



CONNECTIONS

May 2013 Volume 13 Issue 9

Newsletter of the
Structural Engineers
Association of Oregon

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MEMORIAL DAY

Upcoming SEAO Meetings and Events:

Thursday, May 16, 2013: SEAO YMF Happy Hour

Location: On Deck Sports Bar, 910 NW 14th Avenue, Portland, OR
Time: 5:30 pm to 7:30 pm

Thursday, May 23, 2013: American Wood Council—Professional Wood Education Seminar

Location: Embassy Suites Hotel and Conference Center, 9000 SW Washington Square Road, Tigard
Time: 7:30 am registration opens, 8:30 am—4:45 pm seminar (lunch included)
PDHs Available: 6.
See pages 15 and 16 for more information on speakers and topics being covered..

Wednesday, May 29, 2013: SEAO Dinner Meeting

Speakers: Trent Nagele, PE, SE Principal, VLMK Consulting Engineers & Ed Quesenberry, PE, SE, Principal, Equilibrium Engineers, LLC
Topic: Oregon Seismic Resiliency Plan
Location: Governor Hotel, Second Floor, Portland, Oregon
Time: 5:30 pm check-in & social, 6:15 pm dinner, 6:30 program
Sponsored by: Contech Services, Inc.
See Page 2 for more information.

Friday, June 7, 2013: FRED: Seismic Resiliency: Sustaining our Schools for Tomorrow

Panel Moderator: Jay Raskin, AIA
Speakers: See page 15 for a complete list of speakers.
Location: AIA Portland, 403 NW 11th, Portland, Oregon Time: 9 am to 4:30 pm
Breakfast and lunch will be provided.
Space is limited. Register by June 5, 2013. See page 14 for registration information and costs.



Wednesday, June 26, 2013: SEAO Dinner Meeting

Speaker: Ed Wortman, Semi-Retired, Multnomah County Bridge Section
Topic: Sellwood Bridge Move
Location: Governor Hotel, Second Floor, Portland, Oregon
Time: 5:30 pm check-in & social, 6:15 pm dinner, 6:30 pm program
Sponsored by: Redbuilt & Basalite

Wednesday, July 31, 2013: SEAO/OACI Annual Golf Tournament

Location: Stone Creek Golf Club, Oregon City, Oregon
Time: 1:30 pm shotgun start, 6:00 pm social
See page 11 for more information and flyers on pages 12 and 13 for sponsorship and sign up info.

CONNECTIONS is a monthly publication of the Structural Engineers Association of Oregon, published to disseminate current news to our membership and others involved in the profession of structural engineering. The opinions expressed reflect those of the author and, except where noted, do not represent a position of SEAO.

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MAY DINNER MEETING ANNOUNCEMENT WEDNESDAY, MAY 29, 2013

Sponsored by: Contech Services, Inc.

Topic: OREGON SEISMIC RESILIENCY PLAN. Following the Tohoku earthquake and tsunami in 2011, the Oregon House of Representatives introduced House Resolution 3 which called for the development of a 50-year plan to prepare Oregon's critical buildings and infrastructure for the impacts of a magnitude 9.0 Cascadia Subduction Zone earthquake. The Oregon Seismic Safety Policy Advisory Commission (OSSPAC) was tasked with creating the resiliency plan, and assembled a team comprised of over 150 volunteers from various professional organizations, state and county agencies, and different business sectors. Volunteers were divided into 8 Task Groups, each one focusing on specific infrastructure components including critical buildings, transportation, energy, and communication sectors. The effort took just over one year to complete, and resulted in a comprehensive plan that maps a path of policy and investment priorities for the next 50 years. The Oregon Resiliency Plan was submitted to the Oregon Legislature in March of 2013. SEAO played an instrumental role in the development of the Oregon Resiliency Plan. SEAO Past Presidents Trent Nagele and Ed Quesenberry volunteered to act as co-chairs of the Critical Buildings Task Group, and assembled a committee comprised of 15 SEAO members and 9 professionals from other industry, academic, and government backgrounds. The Critical Buildings Task Group was responsible for reviewing the status of buildings in critical sectors, considering how they might be affected by a Cascadia Subduction Zone event, and making policy recommendations for achieving critical building resilience. The presentation will cover the highlights of the Oregon Resiliency Plan with specific emphasis on the findings and recommendations of the Critical Buildings Task Group and the challenges facing Structural Engineers as we tackle this significant issue.

Speakers

Ed Quesenberry is owner and Principal at Equilibrium Engineers LLC in Lake Oswego, and serves as Past President of SEAO on the current Board of Directors. Ed has practiced structural engineering for over 24 years and has worked on projects in high seismic regions including California and the Pacific Northwest his entire career.



Trent Nagele is a Principal Structural Engineer with VLMK Consulting Engineers. A native of Portland, Trent received his Master's degree from Washington State University in 1995, moved back to the Portland area and has practiced in the Northwest ever since. His experience spans a wide range of building and construction types, and he is an active member of several industry organizations and committees.

Location and Times:

Governor Hotel, 2nd Floor, 614 SW 11th Avenue, Portland, OR

The MAX Light Rail System stops just a block away from the hotel (The Galleria stop) and Portland's Streetcar stops right outside the hotel. Smart Park is located at SW 10th and Yamhill about two blocks from the hotel.

Check-in & Social: 5:30 pm; **Dinner:** 6:15 pm; **Program:** 6:30 pm (Videocast begins at 6:15 pm)

Cost: Dinner and Program

\$32 — Prepaid Members
\$40 — Prepaid Non-Members
\$18 — Students

Cost: Videocast Locations

\$20 — Members
\$33 — Non-Members
\$13 — Students

Videocast Venue: Corvallis: CH2M Hill, 1100 NE Circle Blvd, Suite 300, (541)752-4271

Reservations:

Pre-registration is required. **You can register and pay online at www.seao.org before 11 am, Friday, May 24.** You can also register with Jane Ellsworth via phone at (503)753-3075 or via Email: jane@seao.org. Note: No-shows will be billed.

