CONNECTIONS

April 2013 Volume 13 Issue 7

Newsletter of the Structural Engineers Association of Oregon

SEAO

9220 SW Barbur Blvd.
No. 119
PMB #336
Portland, OR 97219

Phone: (503) 753-3075

Fax: (503) 214-8142

E-Mail: jane@seao.org

Web site: www.seao.org

IN THIS ISSUE: PAGE #

Upcoming SEAO Meetings and Events:

Wednesday, April 24, 2013: SEAO Dinner Meeting

Speaker: Kimberley Robinson, S.E., Chief Engineer, Star Seismic
Topic: Advances in Buckling Restrained Braced Frame Design
Location: Governor Hotel, Second Floor, Portland, Oregon
Time: 5:30 pm check-in & social, 6:15 pm dinner, 6:30 program
Sponsored by: American Institute of Steel Construction (AISC)
See Page 2 for additional information.

Thursday, May 2, 2013: SEAO YMF Lunch

Topic: Planning for Upcoming YMF Events
Location: Group Mackenzie, 1515 SE Water Ave. (East end of the Hawthorne Bridge), Portland
Time: noon to 1 pm
All are welcome to attend.
See Page 6 for additional information.

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.

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: Basalite Concrete Products, LLC

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.

Send membership inquires to:
9220 SW Barbur Blvd.
No. 119
PMB #336
Portland, OR 97219

BOARD OF DIRECTORS

APRIL DINNER MEETING ANNOUNCEMENT
WEDNESDAY, APRIL 24, 2013
Sponsored by: The American Institute of Steel Construction (AISC)

Topic: ADVANCES IN BUCKLING RESTRAINED BRACED FRAME DESIGN

Although buckling restrained braces (BRB) have now been a codified system for over five years and have been used in design for much longer, the system is still relatively new. BRB's are now entering their second full code cycle with the AISC Seismic Provisions for Structural Steel Buildings, AISC 341-10, which has introduced significant changes. These new changes will be highlighted along with methods to effectively design Buckling Restrained Braced Frames (BRBF) and to coordinate with BRB manufacturers. The latest innovative uses for BRBs will also be discussed.

Speaker:
Kimberley Robinson is the Chief Engineer for Star Seismic. She is currently responsible for the engineering of their buckling-restrained braces (BRBs), working closely with engineers and designers on the design of the entire buckling-restrained brace frame (BRBF) seismic system. She has authored numerous articles on BRB's and was a contributor to the next AISC Seismic Manual.

Kimberley is a registered structural engineer. She began her career working on-site in structural steel project management for several large-scale projects before joining a structural design office, where she specialized in seismic engineering, office buildings, mixed-use facilities, and parking structures. She also represented the American Institute of Steel Construction as AISC's Northwest Regional Engineer prior to joining the Star Seismic team. She has served on the State Board for the Structural Engineer's Association of Utah and is a member of the Seismic Committee.

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 Venues:
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 noon, Friday, April 19.** 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:

The American Institute of Steel Construction (AISC), headquartered in Chicago, is a not-for-profit technical institute and trade association established in 1921 to serve the structural steel design community and construction industry in the United States. AISC's mission is to make structural steel the material of choice by being the leader in structural-steel-related technical and market-building activities, including: specification and code development, research, education, technical assistance, quality certification, standardization, and market development. AISC has a long tradition of service to the steel construction industry providing timely and reliable information.

SEAO Committees

Seismic
Jason Thompson
Jason@catena.com

Wind
Jim Riemenschneider
jimr@vlmk.com

Snow Load
Andy Stember
andy@jasenginc.com

Code
Eric Watson
eric@miller-se.com

Vintage Building
Wade Younie
wyounie@dci-engineers.com

Special Inspection
Ray Miller
ray@miller-se.com

SEER
Shelly Duquette
emergencyresponse@seao.org

Website
Aaron Stocek
Aaron.stocek@kpff.com

Legislative
Paul Kluvers
pkluvers@gmail.com

Engineers Week
Michelle Chavez
michelle@miller-se.com

Young Member Forum
Seth Thomas & Phil Davis
sthomas@degenkolb.com
pdavis@degenkolb.com

