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Message from the President



David Harvey, P.Eng.
SEABC President

What is it that we do as structural engineers? This is an important question that is well worth thinking about. Clearly, having received the unique education and training we need to safely design structures, we most commonly do just that, often acting as consultants, and sometimes directly for an owner or operator. While many of us routinely prepare designs, others supervise or lead structural projects. Some structural engineers move into other fields such as development, finance or commerce for which our training is eminently suited.

Why is this? Well, we are all different, and are driven by various motivators, but our education, intended to produce ‘problem solvers,’ has broad appeal. I am sometimes asked about my fascination with structural design which has strongly motivated me for the past 50 years. I respond by saying that we never get it quite right – our designs can always be improved. Finding the perfect answer is something we constantly aspire to do. Also, no matter how similar the solutions may be, each project is really a unique combination of circumstances, which no matter how small, deserves our full attention.

I liken all projects to detective work. This is most obvious with forensic work where something has gone wrong and we need to figure out why. For example, the 2018 Florida International University bridge collapse during construction was observed, as it was unfolding, by the design team, and was not understood by them. If you dig into it you will see that the concrete failure plane had only nominal shear friction resistance in zones which are clearly highly stressed. The details used suggest that the designers omitted to address shear friction when designing the unusual concrete truss connections. Some forensic instinct here would have helped mitigate the tragic project outcome.

Detective work applies also to structural inspection work and can make a huge difference when interpreting field reports and determining the course of action. A ‘forensic’ review can add real value to an essentially form-filling exercise, by detecting developing problems and calling for mitigation to ‘buy time’ and/or prevent/limit a potential failure.

A recent culvert inspection revealed corrosive through-penetration of the culvert barrel on both sides at around mid height, near the normal watermark. There was a roof buckle near the outlet and settlement above the culvert on the road surface, which clearly pointed to movement occurring. Careful review of the site photos showed a dip in the watermark at the buckle point. A close-up photograph at the same point showed coarse aggregate only behind the through-penetration indicating loss of fines. The photo showed accumulation of fines in the culvert barrel. The forensic review concluded that fines were being lost in the backfill surrounding zones of through corrosion to the point that settlement was occurring at the end of the surcharged culvert barrel but not in the unloaded barrel projecting from the fill. The excessive rotational displacement induced caused the roof plate to locally buckle.

This information is very valuable in determining a remediation plan which most likely will comprise injection of hydrophobic grout to preclude further loss of fines, while a feasibility study of potential culvert relining schemes is conducted.

But I would take the analogy further. I like to consider all structural designs as ‘forensic’ exercises. Here, the pertinent design information provides the clues, while studying the clues ultimately reveals not ‘whodunnit,’ but the structural solution. Add in development of the key structural details and to me you have endless fascination. How about for you?

BTW, have you noticed how quickly many pandemic-affected businesses are recovering? Both air travel and vehicle sales are well covered in the media, but despite a hefty cost hike, there is quite a demand for in-person events. In 2023, SEABC’s Pinnacle Lecture and CAEE’s Canadian-Pacific Earthquake Engineering Conference were successful in-person events. Now I read of national engineering conferences that are over-subscribed. Have we now come full circle with everything ‘back to normal?’ Only time will tell.

Committee Reports

Young Members Group



Lois Tso
E.I.T.

SEABC YMG Summer Social

On July 6th, we had an incredible turnout of past, present, and future SEABC YMG Committee members and friends at our year-end summer social event hosted at One-Under Golf in Downtown Vancouver. It was a delightful evening filled with great conversations, the sharing of new ideas for YMG initiatives in the coming year, and of course, golf games! If you're interested in getting involved with the YMG Committee or have any ideas for future YMG events and initiatives, please reach out to us at our social platforms or email below. Join us at our next YMG Committee meeting in September as we continue shaping the future together!

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

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

Email- ymg@seabc.ca



Coming Soon! – Northwest Conference

The 2023 Northwest Conference will be held at The Hilton, Bellevue, WA, September 14, 15, 2023. Look out for the flyer!