PDH Credit: One PDH has been recommended for this program.

Meeting Proudly Sponsored by:

See page 7 for more information about this month's sponsor.



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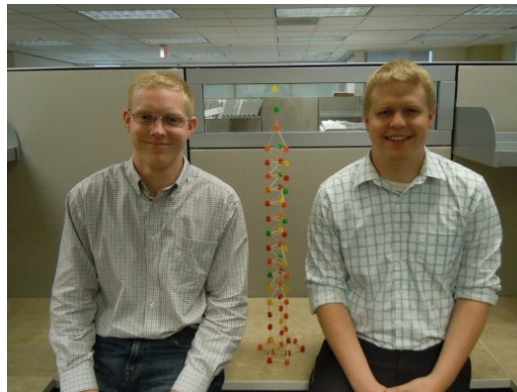
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MEMBERS OF THE MONTH

By: Jennifer Eggers

The Board of Directors of the Structural Engineers Association of Oregon takes great pleasure in honoring and recognizing **Seth Thomas** and **Phil Davis** for all of their work in service of SEAO and the engineering community with the Member of the Month award for the month of May.

Seth and Phil co-chair SEAO's Young Members Forum (YMF) and have both done a tremendous amount of work since they accepted this new leadership role just six short months ago. We appreciate their enthusiasm and dedication to SEAO and the YMF.



Seth and Phil lead the YMF lunch meetings that occur every other month. These meetings focus on YMF business and promoting involvement of YMF members in SEAO.

Some other recent activities that Seth and Phil have organized include student presentations, industry tours (like the most recent galvanizing plant tour), happy hours, and more. Most notably, members of the YMF have been traveling around to local schools giving presentations that educate students (5th grade through high school) about what we do as structural engineers. The presentation is followed by a hands-on activity where student teams compete to see which team can build the tallest gumdrop and toothpick tower. This activity really engages the students, and the YMF presenters have gotten great feedback from teachers as well. Seth has been spearheading this large effort and has put in countless hours coordinating

with both the teachers and YMF members. Both Seth and Phil have done their fair share of student presentations and have also been successful in encouraging other YMF members to make presentations as well. These teams have now reached out to over 1,100 students in Oregon this academic year. SEAO congratulates Seth, Phil and their YMF teams for this amazing effort!

The YMF also organizes a happy hour every month which has been very well attended. Typically there are between 15 and 20 attendees at each happy hour, with the attendance growing each time. Phil has been leading this effort and has been extremely successful. This happy hour has given young engineers a time to socialize outside of the office and develop key relationships that will last through their career.

Seth and Phil are both Designers at Degenkolb Engineers in Portland.

Seth was born and raised in Vancouver, WA where he lives today. Seth received a Bachelor's degree from the University of Washington in 2009 and a Master's degree from Oregon State University in 2010. He is a licensed Professional Engineer in California. Outside the office, Seth enjoys working on projects around his new house and spending time outdoors and with his family.

Phil was born and raised in Bend, OR and now lives in Portland. Phil received a Bachelor's degree from Oregon State University in 2010 and a Master's degree from the University of Washington in 2011. Outside the office, Phil enjoys spending time with his wife, new puppy, and friends.

The SEAO Board would like to thank Seth and Phil for their dedicated service to our organization and the engineering community. CONGRATULATIONS Seth and Phil for a well-deserved honor!

OBITUARY—SUE MAE FREY

NOVEMBER 23, 1953—MAY 12, 2013

The SEAO community has lost a remarkable member. Sue Frey passed away early on Mother's Day ending her ten-year battle with cancer. She was SEAO president from 1997-1998 and served as SEAO's delegate to NCSEA and the Western States Council. In October 2008, SEAO presented her with its first Lifetime Achievement Award. Sue's energy and love of the profession left impressions on everyone she encountered. She will be greatly missed.



Susan (Sue) Mae Frey passed away peacefully in her sleep on Sunday, May 12, 2013, at her home in Corvallis, Oregon after a decade-long battle with cancer.

Sue was born on November 23, 1953, in Gary, Indiana, the daughter of Richard John Frey and Elizabeth Jean Rose Frey, and she grew up in Hobart, Indiana. She grew up helping her parents run their family business, Frey's Dairy Queen, which three of her brothers still run today. She grew up playing softball, playing the drums, reading mystery

novels, and participating in 4H, where she developed a love for baking, sewing, and cross-stitch. Her mother taught her to draw and paint, and she then taught her own daughter everything she knew about arts and crafts.

Sue graduated as Valedictorian of Hobart Senior High School in 1972. When she discovered in college that she had an aptitude for engineering, and especially after learning that, at the time, engineering was something that women didn't do, she decided that was what she would pursue. She graduated from Purdue University in 1977 with a Master's Degree in Civil Engineering.

Later that year, she was hired as a structural engineer at CH2M HILL in Corvallis, Oregon, where she spent her entire career designing everything from concrete water storage reservoirs and wastewater treatment plants to performing arts centers. She was one of the first women engineers at the company. She absolutely loved being an engineer; she loved her work and her colleagues. She was known as a tremendous mentor, both for junior staff and for advanced technical excellence across the firm, through her role as Structural Engineering Global Technology Leader. Purdue University awarded her with the Civil Engineering Alumni Achievement Award in 2005. In 2010, she won the CH2M HILL CEO Excellence Award in the category of respect. She also contributed her time to many national and international professional societies helping to advance the improvement and refinement of building codes and design practices through The Masonry Society, Structural Engineers Association of Oregon, the American Concrete Association, and the National Council of Structural Engineers Association. She was an adjunct professor for Design of Masonry Structures at Oregon State University and was a masonry seminar and webinar instructor for the Northwest Concrete Masonry Asso-

ciation. Recently she was appointed by the Governor as a board member on the Oregon State Board of Examiners of Engineering and Land Surveying.

