



The Institution  
of Structural  
Engineers

# SEABC NEWSLETTER

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ISSUE No.  
007

AUGUST 2009

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- SEABC's Newsletter is edited and managed by Robert Smith ([smithco@axion.net](mailto:smithco@axion.net))
- Submissions to the newsletter are encouraged and all members of the SEABC are asked to actively participate in contributing to our newsletter.
- SEABC editing staff reserve the right to include or exclude submitted material and in some cases edit submitted material to suit overall space requirements. If submittals are not to be edited, please advise editor at submission time.

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## Message from the President

August 2009

By Dave Davey, P.Eng.;  
SEABC Charter President



### CORPORATE MEMBERSHIP IN SEABC

In the New Year, it is the intention of SEABC to set up a Corporate Members Division. This is not a new initiative as the intention has existed since the conception of the Society and provision has been made in our constitution for the

admission of corporate members.

Part of the rationale is derived from the objectives of the now defunct SECBC, which was one of the founding organizations of SEABC. SECBC was set up after the "Save-on-Foods" collapse in response to the call for better engineering standards. Membership of SECBC was corporate only. It sought to establish basic standards and procedures of practice to ensure that structural engineering firms did not cut corners and to ensure that errors would be minimized.

Its achievements included the presentation of numerous design seminars and the production of a design manual for structural engineers. These covered a number of basic design procedures for building styles and building components which were commonly used in the Lower Mainland. It, like SEABC, was a purely volunteer organization, funded by nominal membership dues. Its strength lay in the fact that a cohesive group of engineering firms were able to organize its operations, whereas individual engineers were a fragmented group at that time.

By the end of the 1990s, other safeguards had been introduced and other organizations had been formed to help improve the quality of Structural Engineering. And so, the interest in maintaining SECBC fell away.

One argument against the inclusion of corporate members in SEABC was that SEABC was set up to represent the interests of individual structural engineers whereas SECBC was set up to represent

the interests of structural engineering firms. Although these two sets of interest overlap and coincide in most areas, they may conflict in some circumstances. Accordingly, in order to ensure against a "take-over" of SEABC by corporate interests, our constitution is written to maintain control in the hands of individual elected engineers.

The advantages of setting up a corporate division within SEABC can best be summed up by saying that the inclusion of corporate entities will provide the Society with support, sponsorship and power. In addition, the identification of problems facing individual structural practitioners is often noticed and more clearly defined by corporate management than by the practitioners themselves.

The advantages of corporate membership to structural firms are several.

Firstly, a corporate division will provide a forum for firms to discuss common corporate problems. These could include insurance requirements, scope of practice and standards of practice. As an example, structural firms are still being involved in building envelope problems by insurance companies and legal firms. What can engineering firms do, acting individually, to clarify the separation of structural engineering from building envelope design in the eyes of judges in the law courts? The weight of opinion from our whole Society would significantly help in the resolution of matters of this sort.

Secondly, membership in SEABC would provide a channel for advertising by website listings, Newsletter advertisements and use of the SEABC logo. This would be seen as an endorsement by prospective clients.

Thirdly, and perhaps the greatest benefit that I see, is the ability to list services provided by engineering firms on our website, with access to the public at large. We already receive enquiries for names of firms to supply specific services, from designing wind turbines to balcony enclosures, in specific locations in the Province. All firms could benefit from this service, especially small companies and sole practitioners who otherwise have to rely on the Yellow Pages.

Stay tuned.

## *IStructE News*

The *Institution  
of  
Structural  
Engineers*

By David Harvey, P.Eng., Struct.Eng.;  
IStructE BC Representative



As many of you know, IStructE signed an Agreement with SEABC in 2008, under which, SEABC provides services to local Institution members. However, local members can also provide valuable services to IStructE. Currently, IStructE is looking for a member from BC to review draft technical publications.

The list of publications being worked on at present can be seen at: <http://www.istructe.org/technical/db/270.asp>.

Of these, the publications on building for a sustainable future, car parks, philosophy of structural design and risk in structural engineering have yet to go through the assessment process. If you are an IStructE member (any grade) and interested in reviewing any of these along with future publications, please contact me at [harveyd@ae.ca](mailto:harveyd@ae.ca) or IStructE's Manager Technical Services, John Littler at [John.Littler@istructe.org](mailto:John.Littler@istructe.org)

## *Communications Committee Update*

By David Harvey, P.Eng., Struct.Eng.;  
Chair, SEABC Communications Committee

SEABC continues to add services in response to requests from our members. To do so effectively we need to capture current thinking, and therefore we recently held a membership opinion survey. Read the interesting report on the survey findings in this issue. Your Communications Committee is addressing improvements in member communications on an

ongoing basis, including the website and the newsletter. We routinely include committee reports in our newsletter but are always looking for news items, research reports, brief papers, and new features to publish, so please send us your ideas. We welcome letters to the editor, in particular those expressing concise, balanced viewpoints.

We now offer advertising, both commercial and private in our newsletter and on the website. Note that there is no charge for public service announcements, and advertisements for unemployed structural engineers seeking employment, so we invite you to send in your ads.

Our newsletters are intended to entertain you and keep you informed. We hope you enjoy them, the improved website, and the popular broadcast email service. Thank you for your support of SEABC; please submit your articles and help us to serve our local structural engineers better.