Monthly Meetings/Programs
David Gilroy
dgilroy@strongtie.com

Golf Tournament

Conferences
Kevin McCormick
kevin@miller-se.com

Seminars
Andy Stember
andy@jasenginc.com

Professional Development

Newsletter
JoMarie Farrell
jomarie@equilibriumllc.com

Roster
Jane Ellsworth
jane@seao.org

NCSEA
Sue Frey
sfrey@ch2m.com

WCSEA/NWC
Sue Frey
sfrey@ch2m.com

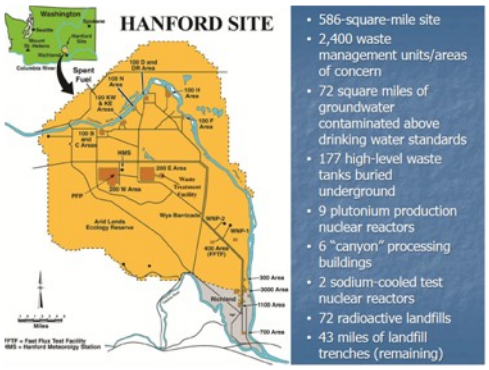
Maser, OBOA, BDS
Ron Vandehey
ron@miller-se.com

JANUARY MEETING PROGRAM RECAP
HANFORD TANK WASTE TREATMENT PROJECT

By: David Tarries

Speaker: Dan McDonald and Dieter Bohrmann, Washington Department of Ecology's Nuclear Waste Program

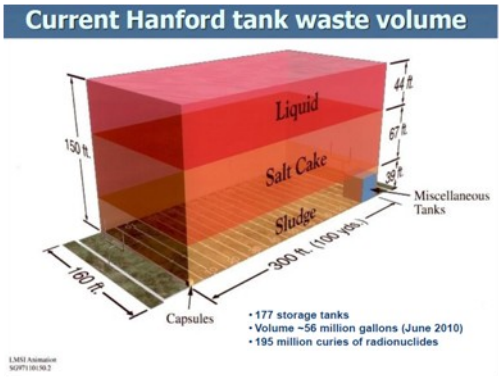
Dan McDonald is currently a Tank Waste Disposal Project Manager for the Washington Department of Ecology's Nuclear Waste Program. He has been working on the Hanford Site in Eastern Washington for nearly 12 years. He holds a BS in Business Management from the University of La Verne, CA, and an MS in Hazardous Waste Management from Idaho State University.



The Hanford Nuclear Reservation was established in 1943 as part of the Manhattan Project. Plutonium processed at the site was used in early United States nuclear warhead research. During the cold war the project was expanded and, by its decommissioning in 1987, it had produced plutonium used in most of the US nuclear arsenal. Millions of gallons of waste material resulting from this production was collected in a series of underground tanks, where it remains today. Clean-up of the site began in earnest in 1989 and will be an ongoing process for many years to come. Currently Dan is working with the U.S. Department of Energy and contractors to construct a tank waste treatment facility on the site that will allow the waste to be removed from the tanks and placed into a suitable long-term storage facility. The project will cover about 65 acres and should be in service for more than thirty years. The facility is funded by the United States Department of Energy and is regulated by the State of Washington Department of Ecology.

The nuclear waste storage tanks are subterranean carbon steel tanks surrounded by concrete. The tanks are buried under 10 to 15 feet of soil to provide radiation attenuation. There are over 175 tanks on the site and each hold from 55,000 to 1,000,000 gallons of waste. Every element on the periodic table of elements is represented in these tanks to some extent. Some of these elements react with steel and corrosion has been occurring for many years. The difficulty comes in understanding what is causing the corrosion and to what extent it is occurring due to the unknown nature of the contents. Mixing of many different manufacturing processes and experimental wastes has resulted in a melting pot that is literally melting the pot. The Ph level of the tanks is monitored and salts (sodium) are added to maintain a relatively neutral level to help inhibit corrosion. In addition to corrosion of the steel liner, radiation has been shown to degrade concrete over time. The waste will need to be agitated and moved to and from tanks to facilitate processing. Part of the difficulty for the cleanup team is determining how many empty and fill cycles the buried tanks in their current condition can support over the life of the project.

