



Newsletter

Volume 30 • May 2015

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Message from the President



Cameron Kemp, P.Eng.
SEABC President

With spring in full bloom, and summer just around the corner, our Board is about to take a break through July and August. While financially we follow the calendar year, SEABC events mirror the school year. Our main activities – Board meetings, seminars, other events, and interactions with outside organizations such as APEGBC – start in earnest in the fall and run through late spring. As this will be our last quarterly newsletter until we resume in the fall, I'll give you a mid-year summary of our current "school year".

In early March we held our 2015 AGM which saw almost 100 people attend and hear Chris Wise, an internationally-recognized engineer from the UK, give a very thought-provoking and insightful presentation. In the last few years we have been very successful in attracting world-class speakers to our AGM meetings and plan to continue inviting speakers of this calibre.

At that time we also reported that we have a membership totaling 890. This is an impressive number given our relatively small population and discipline base within the province. We also introduced four new Board members – Kitty Leung, Grant Fraser, John Sherstobitoff and Kevin Reiderer – to replace Kate Thibert, Renato Camporese, Leonard Pianalto and Bill Alcock who have recently stepped down. On behalf of the SEABC Executive, I would like to welcome our new Board members, and express a sincere "thank you" to the departing Board members for their valuable contribution.

Over the current "school year" our Education Committee will have hosted eight seminars and other events. The committee has consistently delivered high-quality, topical education opportunities. I encourage you to attend as many as you can, either in person or via webcasting. If you are unable to attend at the time, our past

educational events are archived on the SEABC website. Look out also for the Northwest Conference taking place July 16th through 18th in Boise, Idaho. SEABC is an active member of the Northwest Council of Structural Engineers Associations and the conference provides a great opportunity to network with regional structural engineers in an enjoyable educational setting.

Redesign of our website is currently in progress which will give it greater functionality and make it easier to navigate. We look forward to launching the new web site in the fall.

We are also in the early planning stages for hosting a large structural engineering conference in 2017 for the International Association for Bridge and Structural Engineering (IABSE). The IABSE fall symposium typically attracts 600 delegates from across the world. Bringing the event to Vancouver was a significant achievement which will present participation opportunities for local structural engineers. Look forward to information and details in the months to come.

As you can see, we have had busy and productive fall, winter and spring sessions – we look forward to a similar level of activity in our upcoming "school term".

On behalf of the SEABC Board I would like to thank you for your ongoing support of our organization. I hope you have a relaxing summer spending time with friends and family and look forward to re-engaging with you in the fall.



2015 AGM and Dinner Meeting



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

The 2015 Annual General Meeting of SEABC took place on March 4th at the Sutton Place Hotel, Vancouver. Addressing the 95 members attending SEABC's flagship event, President Cameron Kemp highlighted the various reports which had been distributed to the membership earlier by email. He also confirmed that current membership renewals indicate that membership in the Association remains strong and can be expected to increase again this year.

Cameron then introduced Roxanne Duigou, winner of the Young Members Group "*So You Think You Can Give a Seminar?*" competition. Taking us through her winning presentation "*Using recycled polystyrene containers as building materials in Haiti*" Roxanne described how a small entrepreneurial group had harvested waste polystyrene products to manufacture building materials. Tests have shown that buildings which use the lightweight materials have good earthquake resistance. To date the group has constructed four eye-catching Haitian-style buildings which are performing well in local conditions. Under "*Surprise,*" Chris showed us the elegant stairs for the new IStructE headquarters. The surprise comes when you learn that the treads are only notched into the wall and are actually a series of shear-connected horizontal cantilevers. Many leading structural engineers can now be observed puzzling over the new staircase! Hardly a new concept, the Expedition Engineering design was inspired by traditional stone stair construction which historically was in widespread use.

David Harvey then introduced the keynote speaker, Chris Wise, who is currently visiting Vancouver with his wife – architect Catherine Ramsden. Chris is co-founder and a Director of Expedition Engineering, London, UK and is Professor of Civil Engineering Design at University College, London. Chris is a

Fellow of the Royal Academy of Engineering, and has been awarded the Gold Medal of both the Institution of Civil Engineers and the Institution of Structural Engineers.



In his early career Chris worked some of the industry giants at Arup, rising rapidly to become the renowned international consultancy's youngest-ever Director. Before departing to form his own firm, Chris was responsible for designing London's world-famous Millennium Footbridge. When later the structure developed dynamic response problems under crowd loading on opening day, Chris worked closely with his former employer, Arup, to rectify the problem.

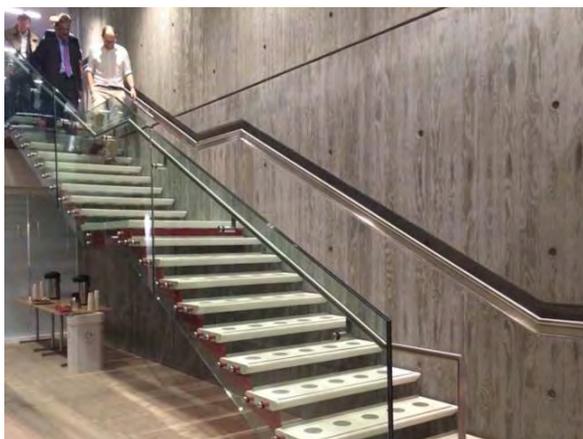


Chris' keynote presentation to SEABC, entitled *A Dead Heap of Stones*, was based on designers attempting to create a superb synthesis with nature.

Chris gave us a tour of the emotional spectrum which took us through his schoolboy visit to Vancouver, early days at Expedition Engineering, some bizarre projects and several spectacular structures. Chris showed us how simple objects can inspire structural forms, explaining that a colleague standing with outstretched arms inspired the pier shape of the Millennium Footbridge.



Chris next moved to 'Constructionarium', a UK education initiative which provides teams of engineering students with hands-on experience of planning and building a wide variety of structures. Under "Joy," Chris described the historical context which shaped the design of the stunningly-beautiful Infinity Footbridge, which won the Supreme Award of the Institution of Structural Engineers in 2009. Chris' design successfully connected the steel-fabrication tradition of Stockton-on-Tees with the modern-day user experience.