## *Education Committee Update*

By Leslie Mihalik, M.S., P.E., P.Eng.  
Chair, SEABC Education Committee



Since the last report to members, the Education Committee has, in collaboration with the Young Members Group, presented a Professional Registration Information evening seminar. The seminar was focused at young members as well as foreign trained engineers.

Jacques Granadino, P.Eng., Associate Director, Internship & Licensing at APEGBC provided information to members seeking professional registration in the structural discipline.

Our monthly evening seminar series will commence after the summer hiatus. The committee has used the summer break to plan events for the fall and winter.

On September 23, 2009, BCIT's Engineering Department will be hosting a Wine and Cheese reception in collaboration with the SEABC. The purpose of the event is to provide more information on the engineering program at BCIT to members.

On Friday, September 25, 2009, the Education Committee will be presenting a day long seminar on the Structural Use of Glass. This premier event will cover the design and implementation of structural glass elements and will be presented by glass researchers from the Dresden University of Technology and local glass design experts from Vancouver.

The committee plans to increase the frequency of larger seminars organized for members. A half-day seminar will be held less than a month later on October 23, 2009. The topic will be Masonry Design with an emphasis on Seismic Aspects.

The evening seminar series will commence on October 28 with a presentation on the Design of Pedestrian Structures.

The Committee recognizes that there is a desire for members outside the Lower Mainland to get access to our events. We currently plan to, when possible, video record the free events and post it on the SEABC website for members to access. We will work at other means of making activities more accessible to members and will welcome suggestions in this regard.

We look forward to seeing you at our future events. If you are interested in giving a presentation, or getting involved with the Education Committee, please contact us through [www.seabc.ca](http://www.seabc.ca) -- your participation is welcome and indeed vital to the success of SEABC!

## SEABC UBC Jim Warne Scholarship

By Andrew Seeton, SEABC Education Committee



SEABC is pleased to offer annual scholarships to undergraduate students of Civil Engineering at UBC and BCIT. The award recipients are selected by faculty recommendation and are presented to students with demonstrated interest and achievement in structural engineering. The awards are funded through proceeds from the SEABC Certificate in Structural Engineering Program. In our November 2008 Newsletter we reported on BCIT student Cameron Smith who received the BCIT scholarship for the 2008/2009 academic year.

The UBC awards carry the name of former DSE contributor Jim Warne and a value of \$1000 each. Recipients from the 2008/2009 academic year are acknowledged below. SEABC congratulates the winners on their achievements!

Mr. Lee Peltz received the scholarship during his 4th year of undergraduate studies in Civil Engineering at UBC. While at UBC, Lee was involved with the Civil Club and was the student rep for the Civil Engineering Department Curriculum Redevelopment Committee. Lee has now graduated from UBC and is working as a Project Engineer for L&M Engineering Ltd. in Prince George, BC.

Mr. Macarious Kin Fung Hui also received the scholarship during his 4th year at UBC Civil Engineering. Macarious has completed his undergraduate degree and will be commencing the Civil Engineering Master of Applied Science program at UBC in September 2009.



**PHOTOS LEFT TO RIGHT:  
Mr. Lee Peltz & Mr. Macarious Kin Fung Hui**



## Structural Practice Committee Update

By Thor A. Tandy, P. Eng, Struct.Eng.;  
Chair, SEABC Professional Practice Committee



Although summer for the Structural Practice Committee (SPC) was relaxed, at the last committee meeting, the Committee reviewed its make-up and mandate. In discussions with APEGBC it was judged that the term "Professional Practice" was too close to the department within APEGBC. Since this committee is devoted to structural issues, it was considered that the committee be renamed to "Structural Practice Committee". The request to change the name was subsequently accepted by the SEABC Board. The Committee also re-visited the terms of reference and confirmed its place in the space between APEGBC and SEABC. As before, issues that come across the table are handled as efficiently as possible and those that are relevant are sent through to the SEABC Board. About 60% of all received issues tend to be forwarded to the SEABC Board for consideration.

**Structural Checking Guidelines:** These are in the final stages of review and acceptance by APEGBC and are still expected to be issued for reference sometime in the fall.

**APEGBC Code Committee:** Leonard Pianalto P.Eng continues to attend those meetings and report on those code issues that are being dealt with by the committee and that may have an impact on professional practice. One of the on-going issues is:

**CAN/CGSB-12.20-M89:** "Structural Design of Glass for Buildings". This initiative from the industry (in particular, IGMAC) to substitute this standard with ASTM E1300 is still on-going. The SPC has not been

notified about any resolution to date. Contact – Leonard Pianalto P.Eng.

**Consulting Practice Committee:** The Consulting Practice Committee is made up of members from various disciplines of engineering and geosciences. They deal with issues that primarily concern the business end of initiatives that APEGBC is planning to roll out but they also review all the guidelines that APEGBC wants to publish for member readership. Fadi Ghorayeb, P.Eng., Struct.Eng of JKK remains as our structural representative.

**Guideline for Design in Existing Buildings:** Summer has seen a lull in updates but Steven will continue to forward significant updates to SPC. Contact – Thor Tandy, P.Eng., Struct.Eng or Steven Kuan, P.Eng.