Sue met her husband, Richard Charles Frankenfield, originally of Lawrence, Kansas and currently of Corvallis, Oregon, on a school bus taking the CH2M HILL staff on a ski trip in 1978. Although it took Rich nearly two years to convince Sue that he was in love with her and wanted to marry her, she eventually got the message, and they were married in 1980 by Sue's cousin and priest Richard Frey. They were happily married for nearly 33 years. Two years after they were married, Sue and Rich lived and worked in Alexandria, Egypt for 15 months.

Sue and Rich have two children: Jamie Katherine Frey-Frankenfield of Sherwood, Oregon, who is a high school Spanish, ELD, and Choir teacher, and Patrick Richard Frey-Frankenfield of Lawrence, Kansas, who is studying Sports Management and Accounting. Sue raised her children to be loving, strong, passionate, and independent and was very proud of all their accomplishments.

Sue had many hobbies and interests. She loved gardening, reading, arts and crafts, softball, aerobic dancing, watching OSU Beavers gymnastics and television with her family, listening to jazz music, and she was an active member of St. Mary's Catholic Parish. She also loved cats and dogs and had many over her lifetime. Sue had a large circle of family and friends who cared about her deeply. She passed away knowing that she was truly loved.

In addition to her husband and children, Sue is survived by her four younger brothers: William Henry Frey of Crown Point, Indiana and his wife Merrilee; Clayton John Frey of Merrillville, Indiana and his wife Carol; Scott Allen Frey of Hobart, Indiana and his wife Penny; and Patrick Richard Frey of Valparaiso, Indiana and his wife Lisa; along with 15 nieces and nephews and 5 great nieces and nephews.

A celebration of life at CH2M HILL and funeral mass at St. Mary's Catholic Church will be held in Corvallis. The celebration and mass are tentatively scheduled for July 12 and 13, respectively.

The family suggests memorial contributions be made either to:

Good Samaritan Hospital Foundation (GSHF) Survivorship Fund
3600 NW Samaritan Drive
Corvallis, OR 97330
(541) 768-4256

Susan M. Frey Civil Engineering Scholarship Fund
Purdue University
403 West Wood Street
West Lafayette, IN 47907-2007
(check should include note: "For the Susan M. Frey Civil Engineering Scholarship Fund.")

Online condolences may be sent to:
www.mchenryfuneralhome.com.

OREGON RESILIENCE PLAN HIGHLIGHTS STATE'S RESILIENCE GAPS

By: Edward Wolf

SALEM, Ore. -- On March 14, Oregon's Seismic Safety Policy Advisory Commission (OSSPAC) presented the *Oregon Resilience Plan: Reducing Risk and Improving Recovery for the Next Cascadia Earthquake and Tsunami* to a special joint hearing of the House and Senate Committees on Veterans and Emergency Preparedness. The plan provides a comprehensive look at how to prepare the State to withstand and recover from a magnitude 9.0 Cascadia subduction zone earthquake and tsunami.

Following the March 11, 2011 Tohoku earthquake and tsunami in Japan, Oregon's House of Representatives unanimously adopted House Resolution 3 directing OSSPAC to "lead and coordinate preparation of an Oregon Resilience Plan that reviews policy options, summarizes relevant reports and studies by state agencies, and makes recommendations on policy direction to protect lives and keep commerce flowing during and after a Cascadia earthquake and tsunami". The Resolution directed OSSPAC to deliver its plan and recommendations to the Legislative Assembly no later than February 28, 2013.

The Commission recruited eight task groups comprising nearly 170 professionals to describe the scenario earthquake, examine potential impacts to the State's roads, bridges, buildings, and utilities, explore the special challenges facing coastal communities, and anticipate the disruption of business continuity that could jeopardize disaster recovery.

The plan is Oregon's first attempt to describe the resilience gaps that separate expected infrastructure performance (e.g., time needed to restore electricity and telecommunications services) from the performance levels achieved after recent earthquakes in more resilient economies, including Chile and Japan. Oregon's resilience gaps, while somewhat speculative due to limited data, range from weeks to months – far wider than commonly assumed.

The plan outlines steps that can be taken over the next 50 years to bring the State closer to resilient performance through a systematic program of vulnerability assessments, capital investments in public infrastructure, new incentives to engage the private sector, and policy changes that reflect current understanding of the Cascadia threat.

The probability of a magnitude 8 or larger earthquake on the Cascadia fault within the next 50 years is approximately 40 percent; the probability of a worst-case magnitude 9 earthquake is estimated at 15 percent.

First steps presented in the *Oregon Resilience Plan* include expanding initiatives such as Oregon's small grant program to retrofit public schools, completing assessments to disclose the vulnerability of key infrastructure, and encouraging residents, particularly on the Oregon Coast, to learn evacuation options and prepare for a minimum of two weeks of self-sufficiency – far longer than the 72-hour doctrine of emergency preparedness.

Sen. Brian Boquist (R-Dallas), chair of the Senate Committee on Veterans and Emergency Preparedness, expressed interest in scheduling hearings to explore Resilience Plan topics in detail in May or June 2013, to set the stage for future legislative efforts.

SEAO members who played a prominent role in the creation of the *Oregon Resilience Plan* include OSSPAC chairman Kent Yu, Ph.D. of Degenkolb Engineers and Critical Buildings Task Group co-chairs Trent Nagele (VLMK Consulting Engineers) and Ed Quesenberry (Equilibrium Engineers). Critical Buildings Task Group members Andre Barbosa, David Bugni, Ed Dennis, Kimberly Dills, Shane Downing, Shelly Duquette, Jennifer Eggers, Joe Gehlen, Tonya Halog, Robert Johnson, Kevin Kaplan, Amit Kumar, Dominic Matteri, Anne Monnier, Willy Paul, Josh Richards, Tim Rippey, Richard Rogers, Terry Shugrue, Jason Thompson, Mark Tobin, Jim Weston, Michael Wieber, and Edward Wolf contributed to the report.