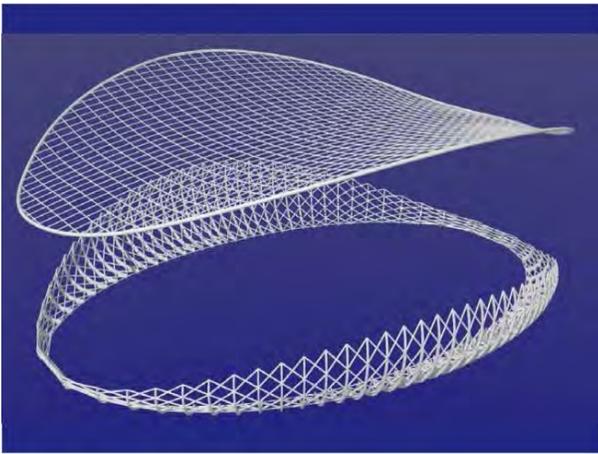
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More surprise came when Chris described his recent revival of ferrocement – a little-used, strong, lightweight composite material that has been used in the past to make floating concrete structures. Ferrocement is labour-intensive to produce, but because ultra-thin sections are possible, the results can be spectacular. With little guidance on its properties or use available, research was needed to explore the possibilities. The Stavros Niarchos Foundation Cultural Center, designed by architect Renzo Piano, required an elegant and durable roof structure – the perfect application for ferrocement. A monument to the value of culture, learning and humanity, the LEED-platinum project will be a demonstration of sustainable construction in the heart of Athens, and will provide state-of-the-art facilities for the National Library of Greece and the Greek National Opera.



Wrapping up his emotional-spectrum tour with "Ecstasy," Chris connected the intense joy of the structural design team in creating the London Velodrome, with the euphoria experienced by the athletes that won Olympic gold medals there in 2012. The Velodrome, with its distinctive roof shape, commonly known as the Pringle, houses a 250 m long cycle track. The building has a highly efficient structural shape which requires only minimal



quantities of materials. A spectacular structure, the Velodrome proved to be a huge success, and was given the Supreme Award for structural engineering at IStructE's 2011 Structural Awards.

Chris' keynote address was well received by those attending SEABC's Annual Dinner. Several members were heard discussing ways of adopting Chris' visionary design philosophy. Many will now think of the emotions generated by structures in service, and will doubtless approach their designs very differently in future!

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Thank you to our Sponsors

SEABC's Annual General Meeting is our flagship event, which features a keynote presentation by a leading international structural engineer with an interesting story. The event is affordably priced and we encourage our members to attend. This is made possible thanks to the generosity of our event sponsors, which we have recognized by including their advertisements in this edition of the newsletter. The organizations who sponsored our 2014 AGM are:

Associated Engineering
 Canadian Wood Council / WoodWORKS! BC
 Fast + Epp
 Glotman Simpson Consulting Engineers
 Gygax Engineering Associates Ltd
 Masonry Institute of BC
 Metrix Professional Insurance Brokers
 Prokon Software Consultants (Canada) Ltd
 S-Frame Software
 Sacre Davey Engineering
 Thomas Leung Structural Engineering Inc.



WoodWORKS! BC

- is a resource for anything and everything related to wood construction, engineered wood products and building systems
- wants to help you build proficiency in using wood.
- offers many opportunities for you to increase your knowledge about designing and building with wood.





Contact:
 Sukh Johal, Dipl.T (Civil), MBA
 Canadian Wood Council/Wood WORKS! BC
 1-877-929-9663 ext. 3
 sjohal@cwcc.ca











Images from the 2015 AGM



Surinder Parmar, Dave Davey and Adrian Gyga



Guests Mike Russell and Rob McLeod



Jacquie Gaudet talking with Bill McEwan



Catherine and Chris enjoying the moment



Bruce Clark and Bill Alcock engrossed



Thor Tandy and Shane Cook relax with colleagues

2015 AGM Emotions



Cam Kemp encourages SEABC members



Roxanne Duigou inspires the audience



Keynote Speaker Chris is amused by his own ideas...



... but ponders the consequences!



David Harvey relishes the occasion



SEABC Administator Cecilia Bernabe has fun!

Committee Reports

Education Committee



Mark Robertson, M.A. Sc.
P.Eng., Struct.Eng

Performance and Applications of Self-Tapping Screws

On April 15, SEABC brought to the membership an interesting evening seminar on the Performance and Applications of Self-Tapping Screws presented by Professor Dr. Thomas Tannert, PEng, PhD, UBC Associate Chair for Wood Building Design, who has been involved with recent research on this topic.

The seminar started where Dr. Tannert presented the background history on self-tapping screws, briefly

setting off: the purpose for this seminar, the structural aspects of engineering with self-tapping screws in our North American industry and the valuable practical considerations vital for their successful application. He followed further to describe the many different structural applications (primary and secondary connector and reinforcements) of self-tapping screws, illustrating their performance at hand based on recent research at UBC and explaining their appropriate design recommendations.

Self-tapping screws are widely recognized as being the state-of-the-art in connector technology for CLT structures. However, the current Canadian Standard for Engineering Design in Wood (CSA O86 2009) has no guidelines for these connectors in CLT. Dr. Tannert clarified the current practice with respect to the design of these screws, together with useful case studies and worked examples.



Technical Committee



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

The Task Group investigating the Seismic Design of Basement Walls is currently the only active task group. Much of the recent university research conducted as part of this investigation is nearing completion. The task group is looking to have a report soon on the next step in presenting SEABC members with the results of the investigation and moving towards offering some guidance on the seismic design of basements walls.

A number of structural related issues have been brought forward recently by APEGBC seeking input from SEABC. The Structural Practice Committee will be working with APEGBC on these items and we will provide an update if any of them are addressed by a specific Technical Sub-Committee or Task Group.

SEABC encourages all interested members to participate in committees or task groups. Some of the existing standing committees are currently seeking a chairperson so please contact SEABC if you have a specific interest in these topics. If you have interests or concerns in other topics dealt with by one of the technical sub-committees or task groups please contact the chairperson of those groups.



Communications Committee



David Harvey, P.Eng.,
Struct.Eng.
Director SEABC

We encourage our members to contribute articles or photographs for the newsletter – please describe any of your activities or matters of interest to your fellow professionals. When we inform readers about our engineering designs, interests or research, we raise our professional profile, and can inspire others. Articles from structural engineers are endlessly interesting but we always need more. Please continue sending in your submissions – we want to hear from you! Kindly send articles for publication to:

newsletter@seabc.ca

– We'll include as many of your articles and photos as possible!