**Quality Certification for Steel Buildings:** CSA-A660 prescribes what constitutes certification for manufacturers of steel buildings. EOR's should remain aware of this and be urged to ensure that if they are involved in the assurance of steel buildings or any part thereof, that they check that certification requirements have been satisfied.

**Member Comment:** Members are encouraged to raise any issues that affect their, or the general, practice of structural engineering. Do contact one of the committee members in your area.

### Committee:

Thor Tandy, P.Eng., Struct.Eng.  
(Chair)

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

Marian Podlovsky, P.Eng.

Jim Mutrie, P.Eng.

Mazeed Abdulla, P.Eng.

Andrew Watson, P.Eng., Struct.Eng.

Leonard Pianalto, P.Eng., LEED AP  
(Code Committee Rep)

Peter Mitchell, P.Eng.

(Director APEGBC Professional Practice)

## Technical Committee Update

By Renato Camporese, P.Eng., Struct.Eng.;  
Chair, SEABC Technical Committee



The great summer weather and busy vacation season has made it difficult for committees and task groups to meet or make progress on their activities. No new progress has been reported.

Some municipalities have expressed concerns to APEGBC regarding the current state of the practice regarding temporary structures. There appears to be a lack of consistency, standards and care applied to the engineering of temporary event structures such as tents and bleachers or temporary construction structures such as formwork and falsework. APEGBC has requested assistance from SEABC to establish a task group which will provide a set of guidelines and standards to assist structural engineers in providing an appropriate level of service for these types of structures.

Any engineers interested and/or involved in this work and who would like to participate in this task group are encouraged to contact Renato Camporese at [rcamporese@rjc.ca](mailto:rcamporese@rjc.ca).

## Vancouver Island Branch

August 2009 Update

Thor A. Tandy, P. Eng, Struct.Eng.;  
Chair, SEABC Professional Practice Committee



**Mission:** To provide a focal point for SEABC members on the Island to meet, discuss SEABC issues

and to take benefit in the form of exchange items of technical interest.

**Meetings:** Executive meetings monthly or by vote.

**Location:** The Pantry on Douglas St. Wednesdays 7:30 – 8:30 am.

**Invitation:** Please join us or send us your contact information with comments and/or suggestions.

**Contact:** Thor A. Tandy, P. Eng., Struct.Eng.

### Executive:

Steve Hoel, P.Eng., Struct.Eng. (JSH Engineering Ltd)  
Dave Bevan, P.Eng., C.Eng., MIStructE  
David Anidjar Romain, P.Eng., C.Eng. (SPAR Consultants)  
Thor Tandy, P.Eng., Struct.Eng. (UNISOL Engineering Ltd)  
Doug Kolot, P.Eng., Struct.Eng. (Kolot Engineering Ltd)

## Young Members Group

By Kevin Riederer, MSc, P.Eng., LEED AP



Last May, the SEABC Young Members Group held our first event, a “Professional Registration Information” seminar. The aim of the seminar was to help EIT’s and internationally trained Engineers better understand the registration process at APEGBC and the seminar was tailored to people working towards a P.Eng in the Structural discipline. Jacques Granadino, P.Eng of APEGBC gave the presentation which had helpful hints and tips for all aspects of professional registration. The event was well attended and we have received positive feedback from several members. Many thanks to the members of the Education Committee who helped make the event a success. Given the popularity of this event and the interest in this topic, we plan to have a similar event again in the future.

Coming up in the next few months we have several other events planned. On August 13th, we will have a tour of the Con-Force Precast Plant in Richmond. Con-Force designs, manufactures and installs precast and pre-stressed concrete components

for a variety of structures and a tour of their facility will provide a great professional development event. Also, one of the objectives of the YMG is to be active in our community and to facilitate outreach opportunities for our members. On those lines, we have arranged a group volunteer day with "Habitat for Humanity" taking place on October 3rd. We are also early in the planning stage for a number of other events for later this year, however, we still welcome your suggestions for other possible initiatives that the YMG could undertake.

In an effort to improve our communication with our members, the YMG is planning to launch a Young Members Group page on the SEABC website. There, you will be able to find information on both recent and upcoming YMG events as well as an opportunity to sign up for the YMG mailing list to receive emails targeted specifically for young members. Be sure to look for it online and as always please give us your feedback. In the meantime, you are encouraged to contact us at [ymg@seabc.ca](mailto:ymg@seabc.ca) with any thoughts, comments or suggestions you may have.

## Sustainability Design Education

By Mark Porter, P.Eng., LEED AP



This last week CaGBC have announced that they will be changing the exams to become LEED® Accredited Professionals (LEED APs) as of January 1st 2010.

More than 6,000 people have become LEED® Accredited Professionals (LEED APs) in Canada since 2001. LEED APs work in every sector of the building industry including structural engineering, and demonstrate a thorough understanding of green building practices and principles and familiarity with LEED requirements, resources, and processes.

In conjunction with changes that have been introduced in the US by the USGBC and the Green Building Certificate Institute. ([www.gbci.org](http://www.gbci.org)) the

CaGBC is updating the exams and professional certification process.

The system in the US now encourages green building professionals to maintain and advance their knowledge and expertise.

