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In This Issue

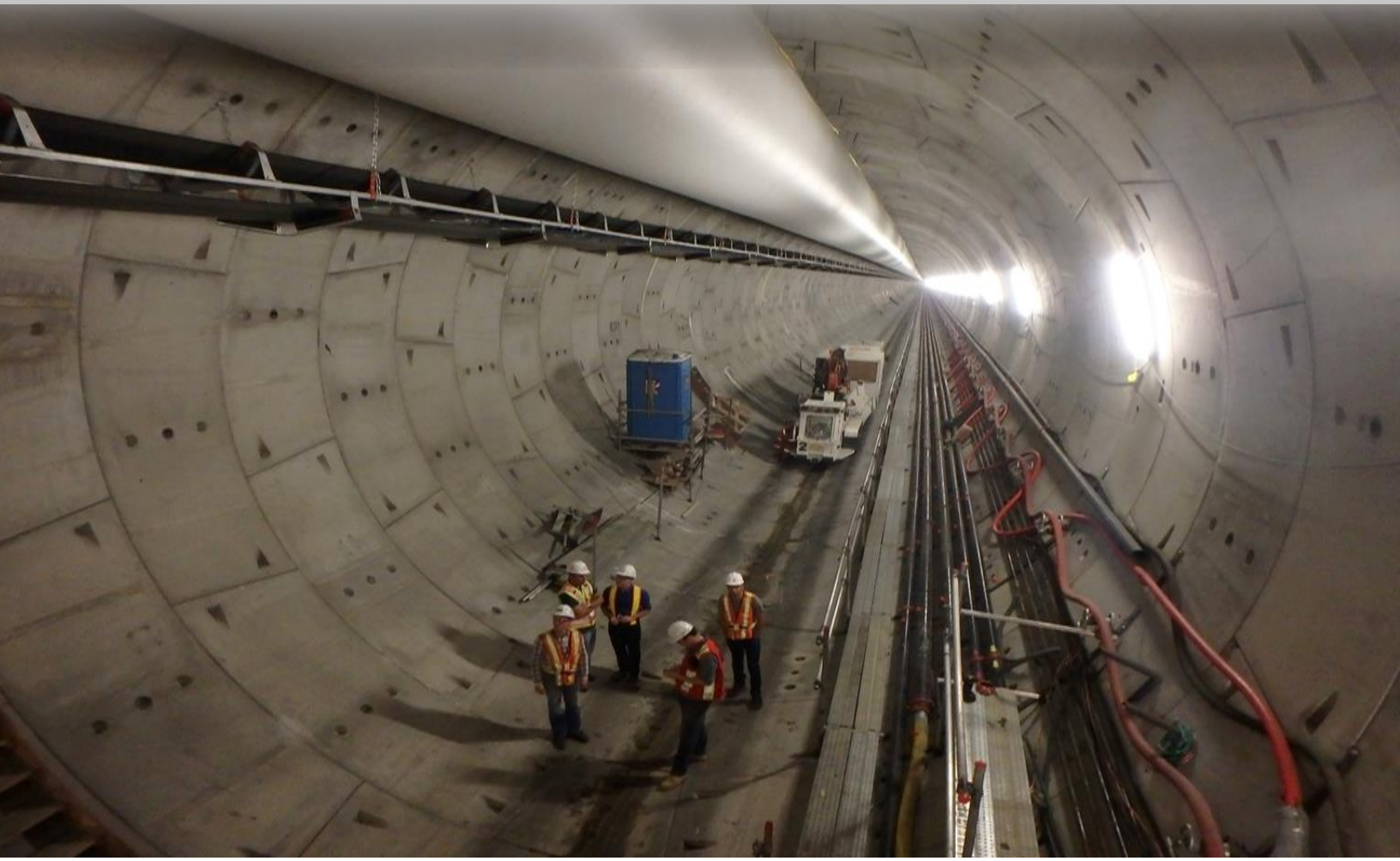
- 2 Message from the President
- 7 Embodied Carbon in Buildings: A Primer
- 8 Certificate in Structural Engineering Program
- 9 NorthWest Conference
- 9 SEABC Trivia Questions

Association News

- 3 Committee Reports
- 6 IStructE News
- 10 Mark Your Calendar

Final Words

- 11 Editorial Information SEABC Board of Directors Advertising



Message from the President



David Harvey, P.Eng.
SEABC President

Structural Engineering Evolution

It is instructive to look back at structural engineering over the past 50 years and see how the profession has adapted to change. While the fundamentals of structural engineering remain, the environment in which we practice and the way we design is enormously different. Overall, I believe the profession has adapted well and I'm convinced that this will continue long into the future – a promising situation for our younger and aspiring members.

