



EARTHQUAKE ENGINEERING RESEARCH INSTITUTE  
BRITISH COLUMBIA CHAPTER

# 2023 EERI-BC Symposium

UBC Robson Square, Vancouver, BC

June 26, 2023



CCEE - PCEE 2023  
VANCOUVER | JUNE 25 - JUNE 30, 2023

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# EERI-BC Chapter's 1<sup>st</sup> Symposium on the Latest Developments in Earthquake Engineering and Seismology and their Impact on New and Existing Infrastructures in Canada

The Earthquake Engineering Research Institute – BC Chapter (EERI-BC) is excited to announce its 1<sup>st</sup> Symposium in Vancouver, BC, Canada. The symposium is jointly sponsored by the EERI-BC Chapter, Canadian Association of Earthquake Engineering (CAEE) and industry partners.

The one-day symposium will be an in-person event and will be held as part of the Pre-Conference Workshops of the CCEE-PCEE 2023 conference.

The focus of the symposium will be to provide an update on the latest developments in the field of structural and geotechnical earthquake engineering, seismic hazard, and seismic risk and their relevance to BC and other parts of Canada.

The symposium will include keynote lectures, invited lectures, expert panel discussions, graduate student presentations and presentations by members of CAEE's Earthquake Reconnaissance Team to Türkiye after the February 2023 Earthquakes.

## Contact Information

For more information, please contact the Symposium Organizers at [2023EQSymposium@klohn.com](mailto:2023EQSymposium@klohn.com)

*Thava Thavaraj, PhD, PEng – Co-Chair*  
*James Williams, MSc, PEng – Co-Chair*

## Date and Time

June 26, 2023 (Monday): 8:00 am – 4:45 pm

## Venue

UBC Robson Square, Theatre C300  
800 Robson Street, Vancouver, BC

## Keynote Lectures

- Carlos Ventura, PhD, PEng, *UBC*
- Tim Little, PEng, *T.E. Little Consulting Inc*

## Invited Lectures

- Harvey McLeod, PEng, *KCB*
- Michael Beaty, PhD, PE, *Beaty Engineering*
- Michal Kolaj, PhD, *NRCan*

## Expert Panel Discussions

### Panellists

- Bruce Hamersley, PEng, *BASIS*
- Ernest Naesgaard, PhD, PEng, *NAGL*
- Garry Stevenson, PEng, PGeo, *KCB*
- Harvey McLeod, PEng, *KCB*
- Michal Kolaj, PhD, *NRCan*
- Michael Beaty, PhD, PE, *Beaty Engineering*
- Omri Olund, PEng, *BC Hydro*
- Paul Wilson, PEng, *Thurber Engineering*
- Tim Little, PEng, *T.E. Little Consulting Inc*
- Upul Atukorala, PhD, PEng, *WSP Golder*

*Symposium delegates are encouraged to submit their questions or points for discussion to the panellists preferably before **June 21<sup>th</sup>** by email to [2023EQSymposium@klohn.com](mailto:2023EQSymposium@klohn.com)*