The goals of the system are:

- **Staying current:** Technology, best practices, and the LEED rating systems evolve rapidly. **Differentiation:** A credentialing system that provides for multiple levels of accomplishment and expertise is needed to distinguish among green building professionals with basic, advanced, and extraordinary levels of knowledge.
- **Specialization:** Many green building professionals develop expertise in specific sub-sectors of the industry.

To achieve these goals three fundamental changes to the LEED credentialing program are being phased in.

Three levels of excellence that distinguish practitioners with basic, advanced, and extraordinary levels of knowledge.

Eligibility requirements for all levels of the exam system.

Credentialing maintenance requirements that ensure that LEED professionals have the latest knowledge and understanding of green building practices.

With all this in mind, please note the following important LEED Canada exam deadlines.

**October 23rd, 2009.** This will be the last date to register your intention to write the LEED Canada NC exam or the LEED Canada CI exam. To register you must visit the CaGBC website and submit your information to receive an eligibility number. The eligibility number is used to schedule your exam.

**December 31st, 2009.** This is the last date in which you can write either the LEED Canada NC exam or the LEED Canada CI exam. On January 1st, 2010 these exams will no longer be available in Canada.

The CaGBC would like to encourage anyone interested in writing these exams to register and schedule their exams as soon as possible due to a

high volume of exam takers expected during this period.

In 2010 the GBCI will be introducing the new exams to Canada.

#### Reference:

<http://www.gbc.org/DisplayPage.aspx?CMSPageID=28>

[http://www.cagbc.org/leed\\_ap/become.htm](http://www.cagbc.org/leed_ap/become.htm)

## On the Web

By Stephen Pienaar, P.Eng;  
SEABC Webmaster



The past few months leading into summer has been relatively quiet as far as new content the SEABC website goes. A lot is happening behind the scenes though:

- Online registrations are currently accepted for the September Term of the Certificate in Structural Engineering (CSE) as well as for "Structural Use of Glass", a seminar organized by SEABC.
- Email announcements of industry seminars and events are reaching members once every week or two. Feedback from members in this regard has been very positive.
- A Young Members section on the website is currently in the making. Our young members are meeting regularly and gearing up for regular educational excursions.
- A searchable members directory is still being planned for this year. The Corporate Members Committee is working out the finer details of corporate membership.

#### IStructE website access

A reminder that SEABC members qualify to access the members area of the IStructE website. This includes access to The Structural Engineer Online and a wealth of other information. For more information and obtain an online account, write to [webmaster@seabc.ca](mailto:webmaster@seabc.ca)

#### Website feedback

We welcome your feedback and suggestions for the SEABC website. Please send your submissions to [webmaster@seabc.ca](mailto:webmaster@seabc.ca). If you have not done so yet, please bookmark [www.seabc.ca](http://www.seabc.ca) and check in regularly for upcoming events, seminars and courses.

## Members Survey

By David Harvey, P.Eng., Struct.Eng.;  
Chair, SEABC Communications Committee

We received some 155 responses to our first SEABC membership survey questionnaire - an impressive response, many thanks to those who participated. In the process we learned some interesting things about how well we are doing at serving our members and where we can improve. The comments you provided are especially useful and include some really good suggestions.

All the voting patterns we saw follow a bell-curve pattern, skewed in a positive direction. The following are the "approval rating" percentages above average on the strong side for the various groups:

- Board of Directors: 77%
- Technical Groups: 77%
- Education Committee: 82%
- Professional Practice Committee: 71%
- Communications Committee: 76%

The percentages above average for the communication tools were as follows:

- Newsletters - Informative / Interesting: 77%
- Broadcast Email Service: 79%
- SEABC Website: 73%

The following are percentages in favour:

- Of establishing a monitored technical forum: 82%
- Of carrying website and newsletter advertisements: 80%



Although only 14% of respondents attended the SEABC AGM, 71% of those rated the event as above average value.

39% of respondents were interested in contributing to SEABC activities. Most popular were the technical committees, sub-committees, and task groups at about 36%. Next most popular were the Professional Practice Committee at 20%, and newsletter contributions at 18%. Surprisingly, support for establishing a regional group was very low at only 4%.

The most valuable SEABC services reported were in the area of continuing education, especially seminars and courses, but also the CSE program and technical presentations. Close behind was the popular newsletter, and there was good support for email communication.

Missing services that were proposed included an awards program; distance learning; advocacy; a four-storey walk-up design guide; an on-line technical resources library; an on-line forum; information on bridges; a book store; sole-practitioner support; technical information; design aids/tips; and regional training. Some of these services are currently under consideration. Most respondents thought that the present level of services is about right.

Proposed topics for newsletter contributions included practical design solutions to code requirements; performance-based design; high-rise buildings; design for permafrost, durability, and cladding attachment; field review practice; seismic upgrading; new technologies; the global economy; the value of record management; drafting; a number of technical subjects; local project descriptions; training for technologists; young member topics; and unique structural designs from the past. Needless to say, articles on these and other topics would be most welcome!

Website improvement suggestions included enhancing links to external information, to navigation, information on Struct.Eng. training; information on current best practices; and adding an on-line library.