On the Web



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

Hope you are all keeping cool during these HOT summer days. As usual, there are less activities during this time but here are a few website updates:

1. SEABC event postings:

- Canadian Conference Pacific Conference on Earthquake Engineering Workshops June 26th:
 - * SEABC Certificate in Structural Engineering Program presents half day workshop: Topics in Performance-Based Seismic Design of Bridges
 - * NRC (Canada) and NCREC (Taiwan) presents full-day workshop: Seismic Risk Assessment & Management of Existing Buildings: Canadian Tools & Practice in Taiwan

2. Industry event postings:

- Free On-Demand Training of FEMA P-154- Learn how to screen buildings for potential seismic hazards, June 14
- Free Virtual Courses on Earthquake Risk Reduction Topics from FEMA NETAP – announcement, June 22

3. The SEABC September 2023 Term Courses will start on September 12 and continue until December 7. Four (4) courses are offered for this term. For more details and to register, go to: [Current Term – Structural Engineers Association](#)

4. SEABC May 2023 Newsletter has been published and available on the website at: [SEABC-May-2023](#)

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



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Automating Structural Engineering Design: Empowering Engineers with Web Apps



Arun Kishore
Structural E.I.T.

Introduction

Structural engineering is a field that demands both meticulous calculations and innovative problem-solving. As a structural engineer based in Canada, I have experienced firsthand the repetitive and time-consuming nature of certain tasks within our profession. Fueled by a desire to focus on the exciting challenges of structural design, I embarked on a journey to automate these mundane processes using programming. In this article, I will share my methodology, skills, and experiences in developing web apps using Python, Streamlit, and Docker, aiming to inspire other structural engineers to leverage technology for enhanced productivity and efficiency.

Finding the Path- A Self-Taught Programmer

With no formal education in programming, I ventured into the world of coding out of curiosity. Through online tutorials and free courses, I delved into Python, Excel VBA, and some JavaScript. Recognizing the potential to alleviate the tedium of repetitive manual calculations, I sought to automate these tasks while preserving the essence of structural engineering as a problem-solving discipline.

The Catalyst- Addressing Pain Points

Two significant pain points served as catalysts for my journey into automation. The first was encountered while dealing with post-tensioned (PT) designs for numerous beams. The process involved running

calculations in ADAPT-PT, but then manually iterating on the solution, extracting data, calculating development lengths, sizing bars, and applying company standards. This arduous process consumed approximately 20 minutes per beam. By developing a web app with automation capabilities, I managed to reduce the time required to a mere minute, allowing for faster and more efficient PT designs.

The second pain point arose during the COVID-19 pandemic when a hybrid work-from-home structure became the norm. Constantly transferring physical manuals between workspaces became cumbersome and accessing them online was not always feasible. To address this issue, I created a web app called "Section Properties" that provides access to essential structural steel resources at any given moment. By hosting this web app using Docker from my home, I ensure that engineers can access these resources with minimal downtime, regardless of their location, and also serves as a convenient reference tool while working on-site.

Complex Calculations and Professional Reports

As my programming skills evolved, I aimed to develop web apps capable of handling complex calculations while generating professional-looking reports. In pursuit of this goal, I created a proof-of-concept web app called "Seismic Tank Loading Calcs." This application allows engineers to perform intricate seismic calculations for rectangular tanks and generate reports that can be easily verified and submitted. By combining accurate calculations with visually appealing reports, this tool aims to streamline the design process and enhance collaboration among engineers.

Acknowledgments and Future Prospects

In my journey as a self-taught programmer, I owe a significant debt of gratitude to Connor Ferster, whose SEABC course (Python for Structural Engineers) provided invaluable insights into testing, maintaining, and future-proofing my code.

Furthermore, I believe in the power of collaboration and knowledge sharing. To foster this spirit, I host a collection of my codes on GitHub, encouraging others to contribute and expand the repertoire of

applications available to the structural engineering community.

Conclusion

Embracing programming as a tool in structural engineering has transformed the way I approach design tasks. By automating repetitive calculations and developing user-friendly web apps, I have been able to allocate more time to the exciting challenges inherent in our profession. I hope my experiences and insights inspire fellow engineers to explore programming and develop their own web apps, thereby unlocking new levels of productivity, efficiency, and collaboration within the field of structural engineering.