I can recall the days of slide rules, drafting boards and ten-figure log tables that existed before the first electronic calculators and the early mainframes computers arrived. That technology helped advance the way in which we framed our structures which was further facilitated by the early personal computers, and later, by the powerful devices we routinely employ today.

The rapid increase in computer power enabled us to routinely adopt more complex structures which are now commonplace. In case you are wondering what I mean by this, a half-century ago it was typical to configure structure as two-dimensional entities that were amenable to analysis. For example, retaining walls would be designed sectionally and provided with separation joints to accommodate the difference in behaviour of adjacent wall sections.

This approach certainly worked, albeit with a loss in efficiency. Today we normally consider structures three dimensionally. We avoid installing joints as much as possible to minimize operational problems – in fact, I have not detailed a 'control' joint in a bridge abutment for decades. Instead, we create three-dimensional abutment structures which are inherently more stable than their component sections. Why do we do this? Partly it is because the analysis is straightforward with current software,

but it is easier to accommodate increased seismic demands of current codes with monolithic structures. This is because the restraint afforded by return walls increases stability and facilitates two-way structural behaviour. In addition, control joints in older structures have not always simply cracked under shrinkage strain but have sometimes opened up in response to backfill pressure or foundation movement. If this occurs, remedial measures may be necessary to restore effectiveness and durability.

Is there a price to pay? Yes, but it can be quite small. As part of designing reinforcement for the external demands, I ensure that in lower demand areas, skin-ductility is maintained. This will ensure that cracking is controlled when restraint effects are applied. Overall, I would anticipate material savings in most three-dimensional situations, but at the very least, I expect to minimize costly future maintenance.

This component level approach has a global parallel. In the bridge engineering world (and I expect also for building structures) which is the desire to reduce the number of separate elements. The aim is to simplify seismic response and enhance performance. This is done by making smaller bridges integral with their substructure and minimizing joints in larger bridges. Although the joints get larger, there are less interfaces where damage can occur, and structural response has greater predictability.

Typically, for medium-sized and many larger bridges, we aim to place expansion joints at each end of the deck – at the abutments where accessibility is optimal. The current state of the art requires bridge designers to allow for bearing replacement in the design. Further, crawl space should be provided for expansion joint inspection and maintenance, and preferably not confined space! An even better feature is to facilitate expansion joint replacement which many joints will require in their service life.

Why do we do this? The reality is that improved access reduces the cost and difficulty of inspections, so owners are incentivized to better manage their infrastructure. Further, traffic interruptions need to be minimized to limit the economic impact associated with traffic lane or bridge closures. This is just one way we are leveraging technology to design better structures and provide better value for our communities – a highly desirable objective.

Committee Reports

Young Members Group



Lois Tso

This issue of the YMG report highlights the bowling night social and two industry tours that were held. The YMG continues to plan events for the months ahead so you can look forward to what's upcoming this summer and autumn! Be the first to know of all new events through our mailing list and social media:

LinkedIn- [linkedin.com/company/seabc](https://www.linkedin.com/company/seabc)

Instagram- [instagram/seabc_social](https://www.instagram.com/seabc_social)

YMG Bowling Night

On May 5, 2022, the YMG was thrilled to host the first in-person event in over 2 years with a night of bowling at Commodore Lanes. A dozen bowlers came out to try their hand at the 5 pin game. A big thanks to all who came out!



After the bowling, all attendees were treated to some complimentary food at Boston Pizza. It was fantastic finally connecting with people face-to-face after the long hiatus. We brainstormed exciting ideas

for YMG events in the future, so make sure to subscribe to our newsletter and social media for announcements on more events like this!



Tour of the Stack Building

On June 22, 2022, the YMG organized a project tour of THE STACK located in downtown Vancouver. The building, once completed later this year, will be the tallest LEED® Platinum office tower in Vancouver.