Processing the waste involves removing three different mediums occurring in varying proportions in different tanks. Those mediums are liquid, sludge, and solid. The majority of the waste in the tanks began as liquid and over time the heavier materials settled out in the form of sludge. In addition to the liquid and sludge, the salts added to the tanks to control the alkalinity have collected as solids in the form of salt cake. The liquids in the tanks tend to have low levels of radioactivity, while the solids, such as the salt cake, have higher levels.



Waste retrieval on the Hanford Site was started in 1989, at least in the developmental stage. Since then there have been many starts and stops in the process due to lack of government funding, lack of the appropriate technology, or simply the complexity of the work. The current goal is to begin

(Continued on Page 7)

2009 IBC Structural Q & A–Section 1613.5.6.1–Alternative SDC

By: ICC Staff.

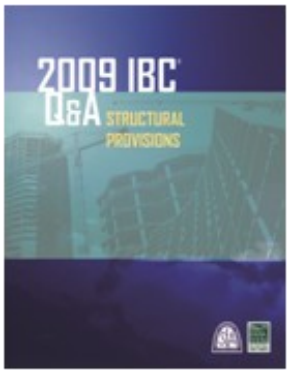
1613.5.6.1 Alternative seismic design category determination. Where S_1 is less than 0.75, the seismic design category is permitted to be determined from Table 1613.5.6(1) alone when all of the following apply.

1. In each of the two orthogonal directions, the approximate fundamental period of the structure, T_a, in each of the two orthogonal directions determined in accordance with Section 12.8.2.1 of ASCE 7, is less than 0.8 T_s determined in accordance with Section 11.4.5 of ASCE 7.
2. In each of the two orthogonal directions, the fundamental period of the structure used to calculate the story drift is less than T_s.
3. Equation 12.8-2 of ASCE 7 is used to determine the seismic response coefficient, C_s.
4. The diaphragms are rigid as defined in Section 12.3.1 of ASCE 7 or, for diaphragms that are flexible, the distances between vertical elements of the seismic-force-resisting system do not exceed 40 feet (12,192 mm).

Q: Section 1613.5.6.1 permits an alternative procedure for calculating the seismic design category where the four criteria are met. Item 3 requires that C_s be calculated using ASCE 7 Equation 12.8-2. If the alternative procedure places the building in Seismic Design Category A, C_s is not used in that category for the lateral force because $F_x = 0.1W$ is used. In that instance, what is used to determine the lateral force, $0.1W$, or C_sW using the C_s from Equation 12.8-2?

A: Section 1613.5.6.1 is an alternative procedure for determining seismic design category. It is an exception to the basic method and allows the seismic design category to be determined using only the short period design spectral response acceleration parameter when the stated conditions are met. Item 3 requires that C_s be calculated using ASCE 7 Equation 12.8-2. So, even if the alternate procedure places the building in Seismic Design Category A, where C_s would not typically be used, the base shear must be determined as C_sW using the C_s from Equation 12.8-2, because this is a specific requirement related to the alternative method. **[16-186]**

This question and answer are from the *2009 IBC Q&A Structural Provisions*. The question is a commonly asked question which arises in the application of code provisions during design and plan review. The IBC section is reprinted for easy reference, followed by the question and answer pertaining to that section. The *2009 IBC Q&A Structural Provisions* is available at iccsafe.org/store. Use ID # 4003S09.



EMPLOYMENT OPPORTUNITIES

Fisher & Sons, Inc. is a design/build construction firm with offices in Burlington, WA and specializing in projects in the food industry. We are seeking a structural engineer to round out our team.

We require a B.S degree in Engineering, and at least 5 years of experience with advanced knowledge in structural engineering. Licensure as a Structural Engineer in Washington is preferred; however, Fisher works in Oregon and California as well. Salary is DOE.

Please send your resume either via e-mail to sw@fishersons.com, via fax at 360-757-3159, or via regular mail to Stephanie Wood, HR Manager, Fisher & Sons, Inc. 625 Fisher Lane, Burlington, WA 98233. Phone: 360-757-4094.

---

www.ptswa.com

Structural Engineer

Duties: Analyzing, designing, planning, providing calculations, researching structural components and structural systems for building, steel platform, retaining wall, and tower projects. Work with reinforced concrete, composite structure, timber, masonry, and structural steel designs. Account technical, economic, and environmental concerns while considering aesthetic and social factors. Telecommunications infrastructure projects will be primary with some small building projects.