Structural Design for Infrastructure

Young Members Group



Nick de Ridder, P.Eng.

Throughout the year the Young Members group sponsors and attends various events in order to help spread the popularity of structural engineering as a career throughout schools and the community.

On April 8th and 9th, Emma Houiellebecq and Anna Lemaire attended the Vancouver Science Fair to present a student prize for the best structural engineering related project. This year the prize went to local student for his investigation into the strength of sugar glass.

On March 19, the YMG then co-hosted a panel discussion with the UBC CSCE Student Chapter on the new UBC Student Union Building. The discussion was led by seven representatives from RJC, Dialog, and UBC Properties Trust.

Kate Gerson and Andrew Larigakis, from DIALOG, provided students with the architectural team's perspective on the project including an outline of the design process, major design concepts, as-well-as issues and challenges that arose during construction. Three structural engineers and one designer, Damien Stoneham, Natalia Myles, Shahryar Davoudi, and Bruce McGarvie from RJC, continued the discussion, highlighting the structural design of the five storey LEED platinum structure. Lastly, Dan Giordano from UBC Properties Trust emphasized the development manager's roll in the project. Dan highlighted the importance of stakeholders and stressed that elements needed for approval were carefully processed and that each part of the project was thoroughly analyzed.

Another event that the YMG sponsors is the Undergraduate Seismic Design Competition, which took place on March 30, in Boston, Massachusetts.

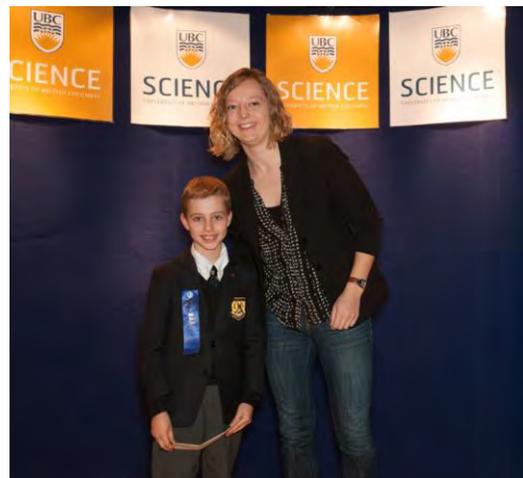
This competition was held in conjunction with the 2015 EERI Annual Meeting and featured thirty-eight

teams from all over the world, with UBC being one of two teams representing Canada.

Thirty students put in over 750 man-hours of labour, working together to design and construct a 1/78th balsa wood scale model of a 30 storey high-rise building. Students gained hands-on experience in structural and seismic engineering through design, construction, and analysis. At the competition, the balsa wood models were tested under three concurrent ground motions. UBC's model withstood both the magnitude 5 and 6 ground motions; however it was not able to withstand the final magnitude nine ground motion.

UBC's structure had the 8th highest Final annual building income and placed 20th overall.

Thank-you to Evan Peatt, the UBC student representative to the YMG, for his summary of the two UBC events above.



Emma Houiellebecq with the Student Winner.



The UBC EERI Seismic Design Team representatives with their model before testing in Boston.

On the Web



Stephen Pienaar, P.Eng.

Webmaster

New Website

Work on a major refresh of the SEABC website was suspended late last year when we ran into some technical challenges. The problems were not too big to fix, but we did not want to risk any interruption during a busy season of events. We plan to resume the project during the quiet summer months and hope to have everything ready in September. Here are our goals again:

A fresh new look.

Good experience on small screens.

A content management system that will facilitate sharing of webmaster duties between multiple people.

Improved access to archived seminar recordings and active courses.

How you can help:

It is never too late to send us suggestions on how we can improve our web service.

Donate photographs that we can use to beautify the new website. We will give full credit to all contributors.

Please contact webmaster@seabc.ca with suggestions or questions.

Current Events

New on the SEABC website:

June evening seminar:

Registration is now open for the June 1 evening seminar **Going Forward from the Elliot Lake Inquiry** www.seabc.ca/events

Recent seminar recordings:

They took a dead heap of stones... (2015 Annual General Meeting Keynote Presentation)

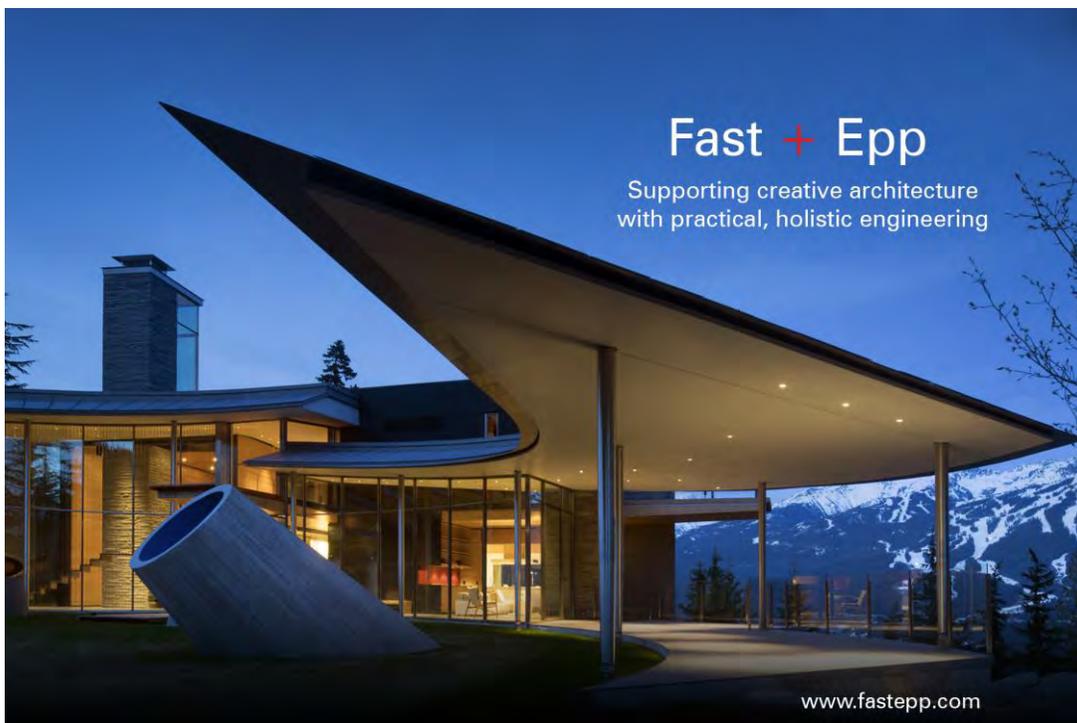
Post-Earthquake Damage Assessment of Buildings (November 2014 evening seminar).

www.seabc.ca/seminar

Be first the first to know:

Join our **Twitter feed**: announcements for SEABC events and other interesting structural engineering snippets.

www.twitter.com/seabc



IStructE News



Bill Alcock, P.Eng. Struct.Eng.
MStructE.