# Symposium Program

<b>08:00 – 08:30</b>	<b>Registration</b>
08:30 - 08:40	<b>Opening Remarks and Welcome Address</b> Thava Thavaraj, Symposium Co-Chair
08:40 - 09:30	<b>Keynote Lecture</b> Carlos Ventura, Professor, University of British Columbia (UBC) Title: The Response Spectrum - A tool of Multiple Uses  <i>Chair: James Williams, Basis</i>
09:30 - 10:30	<b>Graduate Student Presentations</b>  <i>Presenters and Title:</i> <ol style="list-style-type: none"> <li>1. Emma Constance Lambert, UBC : "A Sensitivity Analysis to Quantify the Impact of Modeling Assumptions on Regional Seismic Risk Outputs"</li> <li>2. Kiran Kaur, UBC : "Quantifying the Seismic Resilience of Interdependent Hospital and Transportation Networks in Metro Vancouver, BC "</li> <li>3. Pouria Kourehpaz, UBC : "Advancing Seismic Risk Assessment Methodologies for Building Structures"</li> <li>4. Halla Kim and Ayden Jager, UVic : "2023 UVIC Seismic Design Team Project"</li> <li>5. Biniam Teweldebrhan, UBC : "Seismic Design and Performance Assessment of CLT Shear Wall and Glulam Moment-Resisting Frame Structure"</li> <li>6. Sourav Das, UBC : "Physics-Informed Neural Network-Based Probability Density Evolution Method for Reliability Assessment of Self-Centering Viscous Damper"</li> <li>7. Sisay Tadele, UBC: "Experimental Study on Seismic Performance of Bridge Columns Reinforced with CSA 500W Canadian Steel Bars"</li> </ol> <i>Chair: Carlos Molina Hutt, Assistant Professor, UBC</i>
<b>10:30 – 10:50</b>	<b>Coffee Break</b>
10:50 – 12:00	<b>February 6, 2023, Turkiye Earthquakes: Observed Impacts</b>  <i>Presentations by Members of the CAEE EQ Reconnaissance Team to Turkiye</i> <ol style="list-style-type: none"> <li>1. Introduction: Tuna Onur, OSC</li> <li>2. Seismological, Tectonic and Strong Motion Aspects: Matin Zaleski, BGC and Tuna Onur, OSC</li> <li>3. Structural Aspects- Buildings: Cheryl Sewell, SNC Lavalin</li> <li>4. Structural Aspects- Bridges: Jason Dowling, Associated Engineering and Yavuz Kaya, BC MoTI</li> <li>5. Geotechnical Aspects: Tyler Southam, Tetra Tech and Thava Thavaraj, KCB</li> </ol> <i>Chair: Trevor Carey, Assistant Professor, UBC</i>
<b>12:00 – 13:00</b>	<b>Lunch Break</b>
13:00 – 13:30	<b>Keynote Lecture</b> Tim Little, T.E. Little Consulting Inc Title: Seismic Hazard Assessment – Living with Uncertainties  <i>Chair: James Williams, Basis</i>

# Symposium Program (Contd.)

13:30 – 14:20	<p><b>Expert Panel Discussion</b></p> <p>Topic: Performance-based Seismic Design/Evaluation of Bridges and Buildings and Emerging Issues and Challenges.</p> <p>Moderator: Ernest Naesgaard, NAGL</p> <p><i>Chair: Jonathan Foote, Basis</i></p>
14:20 – 15:00	<p><b>Invited Lectures</b></p> <ol style="list-style-type: none"> <li>1. Michal Kolaj, Natural Resources Canada Title: Seismic Hazard Assessment in Canada and its Implementation in NBCC 2020</li> <li>2. Harvey McLeod, Klohn Crippen Berger Ltd Title: Challenges in the Seismic Design of Tailings Dams</li> </ol> <p><i>Chair: Iman Roshanzamir, KCB</i></p>
15:00 – 15:20	<p><b>Coffee Break</b></p>
15:20 – 15:45	<p><b>Invited Lectures (Contd.)</b></p> <ol style="list-style-type: none"> <li>3. Michael Beaty, Beaty Engineering LLC Title: Benefits and Challenges of Geotechnical Numerical Analysis Through Case History Examples</li> </ol> <p><i>Chair: Iman Roshanzamir, KCB</i></p>
15:45 – 16:35	<p><b>Expert Panel Discussion</b></p> <p>Topic: Performance-based Seismic Design/Evaluation of Earth Dams, Tailings Dams, and Concrete Dams and Emerging Issues and Challenges</p> <p>Moderator: Garry Stevenson, KCB</p> <p><i>Chair: Aran Thurairajah, WSP Golder</i></p>
16:35 – 16:45	<p><b>Closing Remarks</b></p> <p>James Williams, Symposium Co-Chair</p>

