES RELATED TO THE REFERENCE SEISMIC ACTION. GUIDANCE FOR THE SELECTION OF DESIGN SEISMIC ACTION DURING THE CONSTRUCTION PHASE

A.1 Reference seismic action

(1) The reference seismic action can be defined by selecting an acceptably low probability (p) of it being exceeded within the design life (t_L) of the structure. Then the return period of the event (T_R) is given by the expression:

$$T_R = 1/(1-(1-p)^{1/t_L} \tag{A.1}$$

(2) The reference seismic action (corresponding to γ_I = 1,0) usually reflects a seismic event with a reference return period, T_{NCR}, of 475 years. Such an event has a probability of exceedance between 0,10 and 0,19 for a design life ranging between 50 and 100 years respectively. This level of design action is applicable to the majority of the bridges considered to be of average importance.

A.2 Design seismic action for the construction phase

(1) Assuming that t_c is the duration of the construction phase of a bridge and p is the acceptable probability of exceedance of the design seismic event during this phase, the return period T_{Rc} is given by expression (A.1), using t_c instead of t_L. For the relatively small values usually associated with t_c ($t_c \leq 5$ years), expression (A.1) may be approximated by the following simpler relationship:

$$T_{Rc} \cong \frac{t_c}{p} \tag{A.2}$$

It is recommended that the value of p does not exceed 0,05.

(2) The value of the design ground acceleration a_{gc} corresponding to a return period T_{Rc}, depends on the seismicity of the region. In many cases the following relationship offers an acceptable approximation

$$\frac{a_{gc}}{a_{g,R}} = \left(\frac{T_{Rc}}{T_{NCR}}\right)^k \tag{A.3}$$

where:

$a_{g,R}$ is the reference peak ground acceleration corresponding to the reference return period T_{NCR}.

The value of the exponent k depends on the seismicity of the region. Normally, values in the range of 0,30 – 0,40 may be used.

(3) The robustness of all partial bridge structures should be ensured during the construction phases independently of the design seismic actions.

The SEABC Legacy Awards

Adrian Gygax

Director SEABC

Over the past decade, SEABC and its precursor organizations offer numerous professional development activities in the form of technical seminars, workshops and most recently through hosting the Annual Symposium of the International Association for Bridge and Structural Engineering (IABSE). While these events are kept affordable for our local membership and some may operate at a small loss, others such as the IABSE Symposium generated a considerable financial surplus.

As a non-profit society, it is fitting that SEABC find an appropriate use for these funds that benefits our local structural engineering community. As the surplus was generated by specific events, and not day to day activities, the SEABC Board of Directors decided to establish a legacy fund with the surplus invested to generate sufficient annual revenue to support a number of activities. The SEABC Board of Directors further decided that three pillars should support these activities:

- fostering excellence in the profession,
- motivating our young members, and
- enhancing our profession's standing with the public.

Three programmes have been developed for implementing these objectives: a grant to support structural engineering advancement (the Peter Ridgway Taylor Grant for Structural Engineering Advancement), an award to recognize mid-career achievements (the SEABC Young Member Meritorious Achievement Award) and continued support and development of the Notable Structures Initiative.

The SEABC Legacy Awards Task Group has spent the past year reviewing and developing these three programmes. This article describes each of the three programmes and explains how members can participate in them. The SEABC Board feels that all three pillars are reflected in each of these three programmes and hopes that membership participation will be enthusiastic.

The Peter Ridgway Taylor Grant for Structural Engineering Advancement

The grant was established from the SEABC Legacy Fund to encourage SEABC members to advance and promote the field of structural engineering through an undertaking related to the field. Recognizing that "advancement" and "promotion" can take many forms, some of which can be quite serendipitous, the grant selection process is kept as free as possible of prescriptive criteria that would unduly restrict the applicants' imagination. However, the successful project undertaking must clearly demonstrate ingenuity, be of value to SEABC members, and underscore the contribution that structural engineering makes to society.

Dr. Peter Ridgway Taylor is a world-renowned structural engineer who, as a principal of Buckland and Taylor Engineers in North Vancouver and a teacher at UBC, spent his entire life fostering ingenuity in our field. Throughout his career, Peter stressed developing innovative concepts based on sound engineering fundamentals. Peter was also a very active honorary chairman of the extremely successful IABSE 2017 Symposium in Vancouver, which generated a significant surplus that has been added to the SEABC Legacy Fund. Naming of this award in his honour is a fitting tribute to an outstanding career.

Who is Eligible to Submit a Proposal?