The option of a monitored technical forum received cautious support with many respondents recognizing its usefulness, but noting that this would only succeed if SEABC members used it and the necessary monitoring took place. There was some concern that the content may be used in future lawsuits. One respondent thought this would be a good forum for debating Building Code interpretations, variances and revisions.

There were quite a few good suggestions for seminar topics. Always popular are seismic engineering and design guides for specific materials. Other suggestions included overhead cranes and machine supports; wind loads on cladding and attachments; fatigue detailing; base isolation; shear walls; Struct.Eng. exam preparation; and design tips.

Finally, the question regarding the focus of future efforts by SEABC drew several suggestions, including education, to resist outside interference with self-governance, to support APEGBC efforts; and to webcast our professional development events. Other suggestions included raising the profile of structural engineers and coordinating efforts with other organizations - issues which contributed to the creation of SEABC. There were also calls for enhanced SEABC services and expansion into other regions (e.g. Alberta). There was some pressure to fight fee-cutting and some encouragement to improve training of younger members, however, many respondents simply encouraged SEABC to keep working and stay the course!

Overall it appears that our members are pretty happy with what SEABC is doing, but there are some good ideas to think about if the opportunity to act upon them arises. In the meantime we would welcome articles for the newsletter and any interested volunteers to join our various committees' technical groups.

## *Development of Technical Guidelines*

**For the Seismic Assessment and Retrofit of BC Schools  
By Thor A. Tandy, P. Eng, Struct.Eng.;  
Chair, SEABC Professional Practice Committee**

The program is progressing as scheduled and a workshop to cover the developments and results of the intensive research, testing and an in-depth presentation of the Technical Guidelines (Version 3) for use by Engineers is expected to be convened in early spring 2010.

Some of the most recent results of analysis suggest that the originally assessed priorities for retrofit can be revised with respect to the comparison of "flexible" with "rigid" structures. Subject to the assembly of a particular structure, one conclusion is that one and two storied timber structures that have a reasonable amount of walls can be considered to be "low priority" when compared with rigid structures such as URM, clay tile etc.

In order to encourage and develop innovative design and construction, prototype sample retrofits and the associated laboratory testing have been successfully carried out at UBC. One result of the testing and analysis etc is the possibility of reducing the extent of retrofit required and the subsequent reduction in retrofit cost.

As projects progress there are instances of technical questions that are submitted for review by the Peer Review Committee. In turn, the PRC then instructs selected members of the Technical Review Board to consider and develop answers/responses to the posed questions.

## *From the E-List*

**By Thor A. Tandy, P. Eng, Struct.Eng.;  
Chair, SEABC Professional Practice Committee**

**STRUCTURE February 2001  
(Posted by Stan R. Caldwell, P.E., SECB)**

Structural engineering has been around since the first cave shortage, yet there is a growing perception that this noble profession might now be dying. What fuels this troublesome notion? Perhaps it starts in high school, where many of the brightest students are encouraged not to pursue the "long, hard road" of engineering. Why labor over calculus and matrix math, when those hours could be more productively spent learning "high tech" skills like HTML and JAVA? Those who resist this logic are often advised to pursue fields of engineering such as electrical and chemical, which are perceived to offer high initial compensation and early exposure to emerging technology without the burden of obtaining a master's degree.

The perception does not improve in college. Structural engineering is perhaps the only profession that is not supported by any dedicated departments or degree programs at major universities. There is at least one large university where the dean of engineering believes that structural engineering is obsolete. He views structural engineers as little more than math technicians who meticulously follow precise recipes to produce adequate designs. When eminent professors of concrete and steel design have retired, he has replaced them with experts in newer "structural" areas like asphalt and reinforced polymers.

In the workplace, many structural engineers find themselves positioned pretty low on the project "food chain." MEP engineers typically receive higher fees in return for somewhat less effort and far less liability. Architects and civil engineers are almost always the prime professionals on building and bridge projects, respectively. They frequently select structural engineers based on price, and intentionally fail to involve structural engineers on some of their projects. After all, only a handful of states enforce any type of "S.E." license. Meanwhile, structural design codes and regulations have evolved into a self-perpetuating industry, with each revision becoming more

prescriptive and allowing less opportunity for structural engineers to exercise their professional judgment.

Finally, there is the general public. They really have no clue who we are or what we do. Based on media reports, isn't it obvious that buildings are designed by architects and bridges are designed by state highway engineers? I can think of only one movie featuring a structural engineer, and he turned out to be a terrorist. The only instance that I know of where structural engineering has been referenced on commercial television is in a humorous advertisement for a motel chain. Compare this with virtually any other profession. The problem is not that we suffer from a poor public image, but that we have no image whatsoever.

Enough! The reality is that structural engineering is a wonderful profession with a bright future. To quote Herbert Hoover: "Ours is a great profession. There is the fascination of watching a figment of the imagination emerge through the aid of science to a plan on paper. Then it moves to realization in stone or metal." What greater satisfaction can there be than observing the successful completion of a significant building or bridge that you have nurtured from conception? There is also considerable satisfaction derived from the service that we render to society. As Ron Hamburger recently wrote: "Most structural engineers, over the course of their careers, are responsible for protecting more lives than most medical doctors."

