EQUILIBRIUM

Newsletter of the Seattle Chapter
Structural Engineers Association of Washington

March 2010

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April Meeting:

Southwest Chapter is our Host on

Wednesday,

April 21

Watch for Details

Joint SEAW/ASCE Meeting: Haiti Earthquake Briefing

On January 12, 2010, a devastating M7.0 earthquake struck near Port-au-Prince, Haiti. The earthquake was the result of strike-slip motion along the Enriquillo-Plantain Garden fault system, which is near the boundary of the Caribbean and North American plates. Over 50 aftershocks of magnitude 4.5 or greater followed the main event, with a M5.8 aftershock occurring on January 20, 2010. According to current estimates, there were over 200,000 casualties and one million made homeless.

-Photo courtesy of MRP Engineering

Mark Pierepiekarz, PE, SE, President of MRP Engineering, LLC, will present his first-hand experience of the devastation in and around Port-au-Prince following this catastrophic event. Mark was called to Haiti just days after the quake hit to help evaluate the structural damage to buildings and infrastructure.

Traditionally, Haitian buildings are built using lightly reinforced concrete frames, infilled with unreinforced concrete block (CMU) walls. The lateral resistance is primarily provided by the relatively weak unreinforced CMU walls. Failures can occur due to irregular building geometry, lack of sufficient strength, unstable foundations, or sloping sites.

In the days following the initial quake, most residents remained fearful of aftershocks and wary of the stability of the remaining buildings. Survivors set up camps in any available open space, even if their homes survived. As Mark toured the Port-au-Prince region, he visited private homes, a school, and other facilities, providing technical support to those affected by the event. Although much of the damage was catastrophic, many buildings survived the effects of the earthquake with repairable damage. Mark saw immediate need for damage assessments, practical repair techniques, and building retrofits that could be employed for the surviving structures in a country with already limited resources stretched even further by this disaster.

Since Haiti generally lacks the resources and expertise to assess the damage and institute the necessary repairs, skilled structural engineers and contractors from abroad are needed to provide technical and construction expertise, as well as training to rebuild for a better future for Haiti.

Meeting Information:

Date: Tuesday, March 23, 2010

Place: McCormick & Schmick's Harborside
1200 Westlake Ave N, Seattle

Time:

5:30—6:30 PM	Social
6:30—7:30 PM	Dinner
7:30—8:45 PM	Program

Menu: Choose between
Cashew Crusted Tilapia
~or~ Farfalle Pasta Primavera

Price:

SEAW/ASCE Members	$30.00
Non-Members	$35.00
Students	$15.00
Unemployed SEAW members (must have paid 2010 dues)	$15.00
Late Registration, add	$ 5.00

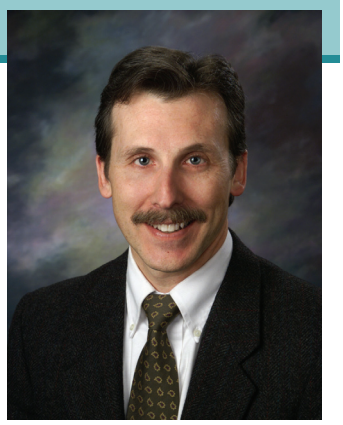
Reservation Deadline: Thursday, March 18, 2010

Register Online at www.seaw.org
or email seaw@seaw.org

PREPAYMENT IS GREATLY APPRECIATED!

No shows and cancellations after reservation deadline will be billed.

FROM THE BOARD: Olympics and Engineering



What a wonderfully successful run for the US Olympic Team! The 2010 Vancouver Games provided wonderful drama, entertainment, and joy for many Americans. I was happy for Lindsey Vonn who battled through a painful injury on a treacherous downhill course to take the Gold. (I had to laugh at the media's characterizations of the icy ski conditions. I thought "Welcome to the Northwest!") Vonn prepared herself for several years, training and practicing before finally reaching the pinnacle of her sport. She will always be recognized as a gold medalist.

NBC did well to build up the drama to all these games with documentaries of various athletes' toils and tribulations, as well as glimpses into the training regimens these athletes worked through to prepare for their ultimate test. For many athletes, these games were their second or third attempts at "getting to the podium." Most fell short. All have a story. All come from different backgrounds and all indicate that they trained long and hard, did their best and, typically, have no regrets.

Thankfully, we engineers in the structural profession are not put under the same scrutiny of the camera like these athletes. However, we do have an analogous process to gain recognition in our field. We sustain many years of training, study, and practice in preparation for the SE Exam. We toil in college for 4 to 6 years and then work for various companies, organizations, and entities. Some jobs prepare us right from day one for the rigors of the structural engineering exam, and we pass it the first time. Other jobs are steppingstones that teach us valuable skills, but not necessarily all the technical know-how that one must have to pass the SE exam until the second or third attempt. Make no mistake; the SE exam has historically been very rigorous with passing rates in the 20%-25% range. However, put in perspective, that passing rate is much higher than our athletes shooting for the podium at the Olympics!