Requirements:

- Bachelor's degree or Master's degree specializing in Structural Engineering
- SE Registration
- Successful completion or current preparation for nationally administered exam, by the National Council of Examiners for Engineers and Surveyors

Desired: AutoCAD experience

Staff Engineer (EIT)

Duties: Providing structural calculations, analysis reports, limited AutoCAD drafting for telecommunication support systems installed on buildings, steel platforms, and other structures. Modeling and analysis of existing structures. Design of steel, reinforced concrete, timber, and masonry. Taking into account technical, economic, and environmental concerns while considering aesthetic and social factors. Telecommunications infrastructure projects will be the primary focus with some small building projects.

Requirements:

- Bachelor's degree in Civil Engineering
- EIT Registration
- Understanding of the IBC
- Minimum of 3 years of experience in Structural Design
- AutoCAD exposure and experience

Please forward resumes and cover letters to crrs@ptswa.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 the **History of Earthquake Engineering**. Note that questions 3 and 5 come from *Earthquakes and Engineers: An International History* by Robert Reitherman. Enjoy!

1. What was the previous version of the document, *ASCE 31-03: Seismic Evaluation of Existing Buildings* and who was it developed by?
2. When was the concept of Bucking Restrained Braces (BRBs) first developed?
3. Who is often credited with being the first earthquake engineer?
4. Who was the author of *The California Earthquake of April 18, 1906* (Report of the State Earthquake Investigation Commission)?
5. Who created the world's first shake table and when?

See bottom of page for answers.

SEISMIC EVENTS

ASCE Webinars (www.asce.org)
Friday May 3, 2013, 8:30 – 10:00 AM PST.
Design of Bridges for Earthquakes.

Wednesday May 15, 2013, 9:00 – 10:00 AM PST.
Seismic Assessment and Design of Pipelines.

NEES Webinar (http://nees.org)

Thursday May 16, 2013, 11:30 – 1:00 PM PST.
Research to Practice Webinar: Development of Tsunami Design Provisions.

Answers to Quiz:

1. *FEMA 310: Handbook for the Seismic Evaluation of Buildings – A Prestandard, developed jointly by FEMA and ASCE.*
2. *At the end of the 1980s by Akira Wada of the Tokyo Institute of Technology, with funding from Nippon Steel Corporation.*
3. *Irish engineer Robert Mallet, author of "The Dynamics of Earthquakes" (1946) and Great Neapolitan Earthquake of 1857: The First Principles of Observational Seismology (1862).*
4. *Andrew Lawson and seven others. The document is now a public domain book and a digital copy is available online.*
5. *John Milne and Fusakichi Omori at the University of Tokyo in 1893.*

YOUNG MEMBER FORUM ACTIVITIES

By: Phil Davis & Seth Thomas

YMF Lunch, Thursday, May 2nd: Meeting at Group Mackenzie office, 1515 SE Water Avenue, Suite 100 from noon to 1 pm. Lunch will be provided. We will be discussing and planning upcoming YMF events. All are invited, and it is a good opportunity for newcomers to learn about the YMF and to get involved.

Bring a friend, co-worker, or both and eat your lunch while we discuss possible ideas for future YMF events and gatherings while getting to know some other young professionals in our area.

Education Outreach: The YMF has been visiting local middle schools and high schools in the Portland area teaching students about what Structural Engineers do. Our visit includes a PowerPoint presentation and a hands-on activity for the students to participate in. If you are interested or know a teacher or school that might be interested in having YMF visit their classrooms, please contact Seth Thomas (sthomas@degenkolb.com) or Ed Quesenberry (edq@equilibriumllc.com) to schedule a visit. See next column for pictures from a visit to Sellwood Middle School in January.

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.

YMF EDUCATION OUTREACH: VISIT TO SELLWOOD MIDDLE SCHOOL

Thanks to all the members who made this visit possible and to the enthusiastic and inventive staff and students at Sellwood Middle School

waste processing by 2019 and be finished with the work before the 40-year design life of the plant is exceeded. The intent is to extract the liquid, sludge, and solids out of the tanks and put it through the waste treatment facility. The treated low-activity waste will be stored at Hanford. The treated high-level waste will eventually be shipped to a permanent deep geologic repository. The Yucca Mountain site was the location the high-level waste canisters were intended to be sent, and the process was developed around the style of containers that would have been used at that location. The Hanford Site is currently being used as a short-term storage site; however, it was not designed to house the high-level waste indefinitely. There are already leaking tanks and contaminated groundwater is slowly migrating towards the Columbia River providing a reminder that the material needs to be moved. Any permanent solution will require a final storage location with a similar containment system to Yucca Mountain or additional redesign of the retrieval process will need to take place.