Director SEABC

Dedication of the new IStructE International Building:

The official opening of the new (renovated) IStructE International Building took place in the late afternoon of Thursday May 14, 2015 following brief speeches by the architect Hugh Broughton, Vice President Victoria Martin, and President Tim Ibell.

In a packed auditorium, his Royal Highness the Duke of Gloucester performed the official opening ceremony, unveiling an engraved plaque to mark the occasion. He then toured the new facilities with Institution Chief Executive, Martin Powell, and Tim Ibell before taking time to personally meet with many of the IStructE members at the reception which followed. HRH the Duke of Gloucester, an Honorary Fellow of the Institution since 1984, is a qualified architect and ran his own practise until he embarked on increased Royal duties following the death of his brother, the previous Duke of Gloucester.

Major renovations to the building were designed by Hugh Broughton Architects and Expedition Engineering, and were completed on time and on budget. IStructE staff were able to move into the building in early December 2014, and, in the words of Director Sarah Fray, “we moved into the building, sorted out personal belongings, and were up and running less than half a day after moving in. We were all happy – there was no grumbling or griping, it was truly remarkable. Credit must go to CEO Martin Powell who orchestrated the move – from negotiating the end of lease in the former Belgravia facilities to the vision for selecting the building on Bastwick Street.”

On a personal level, I can remember seeing the building shell prior to renovation and wondering just

how such a narrow, architecturally plain building could ever be made to showcase the ingenuity of structural engineering. But, thanks to past presidents John Nolan, YK Cheng, Nick Russell, CEO Martin Powell, and the architect and engineers, the building has been transformed into a bright and modern facility with all the latest technical advancements.



HRH the Duke of Gloucester and Tim Ibell unveiling the plaque

To highlight a few of the structural and architectural features, the main floor staircase leads past a beautifully textured concrete shear wall highlighting clever use of the Douglas Fir formwork. The staircase itself is unique. I am still not sure how it stands up under its own weight but have seen it fully loaded from top to bottom. There is also a colorful red bridge which leads from the upper lobby to the library, and the library floor was strengthened with carbon fibre in order to maintain the headroom below. State-of-the-art webcasting facilities will improve the Institution’s connectivity with its global membership of 27,000 structural engineers.

There can be no doubt that this is a fitting building for the Institution. There has already been a lot of

interest in the building from other professional institutions, some of whom are saying that their staid Edwardian edifices no longer represent the vitality that they want to portray.



Duke of Gloucester and Institution President, Tim Ibell socializing with members after the ceremony



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Recent Seminars and Events

2015 Wood Design Awards

Innovative architectural and structural design in large wood buildings, including mid-rise and commercial structures, headlined the 2015 Wood Design Awards event at the Vancouver Convention Centre (West). The 11th annual event, organized and hosted by Wood *WORKS!* BC, honoured excellence in wood building and design, and recognized leadership and innovation in wood use. More than 360 people attended this year's celebration of wood, including architects, structural engineers, project teams, local government and industry sponsors.

Wood *WORKS!* is a national industry-led program of the Canadian Wood Council, with a goal to support innovation and provide leadership on the use of wood and wood products. Wood *WORKS!* BC provides education, training and technical expertise to building and design professionals involved with projects throughout BC, and is a resource on mid-rise construction and the Wood First Act in BC.

There were 107 nominations in 12 categories from all over the province, as well as an international nomination of a BC project by a New York-based designer. All projects showcase distinctive and unique qualities of wood such as strength, beauty, versatility, and cost-effectiveness.

Lynn Embury-Williams is executive director of Wood *WORKS!* BC.

"Each and every one of these projects is spectacular in its own right, and demonstrates how wood can be used in innovative ways as an architectural and structural building material," explained Ms. Embury-Williams. "Wood products and systems have become the material of choice in mid-rise residential as well as for the institutional, commercial and industrial sectors. This is a paradigm shift, and it's encouraging, as our communities and cities want more sustainable and healthier built environments. Here in BC, designers and builders are leading the way by using wood because it is cost-effective; is renewable; has a smaller carbon footprint; and because it creates beautiful and comfortable spaces where people love to live and work."

The panel of four judges included Paul Newman, Executive Director, Market Access and Trade, Council of Forest Industries, Vancouver, BC; Thomas Tannert, PhD, P.Eng., Associate Chair Wood Building Design and Construction, The University of British Columbia, Vancouver, BC; Elsa Lam, BES, MArch II, PhD, MRAIC, Editor, Canadian Architect Magazine, Toronto, Ontario; and Don Lovell, Architect AIBC, CD, M.Arch. (Retired), Victoria, BC.

The Wood Champion Award was presented to Marie-Odile Marceau, Principal, McFarland Marceau Architects Ltd. in Vancouver. Ms. Marceau has a long and distinguished architectural career in both the public and private sectors. Her portfolio of sensitive and profound school projects in many First Nations communities has provided a lasting and significant positive learning impact on the students and communities alike. She championed the use of wood in these buildings primarily as cultural reference, but also as an economic driver. Wood is a building material readily available in many First Nations communities, and promotes the utilization of community labour in the harvest, transformation and erection of wood members.

Eric Karsh, Principal, Equilibrium Consulting Inc. in Vancouver, was awarded the Engineer Award. Known and respected internationally, he shows his love of using wood through innovative structural designs such as the use of cross-laminated timber (CLT) "tilt up" balloon frame construction in his project, Ronald McDonald House BC. – a first in North America. This is a system combining the convenience of concrete with the advantages of wood. He has developed the use of curved, organic shapes, cut from sheets of three-ply cross-laminated timber to form elegant roof and column elements at the UBCO Fitness and Wellness Centre in Kelowna. Mr. Karsh also co-authored "The Case for Tall Wood Buildings" report which introduced an innovative mass timber panel construction concept. Mr. Karsh was the structural engineer of record for the remarkable Wood Innovation and Design Centre in Prince George, BC.