Links:

Oregon Resilience Plan executive summary (PDF):
[http://www.oregon.gov/OMD/OEM/osspace/docs/Oregon Resilience Plan Executive Summary Final.pdf](http://www.oregon.gov/OMD/OEM/osspace/docs/Oregon%20Resilience%20Plan%20Executive%20Summary%20Final.pdf)

Oregon Resilience Plan full report, by chapter:
[http://www.oregon.gov/omd/oem/pages/osspace/osspace.aspx#Oregon Resilience Plan](http://www.oregon.gov/omd/oem/pages/osspace/osspace.aspx#Oregon%20Resilience%20Plan)

Coverage in *The Oregonian* (Feb. 4, 2013):
http://www.oregonlive.com/business/index.ssf/2013/02/cascadia_earthquake_and_tsunami.html#incart_m-rpt-2

Coverage in *The Seattle Times* (March 9, 2013):
http://seattletimes.com/html/localnews/2020525702_earthquake_recovery.xml.html

Oregon Seismic Safety Policy Advisory Commission:
<http://www.oregon.gov/omd/oem/pages/osspace/osspace.aspx>

EMPLOYMENT OPPORTUNITIES

Intel is seeking an experienced Structural Engineer. The heart of Intel innovation lies in its 300 mm semiconductor factory. This is your opportunity to play a central role in designing, constructing, and maintaining our state-of-the-art manufacturing and support facilities. Intel offers you an opportunity to apply your engineering knowledge and your superior problem-solving skills and to collaborate with the site facility management team, suppliers, and stakeholders. We comply with the standards, specifications, and processes that make Intel a world technology leader. Our Mission is "Delivering Facilities and Services Excellence". To learn more visit:

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Reply with resume and cover letter to:
recruiter@case4n6.com.

SEIMIC QUIZ

By: SEAO Seismic Committee

This seismic quiz has been put together by the Seismic Subcommittee of SEAO. This month's theme is **Moment Frames**. Enjoy!

1. Should there be any special designation of CJP welds in steel moment frame beam-to-column connections?
2. True or False? It is acceptable to have spot welds to secure decking within the beam protected zone in a steel moment frame, but it is not acceptable to have welded shear studs and decking attachments that penetrate the beam flange?
3. What are the three primary factors affecting steel special moment frame member size selection?
4. In concrete moment frames, what is an alternative to typical hoops and cross ties for confinement steel?
5. When designing a concrete special moment frame, must cracked stiffness of beams and columns be considered?

See below for answers.

Answers to Quiz:

1. Yes, typically CJP groove welds of beam flanges, shear plates, and beam webs should be designated as "Demand Critical Welds". For exceptions and further reference, see AISC 341-05, Section 9.2c.
2. True. Reference AISC 341-05, Sections 7.4 and 9.2d.
3. The need to control design drifts below permissible levels, the need to avoid P-delta instabilities, and the need to proportion the structure to comply with strong-column/weak-beam criteria of AISC 341. Reference NEHRP Seismic Design Technical Brief No. 2: Seismic Design of Steel Special Moment Frames: A Guide for Practicing Engineers, Section 2.4.
4. Continuously bent hoops. For discussion and photo, see Section 7.2 of NEHRP Seismic Design Technical Brief No. 1: Seismic Design of Reinforced Concrete Special Moment Frames: A Guide for Practicing Engineers. Yes. See ACI 318-08, Section 8.8.2.
5. Yes. See ACI 318-08, Section 8.8.2.

YOUNG MEMBER FORUM ACTIVITIES

By: Phil Davis & Seth Thomas

May 16th: Happy Hour at On Deck Sports Bar, 910 NW 14th Avenue, Portland, Oregon. From 5:30 to 7:30 pm.

Bring a friend or coworker and enjoy appetizers and a drink with other young professionals in the area.

June 20th: Happy Hour: Save the date. Location TBD.

The YMF is planning a tour of the production facility of Cascade Coil in Tualatin Oregon. Check the YMF page of the SEAO website soon and look in next month's newsletter for the date and time.

YMF Website Info: YMF now has an updated website and the address is <http://www.seao.org/committees/youngmembers/>. Please visit our website for more information on YMF events and information.

SEISMIC EVENTS

[ASCE Webinars \(http://www.asce.org\)](http://www.asce.org)

Thursday, May 30, 2013, 8:30 – 10:00 AM PST. [The Seismic Co-efficient Method for Slope and Retaining Wall Design.](#)

Friday, June 7, 2013, 8:30 – 10:00 AM PST. [Damping and Motion Control in Buildings and Bridges.](#)

Friday, June 21, 2013, 8:30 – 10:00 AM PST. [Design of Wood Diaphragms and Shear Walls.](#)

Wednesday, June 26, 2013, 9:00 – 10:00 AM PST. [Introduction to the Seismic Design of Nonbuilding Structures to ASCE 7-10.](#)

[NEES Webinar \(http://nees.org\)](http://nees.org)

Wednesday May 29, 2013, 11:30 – 1:00 PM PST. [Research to Practice Webinar: Concrete-Filled Tubes: Robust Structural Members for Seismic Design.](#)

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<http://www.contechservices.com>

APRIL MEETING PROGRAM RECAP

By: David Tarries

Kimberly Robinson, SE, is the Chief Engineer for Star Seismic and is responsible for engineering of buckling restrained braced frames. She has served on the State Board for the Structural Engineer's Association of Utah and is a member of the Seismic Committee.