It is a myth that structural engineering is a lousy business and structural engineers are poorly paid. Structural engineers are not prohibited from acting as the prime professional on any project, and many are now seizing that opportunity. While fee pressure will never be eliminated, it can be effectively remedied by emphasizing value and by striving for better clients and projects. Structural engineers normally are compensated at least as well as architects and civil engineers with comparable experience, and some earn more than \$200,000.

We provide structural engineering services by exercising considerable professional judgment, even though we don't always recognize it as such. We are continually challenged with the ever-increasing size and complexity of our structures, as well as the advanced materials and techniques used in their construction. Computers have given us incredible power to test multiple options and visualize the results

without the number crunching drudgery of the past. In fact, with GUI systems now in common use, it could be argued that structural engineering is actually fun!

A final concern is that the future of structural engineering is not guaranteed. It is the obligation of all structural engineers to improve the profession and preserve it for the generations that follow. Reality must overcome perception, and not vice versa. We need to work individually and collectively to dispel the myths that are prevalent among students and educators, prospects and clients, regulatory organizations, and the general public. This is the daunting mission of the Advocacy Committee of NCSEA. It will require an army of volunteer speakers and writers. Are you willing to help?

#### *Buckling Capacities*

(Posted by Theo Kerkhoff, P.Eng., MStructE)

The latest version of Hilti Profis DF V2 software, gives substantially increased buckling capacities (250%). If a panel buckling factor of 0.75 is used, it seems like buckling no longer governs.

#### *"Standard of Practice" for wood-frame earthquake retrofit tie-downs*

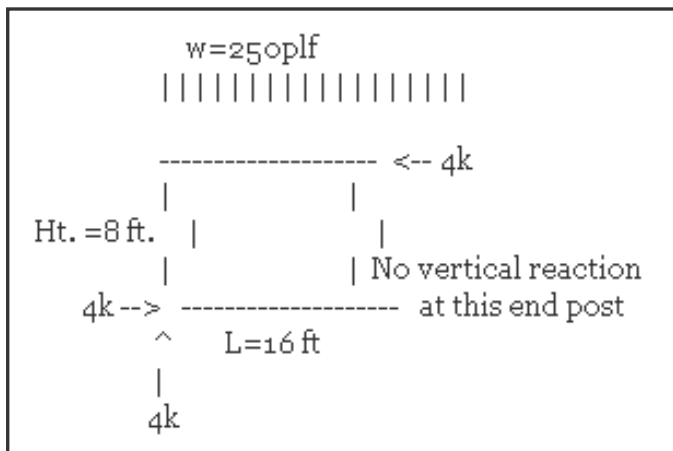
(posted by Thor Matteson, SE)

A general consensus on when to start worrying about uplift forces in earthquake retrofits is, "It depends." This is the best answer possible, indicating that we rely on engineering judgment rather than some arbitrary force level.

Consider this question: If tie-downs are used, what is the effect of slack in the tie-down system? Having watched about 1/2-inch of slack develop in my own home addition project, where the only components that are not engineered lumber are three thicknesses of 2x plates, I will be even more demanding about shrinkage take-up devices in the future.

But a bigger question came up, one that I have not seen explored to my satisfaction yet. Engineers often use the self-weight of the building to resist overturning in shear walls. As an example, consider a shear wall that just happens to have exactly the amount of dead load on it that is required to resist the overturning.

Let's say 4k of seismic or wind force is acting from Right to Left at the top of an 8-ft tall, 16-ft long wall. We have a 4k reaction at the mudsill acting from Left to Right. To balance the overturning, we have 250plf dead load along the wall. This gives us an upward reaction of 4k at the left shear wall end-post, and zero reaction at the right end post (because that's how we originally defined the conditions....)



If you move the force vectors around on the above diagram, you get the same shear force diagram as you do for a cantilevered beam 16 ft. long, supported at the left end, carrying a uniform load of 250plf. The shear distribution in a cantilevered beam is NOT uniform.... For the shear wall illustrated above, we have a shear of 500 plf at the left end and 0 plf at the right. When the earthquake forces reverse, the shear diagram is reversed. This results in "shear slosh" (the shear force diagrams look like water sloshing back and forth in a rectangular tank....) where the ONLY place the shear is 250 plf is at the middle of the wall.

For a shear wall with a loose tie-down system, something like the above will also occur; this could certainly lead to reduced capacity of the shear wall. Of course this is all "in theory," ignoring all kinds of things that occur in reality. But what IS occurring in reality? And what has the biggest effect(s)? Any masters students out there who need a good research project testing shear walls with loose tie-downs? (or NO tie-downs?)

Long ago I heard of a code provision (in Great Britain?) that allowed INCREASING the allowable shear in a wood panel shear wall if it had a uniform

load on it. This seems to contradict the above discussion.

## Engineers to the Rescue!

By Shane Cook, P.Eng.  
Associated Engineering



At about 11 a.m. on June 24, 2009, a garbage truck with its lifting arms elevated, slammed into the Moody Street Overpass, seriously damaging the superstructure. Within the hour the structure had been closed to traffic and we were assessing the structure on behalf of its owner, the City of Port Moody. The truck had damaged a large portion of the west fascia girder above Murray Street, near the north end of the ten-span structure. The overpass provides an important commuter corridor providing a connection between the areas north of the CP Rail mainline with the remainder of the City, while businesses to the west use Murray Street for access.