To access the web apps developed by the author, visit: struct.work

To explore the author's code repository on GitHub, visit: github.com

Stay tuned for more exciting updates and innovations in structural engineering automation!

Northwest Conference



David Harvey, P.Eng.
Struct.Eng

After a three-year pandemic delay, the 2020 Northwest Conference of Structural Engineers Associations (NWSEA) will be hosted by the Structural Engineers Association of Washington's Seattle Chapter. The event will be held in Bellevue, WA on September 14-15, 2023 at the Hilton Hotel, Bellevue, with the theme of *Innovation in Structural Engineering*. The Northwest Council will meet at 8 am on September 15. The technical sessions will take place on Thursday and Friday with the focus on novel solutions and code updates. Topics include Buckling-Restrained Braces, feature bridges, tubular connections, insurance and litigation, seismic evaluation and retrofit, seismic isolation, steel connections, viscous fluid dampers, vibration control, mass timber, and complex geometry – check out the SEAW.org and the flyer attached to this newsletter.

NWSEA comprises Oregon, Washington, Idaho, Montana and British Columbia. Of the >2500 SEA members in the Pacific North West, BC represents about a quarter. BC therefore has a significant presence in the region and the US chapter members love SEABC's involvement in the conference.

Northwest conferences are always enjoyable, informative events in which you get to interact with our creative and well-established SEA neighbours to the south. Most conferences, including this year's event in Bellevue, are accessible from Vancouver via a few hours of driving. There are always excellent presentations, industry-leading guest speakers plus enjoyable social activities.

So please consider joining us at the long awaited in-person 2023 Northwest Conference; take advantage of a plethora of top-quality continuing education opportunities and enjoyable social events.

Course Offerings

UBC Faculty of Forestry offers new online Mass Timber Construction micro-certificate programs October-December 2023. These programs are designed with both flexibility and career advancement in mind. In nine weeks or less, these micro-certificates help participants develop specific skills and applied knowledge while providing them with the competencies to develop their technical and professional expertise.

And this year, you can take these courses free!

These micro-certificates are eligible for full funding through the StrongerBC future skills grant program. This initiative, part of the Province's StrongerBC: Future Ready Action Plan, aims to address the challenges of today's rapidly evolving job market and equip individuals with the skills needed for future success. The StrongerBC future skills grant provides up to \$3,500 in funding for short-term skills training at public post-secondary institutions, regardless of financial need. Details can be found on the [micro-certificate webpage](#).

Mass Timber Building Micro Certificates:

1. [Tall Wood Structures](#)
2. [Fire Safety for Timber Buildings](#)
3. [Zero Carbon Building Solutions](#)
4. [Hybrid Timber Construction](#)

Sourcing Materials for Remote Concrete Batching



Robert Bourdages, P.Eng.
LEED AP

Working on a pier construction project in a small island in the Caribbean (Montserrat) presents a few challenges to procure and deliver quality materials for concrete batching.

Sand and aggregates are sampled locally to determine compliance with project specifications. Many of the local aggregates are volcanic in nature and do not comply with density requirements. Local aggregates have also been tested and determined to be potentially alkali-silica reactive and therefore are not suitable for structural marine concrete.

The alkali-silica reaction (ASR) is an expansive chemical phenomenon where aggregates expand leading to concrete cracking and degradation over time. Reactions occur between highly alkaline cement and amorphous (non-crystalline) silica aggregate. A viscous gel is formed that swells when absorbing water.



Cracking due to ASR (Wikipedia)

Biosecurity is also a consideration that is often not addressed in many locations that can source material locally. In the Caribbean it is possible to inadvertently import undesirable plants and animals during transport. In Montserrat for example, there is an environmental hazard relating to importing aggregate and sand from neighboring islands relating to (non-native) green iguanas, giant African snails,

and red mites, among other hazards. Iguana eggs and snail eggs can reside hidden in aggregate and sand and go unnoticed during transportation. Mitigation measures include import restrictions, inspections of local quarries and suppliers' stockpiles, controlled transport methods, aggregate washing and fumigation.