The tour was led by RJC Design Engineer Vincent Andruk, who was the main Field Engineer for the project throughout construction. Vincent guided the group through the structure outlining the main complexities of design and construction that the team faced at RJC. From the feature V-Column at ground level to the gorgeous views from the top of the 38 storey tower, the group learned about the construction and design process. This included

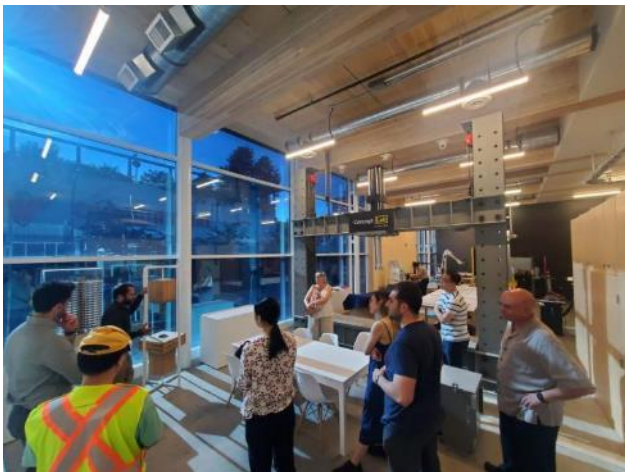
interesting topics such as: Post Tension Cable Installation, Nonlinear Time History Analysis and Coupling Beam Reinforcing.



Tour of the Fast+Epp Concept Lab

On July 27th, a tour took place around the Fast+Epp Concept Lab located in the Mount Pleasant area. The facility is a research and development space that professionals in the industry or in academia are welcome to utilize.

The event was led by Concept Lab Manager Eytan Fiszman, who showed us the 'ins and outs' of the facility, including full scale testing machines, robotic arms, and emerging building materials. Thank you Eytan and Fast + Epp for an incredibly interesting and informative tour!



On the Web



Ricardo Ruiz,
B.Sc., M.Sc.

Hope everyone is enjoying their summer! The past 3 months have been relatively quiet but still lots of activity with the website regarding various SEABC and Industry events and very interesting project or site tours.

- **Industry event postings:**
 - Professional Practice Guidelines: Structural Engineering Services For Tall Concrete Building Projects on May 27
 - Structural Reliability Predictions using Finite Element Models on Jun 27 to 28
 - FEMA P-2091, A Practical Guide to Soil-Structure Interaction on Jun 15
 - Operational Modal Analysis: Background, Theory & Practice by

- the IOMAC conference from Jul 2 to 3
 - Future Code Changes Explained: Seismic Analysis and Design of Nonstructural Components and Systems on Aug 3
- **SEABC Legacy Awards Application Reminder Sent**
 - Peter Ridgway Taylor Grant (PRTG) for Structural Engineering Advancement- applications for the 2023-2024 grant close: 17:00 PST 9 January 2023.
 - SEABC Young Member Meritorious Achievement Award (YMMAA)- nominations for the 2023 award close: 17:00 PST, 31 January 2023
- **SEABC September 2022 Term Courses-** registrations opened on July 2nd
- **SEABC May Newsletter published and posted on the website: SEABC-May-2022.pdf**
- **Project or Site Tours**
 - The Stack Vancouver – organized by the Young Members Group on June 22
 - Victoria High Site Tour – site tour organized by the Victoria Island Branch on June 23
 - Surespan Structures Facility in Duncan, BC – organized by the Victoria Island Branch on July 15
 - Fast+EPP Concept Lab Tour – organized by the Young Members Group on July 27

We want to hear from you!

We welcome your comments for improving the SEABC's website and other online services. Please send your suggestions to webmaster@seabc.ca



Communications Committee



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

Director SEABC

A big thank you! Once again, I write to thank those of you who actively support SEABC. The Board of Directors are always grateful for the high level of support that the organization receives. Equally, the Communications Committee are thankful for those of you who regularly send in contributions to the newsletter. We are also gratified that whether or not you have time to pen articles, you read our quarterly publication. Thankfully, the SEABC Newsletter is well read and that provides the impetus to communicate with our members.