Closure of the overpass effectively cut off access to the west, and so the immediate priority was to secure the structure above Murray Street for controlled traffic use beneath the span. This required removal of fractured superstructure concrete that was potentially hazardous, along with a rapid assessment of the safety of the damaged superstructure. Closure of the overpass had forced a major detour onto many commuters, and so the City was keen to reopen the structure as soon as possible. Our assessment was that the required structural repairs would take some time, but that following the immediate demolition phase, a one-lane detour plan across the east side of the deck was feasible with suitable traffic control.

Although serious damage was limited to only one girder, its replacement was problematic. Dating from the 1970s, the 20 m long precast girder was an AASHTO-section, a type no longer produced in BC. Furthermore, the section was the central portion of three semi-continuous spans and was acting compositely with the concrete bridge deck. Replacement of the damaged girder would therefore





**Accidental damage of the fascia girder**

have required a considerable amount of deck to be removed which would have triggered an investigation into the safety of the partially-demolished bridge under traffic.

When we examined the damaged girder we determined that the original prestressing strands were mostly undamaged. However, with most of the concrete section fractured, we suspected that much of the prestressing force had been lost and would be very difficult to restore. Our rapid analysis suggested that if we repaired the girder it could safely carry its own weight without the intended prestressing force, but we would need to add additional capacity for the superimposed loads.

Very quickly we devised a novel solution. We sized a section of steel plate girder that could be rapidly procured and inserted alongside the fascia girder, but was slightly shorter in height to facilitate installation beneath the deck. The steel girder needed

to project through the pier diaphragms into the adjacent spans to replicate the structurally continuous behaviour. To permit installation, the girder was designed in two sections with a bolted field-splice. Openings were sawn through the concrete diaphragms and the girder sections were shoehorned into place using fork-lift trucks, and bolted together. Bearing pads were placed at the pier caps and grouted.

While the girder was being fabricated, the fascia girder was being repaired. Removal of the damaged concrete almost to the end of the girder did not actually result in strand pull-out, and so the straight strands were in the correct position and self-supporting. Additional reinforcing bars were selectively added to replace damaged stirrups and assist with crack control of the replacement concrete (which was non-prestressed). Self-compacting concrete was used to fill the custom-built girder formwork.



*Installing the steel girder with fork-lifts*

Following installation the steel girder was shimmed against the deck and preloaded by suspending weights near mid-span, followed by grouting of the gap between steel girder and bridge deck. The preloading was to



*Completed installation of the steel girder*

ensure that the steel girder picked up its assigned portion of superstructure dead load thereby relieving the fascia girder. After the steel girder was grouted the pier diaphragms were reinstated. While the fascia girder will continue to undergo live load service deformations, any contribution to resisting imposed loading is unnecessary.

The critical construction work was carried out by West Shore Constructors, who coordinated a number of sub-contractors and performed some high-quality repairs. Thanks to fast and effective work all round, the Moody Street Overpass was opened to full two-way traffic operation on July 31 at 7 a.m. While the project team are well aware that a steel girder is strengthening the concrete structure, users will neither notice it nor stop to admire our handiwork. On opening day the City of Port Moody and harried commuters all breathed a collective sigh of relief; however, the engineering team was just delighted to see everything go to plan. After only a few weeks of inconvenience, the community can now enjoy a fully restored overpass with its original appearance intact.

## *Wood-Frame Building Shaken in Japan*

By Steven Kuan, Ph.D., P.Eng. and Chun Ni, P.Eng.  
Photos by Steven Kuan



On July 14, 2009, at 3:13pm local time, a 2500-year earthquake hit Miki, 445 km west of Tokyo, in Japan. Strangely, only one building – a 6-storey apartment building built entirely out of wood -- was shaken by this strong earthquake.

This was not an unexpected, rare event, but rather it was the final shake-table test of the final experimental phase of the NEESWood research project. Three SEABC members --- Steven Kuan, P.Eng. of BC Building and Safety Policy Branch and Chun Ni, P.Eng. and Marjan Popovski, P.Eng. of FPInnovations Forintek Division --- observed the test in person. They were among the more than 500 people who came from all over Japan, China, the U.S. and Canada to attend this unique and exciting event. This test is of interest to structural engineers and authorities in British Columbia, given the new provincial regulation that allows wood-frame construction to go up to six storeys

NEESWood is a five-university project funded by a four-year, \$1.4 million grant from the National Science Foundation. It involves analysis, testing, and societal-risk assessment with the intent of safely increasing the height of light-frame wood buildings to six stories in regions of moderate to high seismicity. This project is led by Professor John van de Lindt at the Colorado State University. Included in the



experimental part of the project are tests of a full-scale, six-storey, wood-frame building on the largest shake table in the world at E-Defense in Miki, Japan.

The test building, measuring 18m by 12m (60 ft by 40 ft) in plan, was of typical platform construction with LVL floor joists and walls made up of dimensional-lumber studs and plates and oriented-strand-board sheathing. It had a wood elevator core and two stair shafts. Conventional shear walls and mid-ply walls were used to resist the lateral loads from the earthquake. Developed at Forintek and UBC, mid-ply walls can take twice the amount of lateral load as regular walls. Steel rods with shrinkage-compensating devices were installed at each end of the conventional shear walls and mid-ply walls. The wood came from B.C., with the bottom three storeys being Douglas fir and the top three spruce-pine-fir. Almost all of the wall and ceiling surfaces in the interior were covered with gypsum boards, but the entire exterior of the building was left unclad with the OSB exposed. The test building was constructed on site over a period of five months.