Any SEABC member or a group of SEABC members submitting a joint proposal as a team.

While academic SEABC members are not excluded, the selection process recognizes that academic research has numerous funding sources available to it, therefore selection will weigh in favour of non-academic applicants in cases of submission of similar merit.

How is the Grant Recipient Selected?

The grant will be awarded based on a call for proposals process. Members will be invited to submit a brief written proposal, outlining the project undertaking they would be carrying out if successful.

What Kind of Project Undertakings are Eligible?

Proposed projects should identify advancement of structural engineering through ingenuity, practical contribution to engineering practice, public engagement, outreach to the next generation and enhancing the perception of structural engineering in general. Winning proposals will likely comprise some or all of these attributes. The word "undertaking" is used on purpose, recognizing that this can take many forms.

A few examples of possible project undertakings are:

- Developing tools for student or general education, such as a program that brings key aspects of structural engineering topics to the public.
- Preparing a handbook on a structural design topic relevant to BC practice.
- Exploring new uses for existing materials or construction methods.
- Developing a new design method or analytical approach.

This list is by no means intended to be comprehensive or limit the imagination of applicants.

What is the Grant Amount?

One grant of up to $ 10,000 may be awarded annually. The Award Committee may, at its discretion, make no grant in any given year if it feels proposals of suitable calibre have not been submitted.

What are the Proposal Instructions?

The proposals must be no more than ten 8 ½ x 11" pages in length, written in 10 point font and submitted in PDF format. The proposal must be structured as follows:

1. Project description, including time-frame.
2. Proposed outcome of the undertaking.
3. Explain the merits of the proposed undertaking, e.g.:
   - Innovative features showing structural engineering ingenuity.
   - Aspects of the undertaking that would be of interest to the public.
   - Aspects of the undertaking that would be of benefit to SEABC members
4. Proposed methods for communicating the project outcome to SEABC's members and to the public.
5. A brief bio of the proponent(s), including a summary of education, career to date, current employer. Curriculum vitae may be attached and do not count to the ten-page limit.
6. Budget with break-down of expenditures and proposed progress milestones; other confirmed or proposed funding sources to supplement the SEABC Peter R. Taylor grant, if applicable.

The proposal process will close at 17:00 PST on the second Monday of January each year. Proposals must be submitted by email in PDF format to:

awards@SEABC.ca

How is the Winner Selected?

The Award Committee will review the proposals and select the winner prior to the SEABC Annual General Meeting and Keynote Dinner. Proposals will be kept strictly confidential, except for the winning entry. If the committee feels no proposal is worthy of receiving the grant, no grant will be awarded that year.

The winning grant recipient will be announced at the Annual General Meeting / Annual Keynote Dinner. Additional details on the winning grant recipient will also be published in the SEABC newsletter or website.

What Responsibilities Does the Grant Recipient Have?

The grant recipient is responsible for completing the undertaking within the proposed time frame. The outcome presented in the proposal must be

achieved. The grant recipient must be willing to communicate details of the undertaking and outcome to the SEABC membership and the public in a manner appropriate to the nature of the undertaking. Any intellectual property arising out of the undertaking must be considered as belonging in the public domain. The recipient may publish the outcome of the undertaking, if appropriate, but it must be in open-access media available to SEABC members. The grant funds may only cover a portion of the overall cost of a winning proposal but the role of the SEABC Legacy Fund must be acknowledged.

The grant takes the form of a contract between SEABC and the recipient. The grant recipient will be required to enter into a contractual agreement with SEABC that sets out the above responsibilities. The grant will be paid in a number of installments, typically tied to the progress milestones defined in the proponent's proposal. The agreement will also oblige the grant recipient to repay the grant if the proposed undertaking is not completed within the proposed timeframe.

The Award Committee may, at its discretion, agree to an extension of time if clear progress is being made and a result is in sight or if there are extenuating circumstances that have impeded progress. The grant is considered non-renewable, and any request for additional funding from the SEABC Legacy Fund to extend the scope will be considered a new application with no advantage relative to all other new proposals submitted.

The SEABC Young Member Meritorious Achievement Award

Meritorious achievement is usually recognized near the end of an engineer's career. These are fitting tributes to a person who has spent a lifetime enhancing our profession.

However, some engineers demonstrate significant professional achievements early in their careers and recognizing these achievements at mid-career will serve to motivate others.

Recognizing that young members often have difficulty obtaining approval from their employers to attend conferences or workshops, both for reasons of cost and lost working time, the award takes the form of a grant to attend the conference/workshop of the winner's choice, anywhere in the world. The SEABC Board will also contact the winner's employer to facilitate the recipient receiving the time off required to attend the selected conference or workshop.