Since its inception in 2008, SEABC has published its quarterly newsletter. If you check archived issues you will see that the style has been regularly updated. This has typically been the outcome of feedback we receive, so please keep it coming – we do want to improve.

As always, articles can be full- or half-page, or even a short paragraph. To sync with the newsletter style, photo illustrations are mandatory! This helps speed communication and aids readability. Abbreviated research papers are also acceptable. You can also send in photos with a description. Contributions should be newsworthy and/or informative regarding structural engineering. If you have a great idea – please share it with us!

Kindly send your information for publication to: newsletter@seabc.ca – we'd very much like to hear from you.

IStructE News



David Harvey, P.Eng.
Struct.Eng

Happily, IStructE has not only kept going during the recent pandemic, it seems to have weathered the storm extremely well. Already committed to online information and events, the Institution ramped up its digital transformation and now almost everything can be accessed remotely. This of course not only allows domestic members the choice of attending in-person, but online availability is ideal for the global membership. I made full use of access to meetings organized by IStructE and the British Group of IABSE during the pandemic. Happily, that service continues so I suggest checking out the online events the Institution plans to host – both members and guests can register via the IStructE website.

I recently attended the first in-person Council meeting held in-person in London for the past 2½ years. It was an amazing feeling reuniting with fellow councillors from across the world after such a long absence, but despite concern to the contrary, the meeting functioned as if things had never left off. This is a testimony to all participants keeping up to speed on Council business and the positive attitude of the worldwide Institution membership.

The reports to Council were uniformly positive. The financial picture is good and Institution membership is strong – an excellent indicator in challenging times. One big change to note is that at the 2022 AGM, a motion was passed to change the Associate Member grade so that graduates can in future become C.Eng. with the Engineering Council by passing IStructE's IPD Interview. To access the Member grade and be awarded the title Chartered Structural Engineer will still require the Chartered Membership Exam to be passed. The effect of this is that those members who simply want the title C.Eng. and do not want to wait to pass the exam do not have to go to another institution. Those members can upgrade to become an IStructE Member by passing the exam at any time. IStructE will retain more members this way.

The in-person July Council meeting (47 members and 9 staff) was productive and informative. One item was particularly valuable – a workshop session led by Will Arnold, who is passionate about structural engineers designing sustainably, and Niamh McCloskey. IStructE members will be aware of the climate emergency declared by the Institution and the huge effort that has taken place to spearhead the development of tools to assist members in taking positive action to combat our changing climate.

The tools that have been developed are accessible to all under the Climate Emergency tab on the IStructE website. The 'gateway' tool is an interactive pdf that lays out the Institution's sustainability resources. The page directs you to a vast amount of reading material and videos covering sustainable structural engineering. The pdf is accessible at:

www.istructe.org/IStructE/Sustainability-Resource-Map.pdf

Other key tools accessible by members include the guide How to Calculate Embodied Carbon 2nd Edition, and the Structural Carbon Calculator Tool Version 2 – aligned with the guide. There are seven videos explaining the use of the Calculator Tool, so IStructE members have a wealth of sustainability information to draw on. Added to that are five video recordings of leading structural engineers explaining why we need to take responsibility seriously and commit to doing things better – there is good reason for each of us to make a difference.

Will and Niamh's lively workshop explored the UN's sustainable development goals questioning individual, institutional and future actions. Many thoughts were aired by participants.

The other workshop session explored how IStructE can better support candidates with the aim of increasing the exam pass rate and growing membership. The attendees discussed the barriers to providing support, how to overcome them and the new tools and services that can be developed.

In response I raised my pet topic of an online exam – a key accessibility ingredient and one which can help harness electronic sketching, modelling and drafting. Happily, the Institution is currently studying the topic which is vital for the CM exam's relevance and should particularly benefit overseas candidates.

Embodied Carbon in Buildings: A Primer



Robert Bourdages, P.Eng.
LEED AP

Building construction and building use account for significant amounts of energy and greenhouse gas emissions (GHG). On a global scale, estimates range up to 30% of the annual global GHGs are related to the building industry. GHGs have been directly correlated to global warming, therefore, it is essential to understand, quantify, and attempt to reduce GHGs related to building construction.