Prior to July 14, the building was subjected to 60% and 120% of the original ground motion recorded at Canoga Park during the Northridge Earthquake in California in 1994. They represent shaking equivalent to an earthquake with a return period of 72 years and 475 years, respectively. On July 14, the building was subjected to 180% of the Canoga Park record. This represents an earthquake with a return period of 2500 years, which is the Maximum Credible Earthquake given in the building code for design in California.

The building performed extremely well in all the tests. Damage was observed in the gypsum sheathing mainly, particularly at corners of doors and windows. Lateral deflections were observed to be reasonable. Analysis of the test data, recorded by hundreds of sensors all over the building, will provide a better understanding of the actual responses of the building in the tests. The analysis will be carried out over the next few months.

Video of the July 14 test and information on the NEESWood project can be found on <http://www.nsf.gov/neeswood>.

Ironically, the building survived the earthquake but would not survive the human demolition which started the next day. The building was slated to be moved off the table and out of the laboratory within one week after the test.

*Full-scale, 6-storey wood-frame test building on a one-storey steel braced frame on the shake table*



*Mid-ply wall in interior*



*45 degree cracks at corners of window opening*



## Ask Dr. Sylvie

To access Dr Sylvie's information, and to read the current or earlier issues of *Advantage Steel*, click on the following link:

<http://www.cisc-icca.ca/content/publications/publications.aspx>

## Advertising

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50-word "Available for Employment" ads will be free.

## Mark Your Calendars



### '09 SEA NW Conference

**Date:** September 24 – 26, 2009

**Hosted by:** The SEAW Southwest Chapter of the Structural Engineers Association

**Register Now:** [http://www.seaw.org/events\\_detail.cfm?pk\\_event=66](http://www.seaw.org/events_detail.cfm?pk_event=66)

### Educational Events

#### From your Education Committee

- Sept 15: SEABC CSE Program fall term commences: 4 courses on offer.
- Sept 23: SEABC Wine & Cheese reception at BCIT
- Sept 24, 25: SEA NW Conference (Tacoma) incl. technical presentation Sep 25 by Schaun Valdovinos (HMM)
- Sept 25: SEABC Full-Day Seminar at Sutton Place Hotel: Structural Use of Glass
  
- Oct 5: SEABC Evening Seminar at UBC Robson Square: Norm Abrahamson (Event To Be Confirmed)
- Oct 15-17: APEGBC Annual Meeting (Victoria) incl. Structural Stream Oct 16 coordinated by SEABC
- Oct 23: SEABC Half-Day Seminar at Sutton Place Hotel: Seismic Design of Masonry Structures
- Oct 28: SEABC Evening Seminar at BC Hydro: Design of Pedestrian Bridges
- Nov 18: SEABC Dinner Seminar at Sutton Place Hotel: 6-Storey Wood-frame Guidelines by Jim Mutrie, Grant Newfield, Thomas Leung

### Soil-Structure Interaction Seminar

**Date:** April 23 & 24, 2010 (tentative)

**Venue:** University of British Columbia

The seminar will include presentations related to this soil-structure interaction, as well as a roundtable discussion of how Structural and Geotechnical engineers should deal with this issue.

### 2009 ATC & SEI Conference

*Improving the Seismic Performance of Existing Buildings and Other Structures*

**Date:** December 9-11, 2009 in San Francisco, CA

**Register Now:** [http://www.atcouncil.org/index.php?option=com\\_registrationpro&Itemid=56&func=details&did=7](http://www.atcouncil.org/index.php?option=com_registrationpro&Itemid=56&func=details&did=7)



## SEABC One-Day Seminar: Structural Use of Glass

**Date:** September 25, 2009  
**Time:** 8:30am - 5:30pm  
**Venue:** Sutton Place Hotel,  
Downtown Vancouver



### Description:

This seminar will provide a broad understanding of glass design and engineering. The course presents a wide spectrum of information needed to design, detail, and implement structural glass elements and facade components. Discussion of the material properties and construction principles of glass elements will be given. In addition, detailed structural design examples will be presented, covering fundamental first principles through advanced state-of-the-art techniques, with discussion of applicable codes and standards. The course will be presented by glass researchers from the Dresden University of Technology and local glass design experts from Vancouver.

**Registration:** Watch your email for a registration invitation; or see [www.seabc.ca](http://www.seabc.ca)

### Sponsorship opportunity:

If your organization is interested in sponsoring this event, please contact [seminars@seabc.ca](mailto:seminars@seabc.ca)

### Course Schedule:

09:00 am – 10:30 am	Glass as a Building Material
10:30 am – 10:45 am	Coffee Break
10:45 am – 12:15 pm	Construction Principles
12:15 pm – 01:30 pm	Lunch Break
01:30 pm – 03:15 pm	Structural Design Principle I
03:15 pm – 03:30 pm	Coffee Break
03:30 pm – 05:00 pm	Structural Design Principle II