Buckling Restrained Braced Frames (BRBFs) are a style of braced frame that uses yielding of the proprietary brace member core to dissipate seismic forces. The benefit of the system is that braces will yield the same for tension and compression and are ductile with a high codified R value. BRBFs are a fairly new lateral system and are now in their second code cycle. They were first published in the 2005 versions of ASCE 7 and AISC 341. There are some changes in the 2010 versions that will soon be requirements in many jurisdictions as newer codes are adopted.

Basic Mechanics:

Buckling Restrained Braces (BRBs) have a center core element that resists lateral load from the building. They are sized to have a determined capacity and to yield under a design load. The core of the brace is the key element; all other components are provided just to brace the core. That includes the steel casing and the unbonded grout fill. The core material is controlled to have a reliable yield strength, typically of 38 to 46 ksi. Hysteresis curves of BRBFs are more symmetrical and "clean" compared to standard braced frames due to the difference in compression and tension capacities. Casing sizes on braces are not necessarily indicative of capacity. The length and capacity have an effect on overall brace size, and the manufacturer should be consulted before developing architectural finishes.

Uses:

BRBFs have many uses. They can be used in new buildings from big to small. Multi-story hospitals and office buildings, down to single-story metal buildings and tilt-up warehouses have been fitted with BRBs. There can even be cases where a single brace in each direction is acceptable. They can be used in retrofitting existing buildings. Sometimes it is even possible to reuse existing braced frame gusset plates. They can be used for bridge retrofits and can limit the load that is transferred from the abutment to the bridge across the brace. Horizontal applications include being used to keep buildings from pounding across a seismic joint and providing exterior buttresses with a large elastic frame with a horizontal BRB to the structure. External anchoring with BRBs has also been accomplished. Outrigger systems can be used to transfer load to columns and limit peak load, acting as a seismic fuse.

Design Parameters (variables for the building designer):

Stiffness Factor (K_{eff}): The stiffness factor varies by the size of the bay and the member dimensions. The manufacturer provides the stiffness factor for each brace to be used in computer models. Assumptions based on past experience can be incorrect and values should be verified. Shorter-period buildings are less affected by incorrect stiffness factors. The slope of a line

through a tested hysteresis loop is the effective stiffness of the member. Duplicating hysteresis loops from past data can lead to incorrect stiffness values if parameters are different.

Overstrength Factors (w and b): The overstrength factors are used to estimate the amount of strain hardening a particular brace will undergo. Tension and compression strain hardening are different; therefore, two different factors are provided by BRB manufacturers. The compression stiffness factors are about 5 percent greater than the tension stiffness factors. A backbone curve created from testing of braces by the manufacturer is used to develop the overstrength factors. Current drift parameters used by manufacturers to determine overstrength are based on $2 \cdot C_d \cdot D_s$ either side of center for a max drift of $4 \cdot C_d \cdot D_s$.

Damping Coefficients: Specific brace damping coefficients can be provided by the manufacturer for use in modeling if requested.

Code Changes:

The new code requires that if $2 \cdot C_d \cdot D_s$ does not exceed 1 percent drift of the floor then the backbone curve must be based on the 1 percent minimum. This limit can control for taller structures. About 75 percent of the market for BRBs is three stories or less and are controlled primarily by strength, not drift. This new code requirement will result in increased brace sizes in most buildings from the previous version based on a limit that was added for taller structures. BRB manufacturers are talking to the code committee to help limit this requirement, but it may not be adjusted until the 2016 code.

The current code has R factors of 7 for pinned braces and 8 for fixed braces. The new code has been changed so all BRBs have an R of 8 and a C_d of 5.

Seismically compact members have been relabeled as highly ductile members and moderately ductile members. Beams with a V or chevron brace must be moderately ductile and braces must be highly ductile. The standard brace strength requirements still apply and there is no penalty for using single BRBs.

According to current codes it must be assumed that every brace in a frame is fully yielded at the first mode at the same time. This puts a tremendous load on the columns and can make design difficult for taller buildings. It is highly unlikely that taller multi-story buildings will fail in this manner, though it is reasonable for short structures. The hope was that the 2010 code would address this issue; however, it does not and the sum of the full strength of all braces still must be resisted in the frame columns. This may be changed for the 2016 code.

A surprise in the new code is the rotation requirement for brace connections. AISC 341-10 still requires the connections be designed for $R_y F_y A_g$, but it also indicates either a .0025 rad rotation is considered or the connection must be capable of supporting

APRIL MEETING PROGRAM RECAP (CONT.)

1.1R_yM_p of the beam. The fear was that the connection gusset plates could pinch if there was excessive drift in a very ductile frame. This is a large change from the previous code for fixed brace connections and also requires that all welds be demand critical. It can be best addressed by making the beam to column connection a tee shape with the beam splice beyond the gussets or avoided by using pinned brace connections. Almost all BRB manufacturers design the brace connections, so most building designers will not need to deal with this change directly. The 2016 code may reduce this requirement.

Extrapolation allowed for test data used by manufacturers to determine brace parameters like stiffness and overstrength for a range of braces has been reduced. This will require additional testing for a range of brace sizes. It was suggested the code committee based this change on the idea that it is harder to create a small brace than it is a large brace, and data extrapolation was limiting actual testing completed. BRB manufacturers are trying to have this changed in or before the 2016 code is released.

Questions & Answers:

Q: Have BRBFs been tested in a real earthquake of 7.0 or better? Do you have to replace the braces after such an event?

A: Lab testing on events larger than 7.0 have been completed but little real-life data exists for complete BRBF buildings. Nippon Steel had a number of buildings involved in the Sendai Earthquake of 2011, but data from that event has not been released to US manufacturers. It is unclear how many required replacement. Lab test show the braces to be resilient and that they can support more than 200 cycles past yield and are theoretically expected to perform well.

Q: Is a peer review required?