*Note: A boxed-lunch with sandwiches (veg & non-veg), snacks and beverages will be provided. A limited number of gluten-free options will be available.*

## Presenter's and Panellist's Bio

**Carlos Ventura, Ph.D., P.Eng.** is a professor at the University of British Columbia and the Director of the Earthquake Engineering Research Facility (EERF) at UBC. Dr. Ventura's areas of research are in Structural Dynamics and Earthquake Engineering. Dr. Ventura has written over 400 technical papers and reports related to the seismic behaviour of structures and has received numerous awards for his research accomplishments, including the Lieutenant Governor's Award of Excellence (2013), the Innovation Award of the Canadian Society of Civil Engineering (2010) and the APEGBC Meritorious Achievement Award (2006). He is a member of several national and international professional societies and advisory committees. He is a member of the Canadian Academy of Engineering and a Fellow of Engineers Canada. He is also a member of several building and bridge code committees.

**Tim Little, P.Eng.** has worked as an independent consultant since 2011 after a 35-year career with BC Hydro in both technical and leadership roles. His experience covers the life cycle of dams and hydroelectric projects, including design, construction, operation, maintenance, monitoring, dam safety, rehabilitation, and upgrades. For many years a major focus of his work has been seismic hazard, including development of seismic source models, seismic hazard assessments, and installation and monitoring of seismic instruments. He has served on technical committees that developed seismic design standards/guidelines for the Canadian Dam Association (CDA), the International Commission on Large Dams (ICOLD), the National Building Code of Canada (CANCEE) and the Institute of Electrical and Electronics Engineers.

**Harvey McLeod, P.Eng., P.Geo** is a Vice President at Klohn Crippen Berger Ltd (KCB) and a geotechnical engineer with over 40 years' experience in mine environment and water resource projects. He has worked on over 200 water and tailings storage dams and has carried out major studies for over 100 mining projects, including some of the largest mining operations in the world. Harvey is chair of the sub-committee on Tailings Dams for the ICOLD, and chair of the Tailings Technical Review sub-committee for British Columbia's Ministry of Energy and Mines (MEM). Harvey helped write the B.C. government's 2017 Health, Safety and Reclamation Code for Mines, and he's working with the CDA, EGBC and the ICMM on improving their guidelines and regulations for tailings dams. Harvey is a frequent keynote presenter and author of many technical papers.

**Michael Beaty, Ph.D., P.E., G.E.** is an independent engineering consultant with 37 years of experience in geotechnical and earthquake engineering, numerical analysis, and soil-structure interaction. Michael co-authored the widely used UBCSAND constitutive model. In the last 20 years, Mike has been working for a variety of US clients including the Corps of Engineers, US Bureau of Reclamation, Tennessee Valley Authority and Bonneville Power Administration. Mike has presented research and project histories at multiple conferences, short courses, workshops, and is also a co-author of the 2022 USSD Document "Analysis of Seismic Deformations of Embankment Dams."

**Michal Kolaj, Ph.D.** is a Research Scientist with Natural Resources Canada and has published and presented several papers on seismic and geophysical aspects. Michal contributed significantly to the development of the 6<sup>th</sup> Generation Seismic Hazard Model of Canada and the earthquake provisions within NBC 2020. He is currently leading the development of the next-generation seismic hazard model and is working towards the development of the seismic hazard provisions for future editions of the NBC.

**Bruce Hamersley, P.Eng.** is the president of BASIS Engineering and has 33 years of experience with a focus on bridge design, soil-structure interaction, and construction engineering. His diverse design background includes project management of large transportation projects, highway and railway bridge designs, seismic retrofit and rehabilitation of major bridges, and construction engineering for bridge erection. Bruce has been a member of the committee that developed the MOT supplement to the bridge code, Canadian Highway Bridge Design Code (CHBDC) on seismic aspects. He has also been one of the primary authors of EGBC's guideline on Performance-Based Seismic Design of Bridges in BC. Bruce has published and presented several papers on the design and rehabilitation of major bridges.