The Architect Award was presented to Vancouver-based Michael Green Architecture. This firm is

always working on the next extraordinary wood structure, and has an impressive line-up of projects ranging from airports in Prince George and Ottawa, to a landmark social welfare facility fashioned from CLT. The recently-completed Wood Innovation and Design Centre, the tallest contemporary wood structure in North America, demonstrates economical and repeatable technologies for building high-rise structures with timber. Mr. Green was also the co-author for "The Case for Tall Wood Buildings" which was the subject of his high profile TED Talk.

The Wood Innovation Award recognizes creative and innovative approaches in the use of wood in building and product design. The winner of this category was Michael Green, Principal, Michael Green Architecture for his project, the Wood Innovation and Design Centre in Prince George, BC. The structure represents a milestone in the future of tall wood buildings. The project introduces new methods of working with mass timber panels, specifically cross-laminated timber, and is a true showcase for BC wood products. The jury described this project as,

"An exquisite interplay of structure and finish to provide a translucent, warm and inviting structure. The attention to detail is evident throughout, and provides pleasing aesthetic patterns which are both convincing and alluring."

The Environmental Performance Award was presented to Matheo Durfeld of BC Passive House for his project, BC Passive House Plant in Pemberton, BC. The award recognizes how wood products played a significant role in improving the overall environmental performance of a structure. The project was designed to meet the Passive House Standard, currently the world's most rigorous energy standard. The result: an 80-90 per cent reduction in the annual energy used for heating and cooling. The "wood first" approach for the structure of the building avoided approximately 365 metric tons of CO2 emissions. The jury stated that,

"This building exemplifies the use of wood to achieve energy savings, and reduce environmental impact."

Winners in the wood design categories include:

- **Residential Wood Design:** David Ratzlaff, HR Pacific Construction Management Ltd. – Kicking Horse Residence, Golden, BC
- **Multi-Unit Residential Wood Design:** Eric Andreasen, Adera Development Corporation – Sail, Vancouver, BC
- **Commercial Wood Design:** Hugh Cochlin, Proscenium Architecture + Interiors Inc. - Mountain Equipment Co-op Head Office, Vancouver, BC
- **Interior Beauty Design:** Nick Bevanda, CEI Architecture – Southern Okanagan Secondary School Expansion, Oliver, BC
- **Institutional Wood Design- Small:** McFarland Marceau Architects Ltd. – UBCO Fitness and Wellness Centre, Kelowna, BC
- **Institutional Wood Design- Large:** Michael Green, Michael Green Architecture – Ronald McDonald House BC, Vancouver, BC
- **Western Red Cedar:** McFarland Marceau Architects Ltd. – Environmental Learning Centre – North Vancouver Outdoor School, Brackendale, BC

There were two Jury's Choice awards:

- **Steve McFarlane**, office of McFarlane Biggar Architects + Designers inc. – Fort McMurray International Airport, Fort McMurray, AB
- **Thomas Leung**, Thomas Leung Structural Engineering- MEWS, UBC, Vancouver; Emerald Heights, Surrey; Dominion, New Westminster, BC

"We are proud to bring together leading designers and project teams with BC's world class wood products industry to celebrate what has been achieved together: excellence in wood building and design that has made BC a national and international leader," concluded Ms. Embury-Williams. "We look forward to this second decade of celebrating outstanding wood building and design in BC."



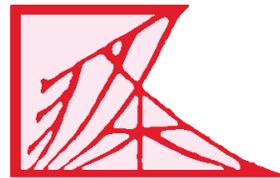
Wood Innovation Winner: Michael Green, Michael Green Architecture – Wood Innovation and Design Centre, Prince George, BC. Photo courtesy of Wood WORKS! BC.



Commercial Wood Design Winner: Hugh Cochlin, Prescenium Architecture + Interiors Inc. Mountain Equipment Co-op Head Office, Vancouver, BC. Photo courtesy of Wood WORKS! BC



Lynn Embury-Williams
Executive Director of Wood
WORKS! BC



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Thomas Leung Structural Engineering Inc.

Since incorporation, Thomas Leung's firm, Thomas Leung Structural Engineering Inc. has been actively engaged in the structural design of countless numbers of low-rise wood frame buildings. Since the BCBC changed to allow mid-rise wood-frame construction, the firm has been and is working on 20 mid-rise projects. From houses to commercial projects, townhomes to condominiums, Thomas Leung and his firm have been designing wood-framed structures for the private sector for well over 30 years.

Thomas is well known for his generosity, in sharing his time and knowledge to the benefit of the engineering community. He is a key contributor to the CSA 086 timber design technical committee, a key contributor to the APEGBC best practice guide for mid-rise construction in BC, and has an exceptional understanding of the technical aspects of wood engineering that goes well beyond the Building Code. He is also well-known for providing workable solutions to the construction site. In addition, he does a lot of work with FII and Canada Wood's Asia markets.



Bill McEwen, P.Eng.
Executive Director

2015 Masonry Design Awards Announced

Category for Structural Masonry

The Masonry Institute of British Columbia is pleased to announce the 2015 Masonry Design Awards. These awards showcase beautiful and distinctive masonry projects, and recognize their architects, engineers, building owners, masonry contractors and masonry suppliers. Submissions for projects that feature brick, block and stone completed in British Columbia between July 2012 and July 2015 are due at the MIBC office by August 30, 2015.

The winners will be announced at a gala event to be held on Thursday October 1, 2015 at the new Robert H. Lee Alumni Centre at the University of British Columbia. Awards will be determined by a distinguished jury panel, and presented in Structural, Restoration, Commercial, Institutional, Residential, Mixed Use and High Rise categories.

Past winners for Structural Masonry include JKK Consulting Engineers for the Centre for Comparative Medicine at UBC, and Equilibrium Consulting for the Ecole au Coeur de l'île and the CNC Technical Trade Centres in Prince George and Quesnel.