GHGs include the following gases known to have global warming effects:

1. Carbon Dioxide (CO₂)
2. Methane (CH₄)
3. Nitrous Oxide (N₂O)
4. Hydrofluorocarbons (HFCs)
5. Perfluorocarbons (PFCs)
6. Sulfur Hexafluoride (SF₆)

Of these gases, CO₂, CH₄ and N₂O account for the majority of observed GHGs.

Carbon Equivalent is a term used to quantify the various GHGs to an equivalent amount of CO₂.

GHG emissions and energy use are tracked through the various cycles of a buildings' life:

1. Material extraction and transportation
2. Material Processing and Component Fabrication, and transportation
3. Construction and Assembly
4. Operation
5. Recycle, Reuse, and Landfill

Cradle to grave Embodied Carbon relates to all cycles noted above. It is also useful to differentiate the Embodied Carbon during manufacturing, transportation and installation of building materials, and that from operations.

A life cycle assessment (LCA) is typically used to estimate the Embodied Carbon of building construction cycles. Embodied Carbon calculations can be difficult to estimate, as it requires a transparent and complete understanding of the history of the material and processes throughout the various building cycles.

There is a tool available to help with estimating Embodied Carbon for the construction phase, known as the Embodied Carbon in Construction (EC3). It is *"a free, cloud based, open-source tool, that utilizes data to power better materials choices and tackle cradle to grave Embodied Carbon"*. The software is supported by Building Transparency, and Washington State non-profit organization. This tool has been used on significant building projects, such as the latest phases of the Microsoft Redmond Campus.

Upon the realization of what activities and materials contribute to GHG emissions, strategies can be developed to reduce Embodied Carbon, such as:

1. Use low carbon materials
2. Implement material reuse and recycling
3. Provide local material sourcing
4. Optimize construction equipment and operations

To minimize the impact of global warming and to reduce energy demands, it is essential that the building industry embrace the use of LCA to quantify and minimize the Embodied Carbon of Buildings. Structural engineers are an integral part of this process and will therefore need to assess the Embodied Carbon of their work.

References: Estimation and Minimization of Embodied Carbon of Buildings: A Review, by Ali Akbarnezhad and Jianzhuang: ([mdpi.com](https://www.mdpi.com))

Global Infrastructure Initiative September 2020 Issue of Voices: ([mckinsey.com](https://www.mckinsey.com))

To access EC3: (buildingtransparency.org)



Certificate in Structural Engineering Program



Shannon Remillong,
CSE Program
Co-ordinator

September Term is Fast Approaching!

Don't leave it too late; space is filling up fast for the September term courses!

Registration is open through the SEABC website:
seabc.ca/certificate-program

The early-bird discount deadline is August 19th and a SEABC Member's discount, also a savings of \$50, will apply at registration. Classes begin the week of September 6th and end the week of December 1st.

The CSE Program returns to UBC Robson September 2022!

The following courses will be offered this September 2022:

- **C4-1** Introduction to Earthquake Engineering & Seismicity
- **E21** Design of Two-way Slab **NEW COURSE!**
- **E24** Introduction to Port and Marine Structures
- **E25** Structural Health Monitoring
- **E29** Python for Structural Engineers **NEW COURSE!**

Outlines for the five courses are available on the SEABC website and Classbit:

seabc.class-bit

Course delivery:

- All courses will be offered LIVE webcast; select courses will be simultaneously offered in-person at the UBC Robson campus.
- Courses are once a week, 2 hours in the evening, either 4:00-6:00pm or 6:30-8:30pm PST.
- Courses are 13 consecutive weeks.

Course fees:

- Classroom: \$500 + GST
- Live Webcast: \$700 + GST

Discounts

- SEABC members: \$50 per course reduction in tuition.
- "Early Bird" registration: \$50 per course reduction in tuition for registrations received and mail-in cheques postmarked on or by Friday, August 19, 2022.

Important Dates:

- Registration opens: Monday, July 4, 2022
- Early-bird Deadline: Friday, August 19, 2022
- Registration Closes: Monday, September 5, 2022
- Withdrawal Deadline: September 19, 2022

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 Administrative Assistant, at email: courses@seabc.ca

CSE Board of Directors

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- Executive Assistant: Shannon Remillong (courses@seabc.ca)

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

NorthWest Conference



David Harvey, P.Eng.
Struct.Eng

You may be wondering what happened to the 2022 Northwest Conference. Unfortunately, the pandemic put pause to the 2020 and 2021 conferences and with the restrictions on travel having been lifted only recently, there was insufficient time to organize an in-person event this year.