**Ernest Naesgaard, Ph.D., P.Eng.,** is a senior geotechnical engineer with NAGL with over 45 years' experience in geotechnical and earthquake engineering. He has carried out complex dynamic soil-structure numerical analyses for several major projects. Ernie was instrumental in the discovery and mapping of paleoseismic sand dykes and research on the seismic behaviour of pile foundations in liquefied ground, and development of numerical models for analyzing soil structures susceptible to soil liquefaction and flow. He recently co-led the writing of the upcoming 2023 Canadian Foundation Engineering Manual seismic chapter. He was a sessional lecturer at UBC and authored more than 45 papers.



UBC Robson Square is located in downtown Vancouver on Robson Street between Hornby and Howe Street. The campus entrance is located on the Plaza Level and may be accessed by stairways on either side of Robson at Howe Street, or by the elevator from the underground parkade. There is a wheelchair accessible entrance on the corner of Hornby and Robson Street that connects to all levels of the campus.

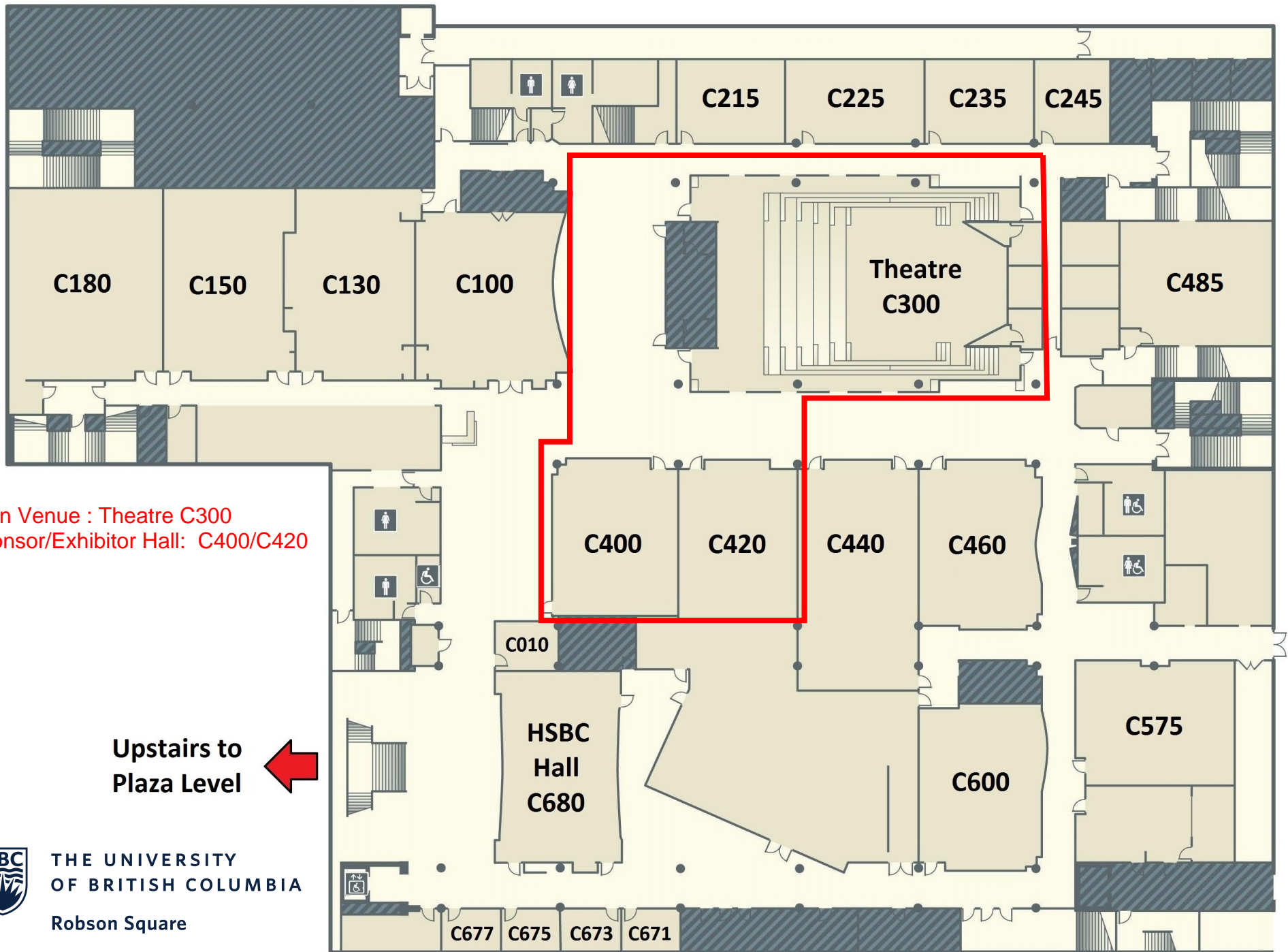
**By Car:** In Vancouver's downtown core, turn south onto Howe Street – a one-way street. The underground parkade is located on Howe at the corner before Nelson Street (right hand side). Hourly parking charges apply. Please visit the Westpark website for updates and more information on payment methods, monthly rates and parking regulations. There is also limited meter street parking on Howe and Hornby Street. (Indigo neo app, Lot 189: \$3.75/hr; \$16/daily)