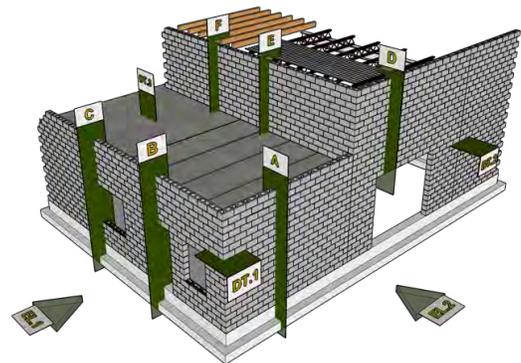


For details of the submission process, please see the Project Submission Form by visiting www.masonrybc.org, or contact us at info@masonrybc.org or 604-291-1458.

MIBC Structural Details

As part of its mandate to support the development of masonry in BC through technical support to designers, the MIBC Design Details were introduced last year.

They include Structural and Veneer modules. The Structural Details illustrate a wide range of reinforcing and connection details using wall sections and elevations. The information can be viewed online, and in PDF, AutoCAD and SketchUp formats. Wall elevations are provided with a unique construction sequence layers format. They are available for free on the MIBC website, www.masonrybc.org.





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Experience – Sacré-Davey Engineering is a mid-sized industrial engineering firm, located in North Vancouver, with specialized expertise in the Ports, Oil and Gas, and Materials Handling fields. Our primary objective in any project is to bring value to our clients beyond the cost of our services.

In our 29 years, we have worked for many industrial clients in western Canada and the USA. Over 80% of our work is with repeat customers. With our current staff levels of approximately 100, we are large enough to provide exceptional service, but not large enough that we carry significant overhead.

We offer a wide range of civil and structural engineering services to multiple market sectors. Our team of engineers are capable of dealing with a diverse and challenging spectrum of projects and we continue to expand our expertise and tools. We adapt and modify the ways we work on projects to respond to the unique challenges that each project may have. We continue to invest in technology and software to continuously improve our services and efficiently respond to our clients.

The Team – At Sacré-Davey Engineering, we strive to create a work environment based on inclusivity and longevity. The culture that we have created attracts some of the best available people and creates long term loyalties.

From our customer's point of view this creates consistency. The team that works together on a project today will most likely be the same team that works on the next project...and the next. This creates not only cost efficiencies, but also project continuity and consistency.

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IABSE Symposium 2017



David Harvey, P.Eng., Struct.Eng.
Director SEABC

SEABC has recently signed an agreement with the International Association for Bridge and Structural Engineering (IABSE) to host their 2017 Symposium in Vancouver. The dates are September 19 through 23 for the conference, preceded by two days of IABSE meetings and pre-conference seminars. Shortly after signing the IABSE agreement, SEABC signed a contract with the selected venue for the symposium – the Westin Bayshore Hotel. It is a significant move for SEABC to host a world-class structural engineering conference, but it is a move that we were keen to make when the opportunity arose. To win the right to hold the conference, we submitted a very attractive proposal to IABSE – one that they received very favourably. IABSE organizes a fall symposium annually – it will be held in Geneva this September, and in Stockholm next year.

With the agreement safely in place, SEABC's Organizing Committee (OC) has started work in earnest. Early conference planning activities involve creating developing graphics and a website, followed by developing the sponsorship and exhibitor brochures. There will be much more to do between now and 2017, including setting up the technical program, site tours and social activities.

To carry out the work we have a high-calibre group of people headed by Peter Taylor as Honorary Chair, ably assisted by Katrin Habel and Adam Lubell, the Conference Co-Chairs. Aided by the other committee members, Peter, Katrin and Adam will be working hard to make their 2017 visit to Vancouver a memorable experience for our overseas guests. The committee is looking forward to showcasing SEABC's capabilities to IABSE and providing a unique opportunity for SEABC members to experience

world-class structural engineering in our beautiful City.

If you have any ideas for contributing to the success of this conference, feel free to contact me or any OC member – we'll be pleased to hear from you. If you are not familiar with IABSE, check them out at: www.iabse.org/ Look out for future announcements

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A Practical Guide to Wood-Frame Design: Built-Up Lumber Columns



Joel A. Hampson, M.A.Sc., P.Eng., LEED AP



Scott Ash-Anderson, B.Sc., EIT

Wood-frame columns are often assembled as multiple plies of lumber and integrated into wall framing. This article focuses on the practical compressive capacities of these “built-up” columns. The contractor may refer to these a “stud packs”, “cripples” or “trimmer studs”. Rectangular sections (instead of built-up sections) are often used where the column is not part of the wall framing or where it might be exposed to view. Engineered wood products, such as parallel strand lumber and glulam are often used for heavier loads or visual appeal.

The column compressive capacity is governed by two failure modes: compression parallel-to-grain and compression perpendicular-to-grain. Table 1 shows the specified compressive strengths and the lower-percentile modulus of elasticity for lumber. These are taken from a worst-case combination of Doug-Fir, Hem-Fir & S-P-F species for grade No. 2—as discussed in “A Practical Guide to Wood-Frame Design: Lumber Properties”. Contractors may want to use Stud grade No. 3; as this is figure-joined and poor in bending, it is prudent to avoid having it on site where it might be used inappropriately.

Table 1. Strengths for No. 2 Grade lumber¹

	Compression		Modulus of elasticity, E_{05}
	Parallel to grain, f_c	Perpendicular to grain, f_{cp}	
SI, MPa	11.5	4.6	6 500
Imperial, psi	1670	670	0.94X10 ⁶

“CSA O86-09: Engineering design in wood” specifies modification factors to account for wood properties and lumber applications. Most factors are unity for day-to-day designs:

- Load duration, K_D , is usually “Standard term”²
- Service conditions, K_{Sc} & K_{SE} , are usually “Dry”³
- Preservative & fire treatment, K_T , is usually “Untreated”⁴

¹ “A Practical Guide to Wood-Frame Design: Lumber Properties” by J.A. Hampson, SEABC Newsletter, August 2014, Volume 27,

² “O86-09: Engineering design in wood” by the Canadian Standards Association, 2010, Table 4.3.2.2

³ Ibid, Table 5.4.2

⁴ Ibid, Table 5.4.3

The system factor, K_H , accounts for the capacity to distribute local failures to neighbouring members. It is taken as “Case 1”⁵ since the column is part of a wall system, and

$$K_H = 1.10$$

The factored strengths are found as

$$F_C = f_c(K_D K_H K_{S_c} K_T)$$

$$F_{cp} = f_{cp}(K_D K_{S_c} K_T)$$

The compression-parallel mode encompasses slender (Euler) buckling, stocky crushing and intermediate failure. The size factor and slenderness ratio is considered per ply and given as

$$K_{Zc} = 6.3(dL)^{-0.13} \leq 1.3$$

$$C_c = \frac{K_e L}{d} \leq 50$$

The typical wood-frame column end-conditions are considered pinned; therefore, the effective length factor, K_e , is unity⁶. The weak access is restrained by attached sheathing; thus, buckling in this axis is prevented. (Unsheathed walls and columns can buckle under heavy loads before sheathing is applied.) CSA O86 defines the slenderness factor as

$$K_C = \left[1.0 + \frac{F_C K_{Zc} C_c^3}{35 E_{05} K_{SE} K_T} \right]^{-1}$$

It is practical to assume a column length, L , of 8'-0". This is the typical floor-to-ceiling height for wood-frame residential construction. Table 2 shows factors based on this length.