A: The 2005 code removed that provision and peer reviews are no longer required. If brace properties are extrapolated from test data beyond code limits, a peer review may be triggered.

Q: How can existing braces be retrofitted with new BRBs and still use the same gusset plates?

A: It does not always work out, but often the reduction of forces due to BRB ductility keeps the demand on the gussets at a reasonable level. The new code requirements for fixed-end brace connections may not work with existing gussets.

Q: Have local jurisdictions had an issue with the lack of proper inspection on existing gusset plate welds?

A: This has not been brought up on known Star Seismic projects. Visual inspection of the existing welds is completed by a competent firm. So far replacing existing braces and keeping their welded gusset plates has not been a red flag to a jurisdiction.

Q: A flowchart of the BRBF design process was shown in your presentation. Where can a copy of that be found.

A: The November 2012 edition of MSC has the article with the flowchart on page 53 and we have included a copy of it on page 10.

NEW MEMBERS

WELCOME NEW MEMBERS!

FEBRUARY:

Jacob Skugrud - Student
Ryan Smith – Side Plate Systems
Brett Cates – Student
Levi Huffman – Student
Anthony Hafner – Black & Veatch

MARCH:

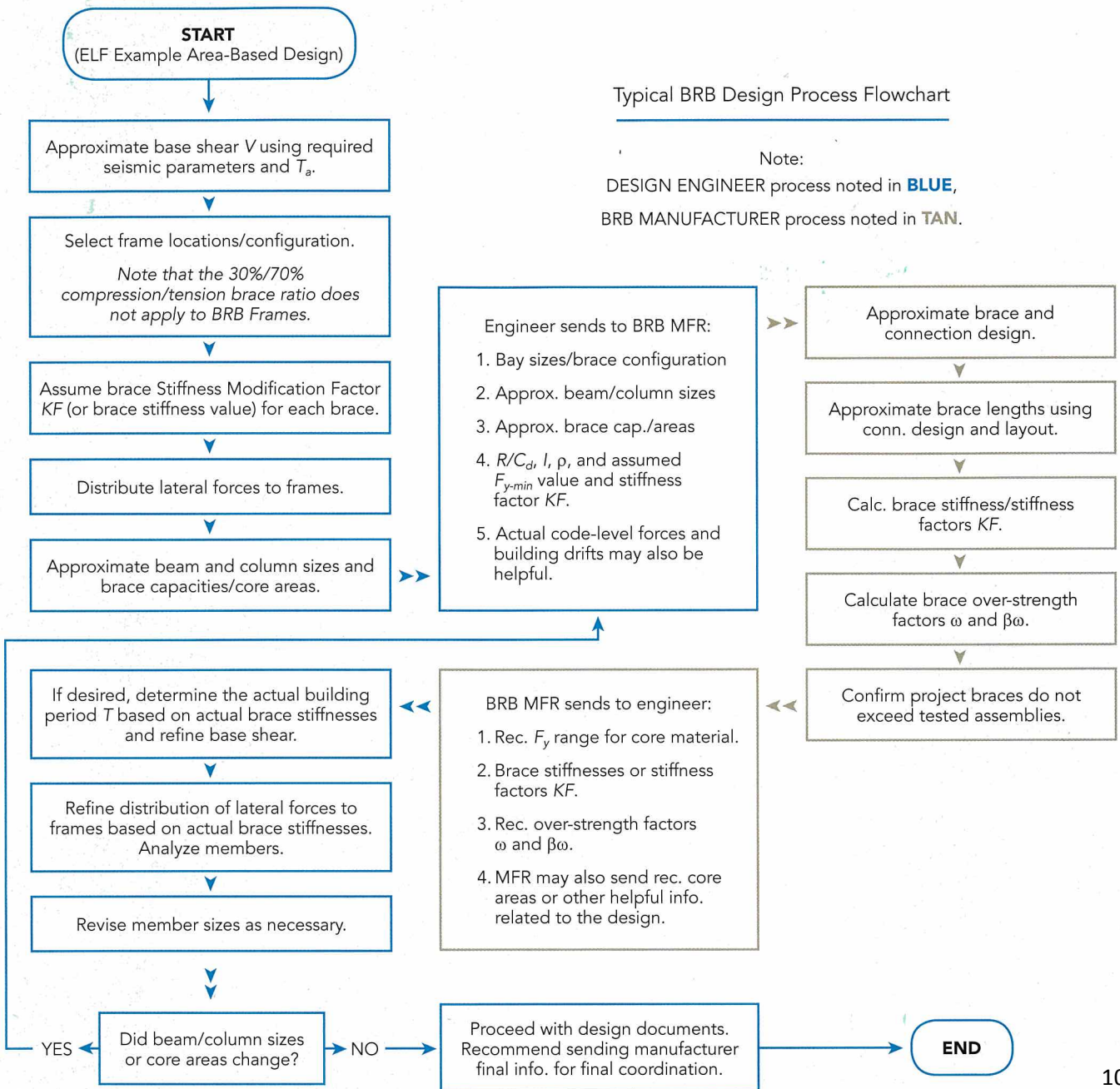
Kristin Hannas – Hannas Engineering
Christopher Hockert – Student
Edward Crabaugh – ECEC
Kyle Williams – KGA
Adrienne Busch – KGA
Thomas Kay – KGA
Benjamin Howard – Lite Solar
Greg Halsted – CRSI
Charles Marquardt – MCE
Julie Havelka – SMG
Alli Rejaie – HNTB Corp
Ugo Costa – AAI Engineering
Lee Glassford – KPFF
Mitra Amini – James G Pierson
Ken Oliphant – CASE Forensics
Cody Cox – Cox Engineering

APRIL:

Howard Thurston – New Paradigm Engineering
Kevin White – Froelich Engineers
Kenny Dupuis – SMG
Rod Hammerberg – Froelich Engineers

MAY:

Eric McDonnell – KPFF
Ryan Nedwicke – Nedwicke Engineering & Design



SEAO/OACI ANNUAL GOLF TOURNAMENT

JULY 31, 2013

Wednesday, July 31, 2013

Shotgun Start: 1 pm

Social Hour: 6 pm

Stone Creek Golf Course
14603 S. Stoneridge Dr.
Oregon City, OR 97045
Phone (503) 518-4653



Once again this year SEAO and OACI combine forces for a return engagement of golf and merriment at Stone Creek Golf Club. Stone Creek is the newest golf course in the Portland area and is the pride of designer Peter Jacobsen. Participants will all enjoy the team spirit of playing a 4-person scramble.