Who is Eligible to Receive This Award?

Any SEABC member under 35 years of age on 1 January of the year the award is given.

Who Can Nominate a Candidate for this Award?

Any three current SEABC members may nominate a candidate. Candidates with nominators from more than one firm might be given a higher standing.

What Makes a Winning Candidate?

A winning candidate has gone above and beyond her or his peers during their career to date in contributing to the structural engineering profession in a meaningful way. A few examples of possible eligible achievements are:

- Developing clever design idea(s).
- Exceptional performance under difficult circumstances.
- Managing team of engineers positively to be recognized by team members.
- Successfully starting a new office.
- Undertaking significant new research or developing an analytical approach.
- Significant contributions towards professional outreach, technical committees or other volunteer service to the profession.

This list is by no means intended to be comprehensive or limit the judgement of nominators.

What is the Award Amount?

One award of up to $ 3500 in value may be awarded annually. The Award Committee may, at its discretion, make no award in any given year if it feels candidates of suitable calibre have not been nominated. The award will be in the form of reimbursement of approved actual trip expenses.

How do We Nominate a Candidate?

The three nominating SEABC members will submit a brief nomination package, no more than ten 8 ½ x 11" pages in length, written in 10-point font and submitted in PDF format. The following must be included:

1. Candidate's name and date of birth.
2. Names and employers of the three nominating members, including contact information.
3. A brief bio of the candidate, including a summary of education, career to date, current employer.
4. A brief career summary of the candidate.
5. Reasons for the nomination.

The nomination process will close at 17:00 PST on the last Monday of January each year. Proposals must be submitted by email in PDF format to:

awards@SEABC.ca

What Form Does the Award Take?

The award will reimburse the winner's airfare, conference or workshop fees, hotel and pay a $75 per diem allowance, up to the award amount cap. Airfare shall be economy return from the awardee's normal place of residence, using the most direct routing unless an alternate routing is less expensive. Hotel and per diem are for the official conference/workshop dates only. The Award Committee will pick the winner, who would be announced at the Annual General Meeting / Annual Keynote Dinner. Additional details on the winner will also be published in the SEABC newsletter or website.

What Responsibilities Does the Grant Recipient Have?

Because this award is a travel grant, the recipient must:

- Submit details of the conference/workshop to the Award Committee for approval of the overall travel budget.
- Provide pro-forma invoices (e.g. airline and hotel booking website screen shots, travel agency invoices, tec.) for approval by SEABC prior to undertaking the trip.

Submit final actual receipts to the SEABC Treasurer upon completion of the trip. A formal written report or presentation is not required since this is a retroactive award for past achievement. However, the recipient will be encouraged to offer a brief "lessons learned" presentation at the annual Young Members Group presentation competition.

Notable Structures Initiative

Objective

The Notable Structures Initiative (NSI) was established in "book" form as a value-added feature of the 2017 IABSE Symposium. It identifies numerous structures in the Lower Mainland and serves as a tool for self-guided tours. The current database is focused on buildings and bridges and has limited geographical scope. The current database can be found on the SEABC website:

seabc.ca/notable-structures

The NSI has significant public relations value to SEABC, particularly if it is expanded to cover a multitude of types of structures throughout British Columbia (including dams, towers, specialised industrial structures, tunnels, historical structures, etc. as well as the current building and bridge entries). Sister organizations, such as AIBC and EGBC, will be made aware of its existence as will heritage groups. Additional outreach initiatives such as industry-focussed or public tours, lectures, or videos/web content could eventually be built out from the content of the database.

The eventual form of the NSI remains to be clarified. Options range from simply expanding content using the existing media, to re-working and improving content by means of a unified writing style or even developing a stand-alone, multi-platform app with high-quality graphics and professionally written text.

Form of Database Support

An NSI Working Group (WG) under the initial leadership of Katrin Habel has been established and The WG will undertake the on-going expansion and maintenance of the NSI. The short to intermediate term tasks of the WG are:

- Establish the Terms of Reference for Database Entries: TOR will emphasize that the Notable Structures are to focus on technical or other unusual aspects of each structure and should not be used as project marketing. Commercial products or company names should not be used, except in the small data block accompanying each entry. All write-ups will be reviewed before publication by at least one member of the NSI Management Committee to determine suitability and make edits for common style and presentation.