Table 2. Compression parallel-to-grain factors

Name	Size factor, K_{Zc}	Slenderness ratio, C_c	Slenderness factor, K_C
2X4	1.275	27.4	0.407
2X6	1.202	17.4	0.739

There are additional modification factors for the fastener types in built-up compression members. These are omitted because a built-up column in a wall has weak-axis restraint⁷. The compressive strength parallel to grain is found with

$$P_r = \Phi F_C A K_{Zc} K_C$$

Built-up columns as wall members bear on a bottom plate. Compression perpendicular to grain is the crushing of this plate. As a column can occur at the end of a wall, it is practical to assume the length of bearing factor, K_B , to be unity⁸. The wall plate lies flat, so the size factor for bearing, K_{Zcp} , is also unity. The compressive strength perpendicular to grain is found with

$$Q_r = \Phi F_{cp} A K_B K_{Zcp}$$

⁵ Ibid, Clause 5.4.4.1.

⁶ Ibid, Table A.5.5.6.1

⁷ Ibid, Clause 5.5.6.4.6

⁸ Ibid, Clause 5.5.7.5

Table 3 & Table 4 show the tabulation of compression parallel & perpendicular to grain for a practical set of column sizes. The governing capacity is indicated in bold type. For the length considered here, compression perpendicular to grain governs: this is indicative of plate crushing. For other column lengths, the Wood Design Manual gives compression-parallel-to-grain design values⁹ in Metric units.

Sheathing or wallboard should be nailed or screwed to the column at no more than 12" on centre. Nailing each ply is not required for these built-up column¹⁰, but it is practical to have a general note indicating that all built-up plies (whether columns or beam) be fastened together with two 3" nails at 6" on centre.

Table 3. 2X4 columns

Name	Breadth, in (mm)	Depth, in (mm)	Area, in ²	Column weight, lb	Factored compressive resistance, lb	
					Parallel to grain	Perpendicular to grain
1·2X4	1.5 (38)	3.5 (89)	5.3	9.0	3991	2798
2·2X4	3.0 (76)	3.5 (89)	11	18	7983	5596
3·2X4	4.5 (114)	3.5 (89)	16	27	11974	8394
4·2X4	6.0 (152)	3.5 (89)	21	36	15966	11192
5·2X4	7.5 (191)	3.5 (89)	26	47	19957	13990

Table 4. 2X6 columns

Name	Breadth, in (mm)	Depth, in (mm)	Area, in ²	Column weight, lb	Factored compressive resistance, lb	
					Parallel to grain	Perpendicular to grain
1·2X6	1.5 (38)	5.5 (140)	8.3	14	10754	4401
2·2X6	3.0 (76)	5.5 (140)	17	28	21507	8802
3·2X6	4.5 (114)	5.5 (140)	25	43	32261	13204
4·2X6	6.0 (152)	5.5 (140)	33	57	43014	17605
5·2X6	7.5 (191)	5.5 (140)	39	67	53768	22006

Joel A. Hampson, MASC, PEng, LEED AP & Scott Ash-Anderson, BSc, EIT, practice structural engineer in Vancouver.

⁹ "Wood Design Manual" by the Canadian Wood Council 2010, pp. 145-147

¹⁰ Ibid, p. 141

While the authors have tried to be as accurate as possible, they cannot be held responsible for the designs of others that might be based on the material presented in this article. The material covered in this article is intended for the use of professional personnel who are competent to evaluate the significance & limitations of its content & recommendations and who will accept the responsibility for its application. The authors and the sponsoring organizations disclaim any and all responsibility for the applications of the stated principles & values and for the accuracy of any of the material presented in the article.



Mark Your Calendar

Upcoming SEABC Seminars

Evening Seminar: Going Forward from the Elliot Lake Inquiry

Date: Monday June 1st 2015

Presenter: Chris D. Roney, P.Eng, BDS, FEC, Counselor and Spokesperson for PEO's inquiry into the incident.

Venue: Room C300, UBC Robson Square, 800 Robson St. Vancouver

Time: Refreshments 6:00pm, Presentation 6:30pm

Registration: www.seabc.ca/commerce

See flyer attached

Upcoming Events

Northwest Conference: Jump into the Future

Date: July 16th-18th 2015

Venue: Boise, Idaho

Registration: www.seaidaho.org

See Flyer attached

SEAOC Convention

Date: September 9th-12th 2015

Venue: Bellevue, WA.

Registration: www.convention.seaoc

ACI BC Chapter 2015 Annual Spring Seminar & Trade Show: Extending the Service Life of Concrete Structures

Date: Friday May 29, 2015

Venue: Italian Cultural Centre, 3075 Slocan Street, Vancouver, BC

Time: 8:00am-4:30pm

See flyer attached

Final Words

Editorial Information

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

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

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

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

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

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Monthly Seminar

GOING FORWARD FROM THE ELLIOT LAKE INQUIRY

Date: Monday - June 1, 2015
Venue: Room C300, UBC Robson Square, 800 Robson Street, Vancouver
Time: Refreshments 6:00pm, Presentation 6:30pm
Presenter: Chris Roney; P.Eng., BDS, FEC
Cost: Free for SEABC Members and \$75 for non-members
Registration is required: www.seabc.ca/ElliotLake

The collapse of Algo Centre Mall on June 23rd, 2012 in Elliot Lake, ON occurred due to a failure of one beam-to-column connection. However, the root cause of the collapse was not one of material failure – it was human failure. This is a humbling wake-up call for our self-governing profession and a reminder of our responsibility to regulate the profession of engineering in order to serve and protect the public.