Green Iguana (Wikipedia)



Giant African Snail (USDA)

The cost of local sourcing of aggregates can be significant due to limited mining and transporting equipment, roadway conditions and available workforce. Importing materials from larger islands with abundant resources sometimes can be more cost effective, however several logistics and costs come into play such as locating barges and tugs, extended delivery times, locating compliant materials (cement, aggregates and sand), and paying port fees.

Finally, small islands do not have concrete batching facilities available, therefore, to produce any significant volumes of concrete, a modular batch plant was imported to adequately supply concrete for the new pier.



Module batch plant being unpacked and assembled onsite.

Mark Your Calendar

Upcoming Seminars, Webinars and Events

Leading and Managing Organizational Change

Date: Tuesday, September 12, 2023

Location: Webinar (16 seats available)

Time: Registration and Login: 8:15 AM–8:30 AM Pacific Time

Webinar: 8:30 AM–4:00 PM Pacific Time

For more info: egbc.ca/Events

Hydraulic Modelling of Water Distribution Systems

Date: Thursday, September 14, 2023

Location: Webinar **Participants should bring a laptop to the seminar**

Time: 8:00 AM–8:30 AM: Registration and Breakfast
8:30 AM–4:30 PM: Hydraulic Modelling of Water Distribution Systems

For more info: egbc.ca/Events

Writing Effective Proposals and Reports

Date: Wednesday, October 4, 2023

Location: Webinar (20 seats available)

Time: Registration and Login: 8:15 AM–8:30 AM Pacific Time

Webinar: 8:30 AM–4:00 PM Pacific Time

For more info: egbc.ca/Events

2023 Annual Conference and AGM

Date: October 26–28, 2023

Location: Whistler Conference Centre, BC

For more info: egbc.events

Introduction to Unconscious Bias

Date: Wednesday, November 15, 2023

Location: Webinar (300 seats available)

Time: 8:50 AM–9:00 AM Pacific Time: Login
9:00 AM–10:00 AM Pacific Time: Webinar

For more info: egbc.ca/Events

Pavement Design for Municipal Roadway Infrastructure

Date: Tuesday, November 21, 2023 - Wednesday, November 22, 2023

Location: Webinar

Time: Registration & Login: 8:00 AM–8:30 AM Pacific Time

Course Day 1 & 2: 8:30 AM–4:30 PM Pacific Time

For more info: egbc.ca/Events

Respect in the Workplace

Date: Wednesday, November 22, 2023

Location: Webinar (300 seats available)

Time: 8:50 AM–9:00 AM Pacific Time: Login
9:00 AM–10:00 AM Pacific Time: Webinar

For more info: egbc.ca/Events

Managing Microaggressions

Date: Wednesday, November 29, 2023

Location: Webinar

Time: 8:50 AM–9:00 AM Pacific Time: Login
9:00 AM–10:00 AM Pacific Time: 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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Seattle Chapter

Please join us at the
SEA NorthWest Conference
“Innovation in Structural Engineering”



After a three-year hiatus, the annual 2023 SEA Northwest Conference (NWC) will be held September 14 and 15, 2023 at the Bellevue Hilton Hotel, 15 minutes east of downtown Seattle. The NWC will be hosted by the Seattle Chapter of the Structural Engineers Association of Washington.

The 2023 Northwest Conference theme, “**Innovation in Structural Engineering**”, will feature technical sessions designed to educate engineers about innovations utilized in structures that have come to symbolize the unprecedented growth of the Pacific Northwest region. There will be technical sessions that will include the innovative design of projects in the Pacific Northwest as well as technical sessions on codes and standards, and non-technical sessions that are of interest to young and seasoned practicing structural engineers. Attendees can earn up to 13.0 PDH Development hours over the course of the 2-day conference. The conference will also feature networking events and a trade show with up to 30 exhibitors.

Presentations include:

- Engineering for Elephants: A Structural Safari by Ed Quesenberry.
- Using Applied Research for Update of Seismic Evaluation and Retrofit Methods by Terry Lundeen.
- The Lateral System Design of the Artise: Bellevue's First Building with Fluid Viscous Dampers by Scott Erickson.

For more information and registration go to: www.2023seanwconference