We will have a shotgun start at 1:00 pm, allowing us to all finish at the same time to share stories of the day's glory and despair, along with dinner, beverage, and many prizes. We hope that you will come join us and support both organizations.

The course offers a driving range, a large putting green to hone your skills prior to the tournament--so come early. Power carts and range balls are included in the golf fee.

See attached flyers for registration for golf and sponsorships.

It is through our members participation and generosity that this tournament is so successful.

**\$10,000
HOLE IN ONE
PRIZE!**

2013 SEAO / OACI Golf Tournament

**JULY 31ST, 2013
Stone Creek Golf Course**

**1:00 PM
SHOTGUN START!**

WHEN:

DATE: Wednesday, July 31st
SHOTGUN START: 1:00PM
SOCIAL HOUR: 6:00PM
DINNER & AWARDS: 6:30–7:30PM



TOURNAMENT:

4-Person Scrambles

CONTACT INFO:

Jane Ellsworth (503) 753-3075 jane@seao.org

NO REFUNDS FOR CANCELLATIONS AFTER JULY 6TH

WHERE:

STONE CREEK GOLF CLUB

14603 S. Stoneridge Dr.
Oregon City, OR 97045
Phone: (503) 518-4653

DINNER:

Dinner Will Be Served

FEES:

Golf & Dinner: **\$100/person**
(Includes golf cart & driving range)

EVENT DETAILS:

Once again this year S.E.A.O. and O.A.C.I. combine forces for a return engagement of golf and merriment at **Stone Creek Golf Club**. Stone Creek is the newest golf course in the Portland area and is the pride of designer Peter Jacobsen. Participants will all enjoy the team spirit of playing a 4-person scramble.

We will have a shotgun start at 1:00PM, allowing us to all finish at the same time to share stories of the day's glory and despair, along with dinner, beverage and many prizes. We hope that you will come join us and support both organizations.

The course offers a driving range, a large putting green to hone your skills prior to the tournament so come early. Power carts and range balls are included in the golf fee.

Don't forget to bring money for the raffle prizes and string! This year's raffle prizes will be:

**42" TV, iPad Mini, Golf Rangefinder,
Ocean Salmon Fishing Trip for 2,
Ocean Halibut Fishing Trip for 2,
Power Washer, Gift Cards & much more!**

**Appropriate "Country Club" attire
is recommended:**

- Collared Shirts
- No Denim
- Shorts must have a 6" inseam
- Soft spikes only.

**PLEASE RETURN
THIS ENTRY FORM
BY JULY 5TH TO:**

S.E.A.O.
9220 SW Barbur Blvd. #119
PMB #336
Portland, OR 97219
(503) 753-3075 Phone
(503) 214-8142 Fax

Player Names	Green Fees	Membership	Payment Enclosed
	<input type="checkbox"/> Golf & Dinner – \$100	<input type="checkbox"/> SEAO <input type="checkbox"/> OACI	\$_____
	<input type="checkbox"/> Golf & Dinner – \$100	<input type="checkbox"/> SEAO <input type="checkbox"/> OACI	\$_____
	<input type="checkbox"/> Golf & Dinner – \$100	<input type="checkbox"/> SEAO <input type="checkbox"/> OACI	\$_____
	<input type="checkbox"/> Golf & Dinner – \$100	<input type="checkbox"/> SEAO <input type="checkbox"/> OACI	\$_____
String & Mulligan Add-Ons (1 Mulligan = 1 Shot Per Person)			
<input type="checkbox"/> 5' String – \$15 (Limit 5' Per Foursome) _____ Qty			\$_____
<input type="checkbox"/> Mulligans – \$5 ea (Limit 5 Per Foursome) _____ Qty			
<input type="checkbox"/> 5' String & 5 Mulligans – \$30 (Limit 1 Per Foursome) _____ Qty			

☐ Check Enclosed

☐ VISA / ☐ MC Accepted

Total \$_____

Name On Card: _____ Contact Number: _____

Card # _____ Exp. Date: _____

2013 SEO / OACI Golf Tournament

JULY 31ST, 2013
Stone Creek Golf Course

1:00 PM
SHOTGUN START!

Donation / Hole Sponsor Form

Sponsor Information:

Company Name: _____

Contact Name: _____

Phone: _____ Fax: _____

Email: _____

Hole Sponsorship

- ☐ **GOLD - \$200** for tee sign and flag at the hole and recognition on banner at dinner
Hole Preference _____
- ☐ **SILVER - \$150** for tee sign, but stationed at putting green/driving range before golf and recognition on banner at dinner
- ☐ **BRONZE - \$125** recognition on banner at dinner

Special Sponsorship

- ☐ **LD/KP/Long Putt Hole Sponsor | \$150**
Hole Preference _____
- ☐ **On Course Drink Refreshment Sponsor | \$375**
(Host drink cart for one beverage per participant to be redeemed during play)
- ☐ **19th Hole Sponsor | \$250**
(Host keg of Micro-brew)
- ☐ **Golf Cart Sponsor | \$200**
(Host the golf carts with a sign in each cart with your company name)
- ☐ **Scorecard Sponsor | \$200**
(Host the scorecards with the name of your company on each card)