- Database maintenance:

    - Initial work is to make a submission form, template and the TOR, and develop a website layout.
    - Send out a call for new structures once a year with a deadline.
    - The WG will review submissions, but it is not the WG responsibility to rewrite articles if they don't meet the TOR, i.e. articles will be sent back to the authors if they are inadequate. Existing entries serve as examples to authors as to what to submit.
    - Ongoing website maintenance.

Those interested in participating in the WG for this initiative, please contact Katrin Habel (habelk@ae.ca).

Legacy Awards Committee

The SEABC Board has established an Award Committee that is required to review applications for the Peter Ridgway Taylor Grant for Structural Engineering Advancement and the Young Member Meritorious Achievement Award and to select the winning proponents and generally administer the programmes. The Legacy Fund itself will be administered by the SEABC Board and Treasurer. Awards recipients are selected by a simple majority of the selection committee members.

The committee comprises of five members selected by the SEABC Board of Directors: the Past President as chair (Cameron Kemp), the Education Committee Chair (Tejas Goshalia), and three others appointed by the Board (Adrian Gygax, Paul Fast and one vacant). The latter three members of the Award Committee are appointed bi-annually, in May or June. The SEABC Board hopes to fill the vacant position with an Emeritus Professor from one of BC's universities shortly. Inclusion of the Past President and Education Committee Chairs should ensure year-to-year continuity in the process.

Columbia River Skywalk, Trail, BC

Mark Budd, P.Eng.

The Columbia River Skywalk opened in December 15, 2016 and is one of the longest suspension bridges of its kind in North America. Spanning across the Columbia River, a vital part of the Pacific Northwest's ecosystem, the bridge connects Trail's east and west communities with an elegant pedestrian walkway and utility crossing. There is an interesting article in Innovation Magazine (EGBC, December 2017) that provides first-hand perspective from the designers and builders. I will defer to that article for technical explanations. I will, however, comment on the bridge's scale, which can only be understood in-person. The anchor plates at each end are massive and it is remarkable to stand next to cables and connections of that scale. Observing the bridge along its walkway, the scale never seems out-of-touch with the community that it connects.

Figure 1cv Elevation view of the bridge and the community

It was only through a matter of weather-related bad luck that I ended up in Trail last November. After two days of cancelled flights via Castlegar, I switched my itinerary to fly into Trail where less fog was expected. No problem, I thought. I would drive an equivalent distance to Grand Forks, carry out a site review, and then stay overnight back in Trail in order to catch a morning flight home. What I didn't quite consider was how susceptible the Kootenay region is to weather-related air travel delays. Fog delayed the next morning's flights until the afternoon. I left the vacant airport to explore the city's bakeries, bookstores, and bridges. In the end, I would hitch an evening ride to Cranbrook with four other displaced passengers. Our flights were re-routed indefinitely and I arrived home safely the next afternoon.

Classic upview of the cables

I recently developed the film roll with a few pictures to remind me of my time in Trail. Looking back, the Columbia River Skywalk not only represents beauty in structural engineering, but also how structural engineering can be responsible for connecting otherwise remote communities.

Detail of the anchor plate

Understanding Risk (UR) BC 2020

The Understanding Risk (UR) event, noted in the information below, is the third such event in BC following two previous very successful similar events. The UR events enable structural engineers to interact with a wide variety of experts and interested parties from the community regarding risks to the built environment, with considerable focus on the earthquake risk.

DATE: August through November 2020

LOCATION: Online event series

CONTACT: For more information please visit the website urbc.ca or contact: jessica@thriveconsulting.me

Join an exceptional community of planners, engineers, policy-makers and researchers at this year's online Understanding Risk BC (URBC) 2020 Symposium. From summer to fall 2020, URBC 2020 will feature online events including:

Summer Webinars: Hear from local and international experts on holistic impacts of disasters including lessons from the pandemic.

Launch events: September and November sessions that launch the upcoming sessions by merging art, traditional knowledge, Ignite talks and collaborative presentations. Hear key updates and get a sneak-peek of upcoming themes and sessions.

Initiatives-in-focus Workshops: Step into the shoes of leading practitioners and policy makers in BC to wrestle with emerging initiatives that aim to reduce disaster risk reduction and build resilience.

Dialogue panels: Tune into exciting conversations that examine key tensions, challenges and opportunities to reduce risk and improve disaster recovery pathways in Southwest BC.

Closing: Connect, reflect, celebrate and initiate next steps.

Register for one fee and get access to over 20 online events that will connect you to the region's most cutting-edge conversations about disaster risk reduction and building resilience.

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
- Editorial Assistant: Mark Budd
- 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

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Pre-paid rates per edition:

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- 50-word “Available for Employment” ads are free.

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