**By Public Transit:** The Burrard, Granville, and Vancouver City Centre SkyTrain stations are located within walking distance of the campus. Buses stop near the campus on Burrard, Georgia, and Howe Streets. The SeaBus from the North Shore docks is within walking distance. Visit the Translink website at [www.translink.bc.ca](http://www.translink.bc.ca) to plan your route.

**By Bicycle:** A bicycle rack is located outside our front doors on the plaza level. They are to the left of the doors as you come inside.







Main Venue : Theatre C300  
Sponsor/Exhibitor Hall: C400/C420

Upstairs to Plaza Level 



THE UNIVERSITY  
OF BRITISH COLUMBIA  
Robson Square

**Garry Stevenson, P.Eng., P.Geo** is a Senior Geotechnical Engineer with Klohn Crippen Berger Ltd (KCB) and has over 45 years' experience in design and construction of embankment and roller-compacted concrete dams, tunnels, and shafts in hard and soft ground, as well as safety evaluations of operating dams. Garry is a recipient of the Meritorious Achievement Award from the EGBC in 2009 and the Lifetime Achievement Award from the Tunnelling Association of Canada (TAC) in 2018. Garry is a past president of TAC and author of several technical papers.

**Omri Olund, P.Eng.** is a Civil/Structural Engineering Team Lead with BC Hydro Generation Stations. He has over 20 years' experience in the design and implementation of seismic upgrades on dams and appurtenant structures. Omri graduated from UBC in 2001 with a B.A.Sc. in Civil Engineering and 2009 with an M.A.Sc. in Structural Engineering.

**Paul Wilson, P.Eng.** is a Principal and Senior Geotechnical Engineer with Thurber Engineering in their Vancouver office. Paul has been actively involved in major transportation, oil and gas and building projects in BC. Paul is actively involved in design guideline and code development including Section 6 of the CHBDC and EGBC Guidelines for school seismic retrofits, seismic site response analysis and seismic design of dikes.

**Upul Atukorala, Ph.D., P.Eng.** is a Senior Principal Geotechnical Engineer with WSP Golder. Upul has over 35 years' experience and is an industry-recognized specialist on ground response analysis and seismic design of earth structures, soil/structure interaction analysis, and ground improvement methods required to mitigate soil liquefaction. He has in-depth and hands-on knowledge on all aspects of deep foundations, shallow infrastructure tunnels, and design of above and below-grade structures. Upul has led a number of assignments related to the development of seismic design guidelines for earth structure systems (including dikes) and has participated in Task Forces and Codes/Standards addressing geotechnical earthquake engineering aspects.