Raffle Prizes*

- | | | |
|---|--|---|
| <input type="radio"/> 42" TV \$600 | <input type="radio"/> Ocean Salmon Fishing Trip for 2 \$250 | <input type="radio"/> Imperial Restaurant \$150 |
| <input type="radio"/> iPad Mini \$500 | <input type="radio"/> Ocean Halibut Fishing Trip for 2 \$400 | <input type="radio"/> Golf Rangefinder \$300 |
| <input type="radio"/> Gift Cards \$50 & \$100 | <input type="radio"/> El Gaucho Gift Card \$150 | <input type="radio"/> Power Washer \$500 |

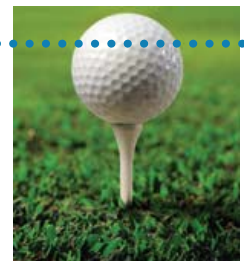
**Golf committee will purchase raffle prizes*

Please Return This Form A.S.A.P. to:

S.E.A.O.
9220 SW Barbur Blvd., Suite #119, PMB #336
Portland, OR 97219
Fax: (503) 214-8142

Contact Info:

Jane Ellsworth
(503) 753-3075
oaci@comcast.net



FRED: Seismic Resiliency in our Schools

Seismic Resiliency: Sustaining our Schools for Tomorrow

Limited space for SEAO Members at the AIA price of \$150, register today!

Go to <http://fredseismic.eventbrite.com/#> to register today.

Following the 2011 Preparing for Seismic Certainty Symposium and the recently passed Portland Public School Construction Bond, AIA Portland and Portland Public Schools are leading a call to critically assess the seismic resiliency of **Portland Public Schools**.

AIA Portland invites you to attend a day-long forum on June 7th, 2013. Together we will address the issue of seismic resiliency in our schools and communities.

Forum participants will explore the recently passed bond measures, the plan for seismic strengthening and build effective, practical strategies to strengthen our schools, and allow for long term resiliency. This forum will continue the seismic conversation that started two years ago, among architects, engineers, members of the construction industry, and government leaders.

Join us on June 7th, together will seek design answers to seismic issues ensure the safety of our schools.

Seismic Resiliency: Sustaining our Schools for Tomorrow

Friday, June 7th, 2013

9am – 4:30pm

AIA Portland

6 CEH/HSW

\$150 AIA Members and Member of SEAO / \$210 non-members

Forum Speakers:

Jim Owens, P.E. - Director Capital Operations, Portland Public Schools

Mark Tobin, P.E, S.E – KPFF Consulting engineers

Dr. Chris Goldfinger – Director, Active Tectonics and Seafloor Mapping Laboratory, College of Earth, Ocean and Atmospheric Sciences, Oregon State University

Panelist:

Ralph Dinola, Principal – Green Building Services

Peter Meijer, AIA, Principal - Peter Meijer Architect, PC

Andre LeDuc, Executive Director, Enterprise Risk Services – University of Oregon

Jason Thompson, SE – Catena Consulting

Allison Pyrch, PE, GE, Principal -Shannon & Wilson, Inc.,

Panel Moderated by Jay Raskin, AIA - Ecola Architects, PC



American Wood Council – Professional Structural Wood Education Seminar

Presented by the Structural Engineers Association of Oregon (SEAO)

Date: **Thursday, May 23, 2013 – 8:30 AM to 4:45 PM**
Registration Opens at 7:30 AM (Lunch Included)

Cost: \$175 SEAO Member (Includes Class Notes) \$225 Non-member
\$25 Late Fee (if registration received after May 16, 2013)
Students \$55 (Includes Notes) – Must show current student ID
No refunds after 12:00 noon Tuesday, May 16, 2013

Register early; Maximum 100 people

**Program to be Taped
by Limelight Video**

Location: **Embassy Suites** 9000 SW Washington Square Rd
Hotel and Conference Center Portland, Oregon
(503) 644-4000

Continuing Education: **SEAO has recommended this seminar for 6 PDHs
(4 PDHs for Viewing Video)**

Speakers: **Michelle Kam-Biron, PE, SE, Director of Education, American Wood Council** Graduate of Cal Poly, San Luis Obispo

Terry Malone, PE, SE, Woodworks – Senior Technical Director of Architectural and Engineering Solutions, Mr. Malone served as a faculty member at St Martin's College in Lacey, Washington.

Ethan Martin, PE, SE, NW Woodworks – Regional Director of Design & Construction Services, Graduate of Cornell University

- Designing with AWC's National Design Specification® (NDS®) for Wood Construction (NDS 2012)
- AWC's 2008 Special Design Provisions for Wind and Seismic ASD/LRFD – Overview and Changes from Previous Editions
- Seismic and Wind Design Considerations for Wood Framed Structures
- The Analysis of Offset Diaphragms and Shear Walls (1.5 hours)
- Wind Design of Structures Using ASCE 7 2010
- Overview of Cross Laminated Timber (CLT): Current and Future Code Applications

Questions: Andy Stember (503) 657-9800

American Wood Council – Professional Structural Wood Education Seminar

Registration Form

Register Online at www.seao.org or

Send to: SEAO
PO Box 2958
Vancouver, WA 98668
(503) 753-3075

Make Checks Payable to:
SEAO

(503) 214-8142 (fax)SEAO

Firm Name: _____

Firm Address: _____

Phone _____

Name of Attendee(s) _____

of Attendee(s) _____ @ \$175.00 / each = \$ _____

(Nonmember \$225.00)

of Late Fees _____ @ \$25.00 / each = \$ _____

of Students _____ @ \$55.00 / each = \$ _____

of Videos _____ @ \$150.00 / each = \$ _____

Total Enclosed = \$ _____

Visa Or Mastercard (circle one)

Name (as appears on card) _____

Credit Card # _____ exp _____

Cardholder Signature _____