As a consequence to this incident, the Professional Engineer's Ontario (PEO) submitted 11 detailed recommendations to the Elliot Lake Commission. In his capacity as PEO's Councilor and a Spokesperson for the association's Elliot Lake Advisory Committee, Chris Roney participated in the Inquiry as an expert and in drafting of PEO's recommendations. He will highlight the key themes that emerged during this public inquiry and discuss on how our profession may respond to those challenges. His presentation will:

- Explore the regulatory lessons learned
- Review the 11 PEO Inquiry recommendations
- Discuss the path going forward for the profession
- Explain implications for the profession across the Country

All structural engineers, EITs, students, regulatory officials, are encouraged to attend this June 1st evening seminar.

Chris D. Roney, P.Eng., BDS, FEC

Chris Roney leads Roney Engineering Limited - a Kingston, Ontario consulting firm offering full range of structural engineering services for building design, construction, investigations and restorations. With over 24 years in practice, Chris is an accredited Building Design Specialist and with expertise in design and evaluation of existing buildings and historic structures.

In addition, Chris devotes a significant portion of his time serving our engineering community by providing strategic advice on matters related to on-going policy, administrative and technical issues related to the Building Code. He is a Director of Engineers Canada, representing the 12 provincial and territorial associations that regulate engineering in Canada and license the country's more than 260,000 professional engineers. He is a member of the Ontario government's Building Safety Technical Advisory Panel and the Building Advisory Council. He was past Chair of the Part 4 (Structural) Technical Advisory Committee for the Ontario Building Code.



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Extending the Service Life of Concrete Structures

ACI BC Chapter 2015 Annual Spring Seminar & Trade Show

Date: Friday, May 29, 2015
Time: 8:00am – 4:30pm
Location: Italian Cultural Center
3075 Slocan Street, Vancouver, BC

Overview:

The focus of the 2015 Annual ACI BC Chapter Spring Seminar is the extension of service life of reinforced concrete infrastructure. This one day seminar will feature seven speakers from academia, industry, and ownership agencies from Canada and the United States who will share their perspective on this popular topic.

As well as being informative and educational, the ACI Spring Seminar is an excellent opportunity to network with others in the concrete design and construction community. A trade show will be held to give you access to vendors active in the local industry.

Speakers & Topics:

1. Design Considerations for 100 year Service Life of Concrete Infrastructure

Neil Cumming, P.Eng., FACI - Executive Vice President, Levelton Consultants Ltd.

It is well known that the deteriorated state of our infrastructure has reached crisis proportions. In the face of this, Owners are routinely demanding that new structures be designed for service life of 100 years or more. Designers are faced with some significant challenges, not the least of which is the lack of a coherent North American design standard for extended service life. This presentation will highlight some of these challenges and will discuss what is available to designers to answer the call for durable structures, and suggest what is needed in the future.

2. Uses and Limitations of Service Life Prediction Models

R. Douglas Hooton, P.Eng., Ph.D., FACI - Professor and the Natural Sciences and Engineering Research Council / Association of Canada Industrial Research Chair in Concrete Durability and Sustainability in the Department of Civil Engineering at the University of Toronto

In this presentation, descriptions of what a service life model can do, and what it can't, will be provided along with typical data inputs and outputs. Limitations of models will also be described.

3. Material Testing Methods for Service Life Modeling

Andrew J. Boyd, Ph.D., P.Eng., FACI -, Associate Professor, Department of Civil Engineering, McGill University. Chair of ACI Committee 228 - Nondestructive Testing

Service life models can only be as accurate as the material properties used to formulate their predictions and, of course, the applicability of these properties to actual behavior of concrete in the field. After placement, re-evaluation of the concrete is necessary not only to confirm that the originally specified properties have been achieved, but also to monitor changes in these properties over time. This presentation will discuss the different test methods available, or needed in order to properly implement a true service life modeling approach.

4. What Structural Engineers Should Know About Concrete

Sidney Mindess, Professor Emeritus – Department of Civil Engineering, University of British Columbia

This presentation will focus on some of the issues surrounding the production of durable, sustainable concrete, and the difficulties that can arise due to improper material selection, admixture interactions, poor curing techniques, and so on.

5. A Review of Vancouver Port's Concrete Assets Management Strategy

Mo Mofrad, P.Eng. – Project Engineer, Port Metro Vancouver

In 2014 The Vancouver Fraser Port Authority (Port Metro Vancouver) began developing a risk-based multi-year works program with funding needs analysis to enable it to secure the future funding required to ensure the reliability of its concrete structural assets. This presentation will present the methodologies and ongoing work being done to develop a strategy for the most cost effective, responsible management of these overpass bridges and dock structures owned and operated by Port Metro Vancouver.

6. Causes of Cracks and Repair Techniques

Kim Basham, Ph.D., PE, FACI – President, KB Engineering, LLC, Cheyenne, Wyoming

Concrete cracks are caused by tensile stresses but what causes the tensile stresses? In this session, learn about structural and nonstructural cracks including intrinsic cracking before and after concrete hardening. Also, hear about designing crack repairs and repair options.

7. Pattullo Bridge Seismic Retrofit and Rehabilitation Project

Darren Woodworth, P.Eng. - Senior Project Manager, TransLink (South Coast British Columbia Transportation Authority)

The Pattullo Bridge crosses the Fraser River between the Cities of New Westminster and Surrey and has served the Lower Mainland for 78 years. This presentation will provide a brief history of the Pattullo Bridge, provide a summary of all the upgrades performed to date on the bridge, identify the challenges currently facing the bridge and describe the rehabilitation work planned to begin in fall 2015. How the upcoming rehabilitation work relates to the current Metro Vancouver Transportation & Transit Plebiscite and the future replacement bridge will also be discussed.

REGISTRATION FORM

ACI BC Chapter 2015 Annual Spring Seminar

Date: Friday, May 29, 2015

Time: 8:00am – 4:30pm
8:00am - Registration
8:30am - Start

Location: Italian Cultural Centre
3075 Slocan Street, Vancouver, BC

Name: _____

Company: _____

Address: _____

City: _____ Postal Code: _____

Phone: _____ E-mail: _____

Attendance Fees:

- \$325 + \$16.25 GST = \$341.25 - Members
- \$145 + \$7.25 GST = \$152.25 - Students
- \$365 + \$18.25 GST = \$383.25 - Non-members (includes membership for 2015)

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