SEABC is a member of the Northwest Council of SEAs that normally hosts the Northwest Conference. The other Council members are Washington, Oregon, Idaho and Montana. Although BC joined NWCSEA in 1996, conferences have been held in the region for at least four decades. Those events are a very good way of keeping in touch with regional structural engineering issues and mingling with structural engineers from across the Pacific Northwest. Although the conferences have been deferred, the Council has been able to meet online, and you can

be assured that plans are underway to reinstate the Northwest Conference in 2023.

Next year’s event will be organized by SEAW’s Seattle Chapter. BC’s next turn to host the event will be in 2028. Look out for notices of the next Northwest Conference and keep yourself well informed!

SEABC Trivia Questions

May 2022 Trivia Answers:

- World’s longest span bridge: **Canakkale**
- Main span: **2023 m**
- Country: **Turkey**
- Design firm: **COWI**
- Strait: **Dardanelles, Gallipoli, or Hellespont**
- Seas: **Sea of Marmara; Aegean**

And in case you were wondering, the strait is 61 km long, has an average depth of 55 m and the bridge cost **2.5B Euros**. There are three other Turkish Straits bridge crossings linking Europe to Asia – all spanning the Bosphorus Strait at the other end of the Sea of Marmara.

No correct answers were submitted – the prizes roll forward to the new Trivia question.

August 2022 Trivia Question:

- **What is the world’s tallest free-standing structure?**
- **What is its official height?**
- **Which was the world’s tallest free-standing structure from 1975 to 2007?**

Please reply to: info@seabc.ca and add **Trivia Question** in the subject field.

The first three fully correct answers will win special SEABC discount prizes valid until December 31, 2023.

Mark Your Calendar

Upcoming Seminars, Webinars and Events

Hydraulic Modelling of Water Distribution Systems

Date: Tuesday September 13, 2022
Location: Webinar (17 seats available)
Time: 8:00 AM–8:30 AM: Registration
8:30 AM–4:30 PM: Webinar
For more info: egbc.ca/Events

Influencing and Persuasion Skills

Date: Monday September 19, 2022
Location: Webinar
Time: 8:45 AM–9:00 AM Pacific Time: Registration
9:00 AM–12:30 PM Pacific Time: Webinar
For more info: egbc.ca/Events

Project Construction Management

Date: Thursday September 22, 2022
Location: Webinar (10 seats available)
Time: 8:15 AM–8:30 AM Pacific Time: Login and Registration
8:30 AM–4:30 PM Pacific Time: Webinar
For more info: egbc.ca/Events

Fundamentals of Project Management

Date: Tuesday October 18, 2022
Location: Webinar (5 seats available)
Time: 8:15 AM–8:30 AM Pacific Time: Registration and login
8:30 AM–4:30 PM Pacific Time: Webinar
For more info: egbc.ca/Events

Coaching for Performance

Date: Friday October 21, 2022
Location: Webinar (23 seats available)
Time: 8:45 AM–9:00 AM: Registration
9:00 AM–12:30 PM: Webinar
For more info: egbc.ca/Events

Writing Effective Proposals and Reports

Date: Tuesday October 25, 2022
Location: Webinar (20 seats available)
Time: 8:15 AM–8:30 AM Pacific Time: Registration and Login
8:30 AM–4:00 PM Pacific Time: Webinar
For more info: egbc.ca/Events

Advanced Modelling and Water Master Planning

Date: Tuesday November 8, 2022
Location: Webinar (15 seats available)
Time: 8:15 AM–8:30 AM Pacific Time: Registration
8:30 AM–4:30 PM Pacific Time: Webinar
For more info: egbc.ca/Events

Stress Management

Date: Friday November 25, 2022
Location: Webinar (23 seats available)
Time: 8:45 AM–9:00 AM: Registration
9:00 AM–12:30 PM: Webinar
For more info: egbc.ca/Events

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: Ricardo Ruiz

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.

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- \$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.

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