The radioactivity of the waste can be broken down into two basic categories: High Level and Low Activity. High-level waste tends to be present more in the sludge and solids in the tanks. They need to be mixed to keep them in a fluid state for movement through the different phases of treatment. The mixing method must be done remotely, with no moving parts, to reduce the need for maintenance and exposure of repair personnel. A pneumatic system is incorporated into the treatment facility design. As material moves it mixes with other materials from other tanks and becomes a new type of waste. The plant must be able to process any mixture of material that can be combined from the tanks. There is more high-level waste at Hanford than any other US site, such as Los Alamos, by a considerable degree. The Hanford facility is not currently large enough to process all the waste on the site. A second treatment facility will be needed to treat all of the low-activity waste on the site. Over years of service, any facility will have physical erosion in locations like elbows and in components with moving parts. Preparation for maintenance is critical to proper function of a facility over its design life.

(Continued on Page 8)

JANUARY MEETING PROGRAM RECAP (CONT.)

Questions and Answers:

Q: Is there redundancy in the existing tanks?
A: The existing tanks do not have redundancy beyond the concrete walls with steel lining. The new waste treatment facility will have redundancy measures.

Q: Are the existing tanks leaking?
A: The site has 149 single wall tanks and 28 double shell tanks. Some of the single wall tanks are over 60 years old and there have been documented leaks.

Q: Is the rumored contamination plume real?
A: Yes, there is a plume that runs northeast from the site towards the Columbia River. There are monitoring wells to track the migration of the contamination. Attempts are being made to capture the waste by collecting the ground water and treating it. There is urgency in this operation because the waste must not be allowed to reach the river.

Q: If the tanks are already leaking, will they last until cleanup is complete?
A: Waste processing will be prioritized by the condition of the tank storing the material. The tanks in the worst condition will be the first to be cleared.

Q: How is the material in the tanks tested?
A: Each tank has at least one riser where technicians can pull samples. The risers are numbered and mapped to document where materials exist on the site. The tanks themselves are also contaminated and will require proper hazardous material disposal after the waste material is removed.

Q: If it will take 30 years to process the waste on the site should not the design life of the treatment facility be more than 40 years?
A: Given that the design life of the facility has already been determined, the government will need to provide additional funding to support other options if the design life is reached.

Q: What is being done at other similar sites?
A: Hanford is the most complex site in the US. Other sites have smaller amounts of waste with less constituents. Much less is being done at other US locations.

Q: Is there any international cooperation or sharing of treatment methods?
A: There has been some, particularly with Great Britain.

Q: Could a “Criticality” occur in the waste on site?
A: A criticality is where enough of a reactive material comes together to form a “critical mass” and there is a large release of energy. Theoretically yes, but the odds are so unlikely that it is a near impossibility. A Criticality requires pure isotopes in just the right configuration. The materials in the tanks have been mixing and reacting for so long that it is very unlikely that enough pure isotopes could present themselves in the right location to create a criticality. Just the same, batches are kept small and conditions are monitored to minimize the chance of a criticality occurring.

Q: Will the plant be safe for workers?
A: The Low Activity waste treatment areas should be safe for workers. High Level waste will be treated in a remote system so that there will be no direct handling of waste or contaminated components by workers.

The waste treatment facility at the Hanford Site is a complicated project. The variability and dangerous nature of the material make it a challenge to process. In addition the facility personnel and general public must not be put at greater risk as a result of the plant operation. The facility under construction on the site has been designed with this in mind and is arguably the best available option to deal with the situation created by years of nuclear research and plutonium production. Funding has plagued the project since its inception and will be a critical factor throughout the life of the facility and the through the entire site clean-up process.

Thank you Dan and Dieter for taking the time to share with us this unique situation and let us hope and do our part to see that those in charge do not forget the importance of seeing remediation of the Hanford Site through to its completion.