SEAW members all have a personal story and come from different backgrounds just like the athletes. Some prospective SEs may have designed wood-framed homes their entire career. Others may be mechanical engineering graduates working structural aspects of industrial projects. Some may be specialty structural engineers designing curtain walls and cladding, or power and telecom towers, or signs, retaining walls, detention vaults, and bridges for the DOT. Some engineers preparing for the SE exam may find they have plenty of technical strength in a specific material or industry specialty, but lack broad code knowledge.

Examinees sitting for the SE exam must be prepared to show proficiency across the broader spectrum of structural design to pass the test. The examinee must demonstrate knowledge and proficiency in the application of the current edition of the model building code including most of the reference material codes (steel, concrete, timber, masonry, etc). So, how does a prospective SE bridge this gap?

SEAW offers an annual Refresher Course in the months of August and September leading up to the October exams. Evening sessions are held at the Civil Engineering hall of the University of Washington typically on Tuesday and Thursday evenings from 6:30 to 8:30 PM. The Refresher Course is presented by volunteers. Course notes typically are double sided, fill out a 3"-thick, 3-ring notebook, and are intended to highlight design code requirements of the various materials as they pertain to the current model building code, touching on design from both a gravity and lateral perspective.

Different volunteers for each section strive to update these notes each year and work to inform attendees of current and upcoming code changes and how they do or will apply to the relevant model building and material codes. The course notes have evolved over time from the efforts of many selfless individuals. Obviously, there are differing styles and approaches presented in the notes. The course is intended to quickly cover structural engineering fundamentals relevant to the test and to offer insight on what aspects of a subject may or may not be expected on the test. The course and notes are intended to offer suggestions to help the examinees better prepare for the exam. The notes are intended to be a resource that supplements the practicing engineer's library; they are—obviously—not an answer book for the SE exam.

SEAW is here as a resource for engineers focused on structural engineering. With years of training and hard work, several engineers each year reach the pinnacle of our profession and achieve SE recognition. Like an Olympic-medalist, an SE will always be proud of his or her accomplishment and nationally recognized for that achievement.

As of February 2010, I have taken over as chair of the Refresher Course Committee. I wish to thank the past-chair, Chevy Chase, for his contributions and efforts in the management of the SEAW Refresher Course over the last several years.

Under Chevy's leadership, SEAW offered the opportunity for engineers to pick'n'choose to attend up to 50% of the refresher sessions (Half Refreshed) and also offered the notes for the first time as PDF files on a CD in lieu of in print. Both changes resulted in positive feedback from the membership.

As my term on the Seattle Chapter Board comes to a close, I am specifically looking to improve the value of the content and delivery of the Refresher Course in the upcoming years. This may be through the implementation of more targeted and relevant review material or through presentation techniques. We are seeking feedback from the membership on ways to improve the Refresher Course system. If you can contribute help or ideas, feel free to email your suggestions to mmoorleghen@dci-engineers.com.

Lastly, I am urgently looking for a volunteer to take over the presentation of the Structural Steel sections of the course. The session notes have been updated to the 2005 AISC. Please call me at 425-827-2238 or email me, mmoorleghen@dci-engineers.com. Thank you.
Mark D. Moorleghen, PE,SE

Mark Moorleghen , SEAW member since 2003, is an Associate with DCI Engineers in Bellevue. In addition to his board duties, he is the new Chair of the SEAW Refresher Course.

The SEAW Seattle Chapter *Equilibrium* is published monthly from September through May and is available online at www.seaw.org.

Articles, letters, and announcements are accepted by e-mail to seaw@seaw.org.

Advertising rates (prepaid) Help Wanted/Job wanted, max 200 words, $65; Display ads: Quarter page, $115; Half Page, $150; Full Page $190. 10% discount for ads running two or more months. Deadline is the fourth Friday of the month. Contact SEAW for an advertising order form.

Company Spotlight:
Coughlin Porter Lundeen

Established in 1994, Coughlin Porter Lundeen is a structural and civil engineering firm that provides inventive solutions and high-quality design services to clients throughout the Pacific Northwest. A different kind of engineering firm with a unique philosophy, our scope is not limited to the traditional boundaries of our disciplines. We provide a broad level of service and holistic approach by involving ourselves with all the major building components.

Providing services using advanced technologies is part of our basic philosophy; Coughlin Porter Lundeen uses various forms of BIM on the majority of our projects with a variety of framing systems and site designs across a wide range of market sectors.

Coughlin Porter Lundeen incorporates a sustainable life cycle approach for many projects by integrating resource conservation, waste minimization and long-term business goals into our building and site designs. Many of our LEED® projects are the first of their kind, including the first retail store in the nation to receive Gold LEED-CI certification (REI Portland) and the first fire station in the nation to receive Silver LEED-CS certification (Issaquah Highlands Fire Station #73).

A recognized leader in seismic upgrades, Coughlin Porter Lundeen has completed nearly $2 billion worth of seismic renovations or retrofits ranging from small, neighborhood buildings to the most notable public and private landmarks in the Pacific Northwest including Smith Tower, King County Courthouse, and Union Station.

SEAW Members at Coughlin Porter Lundeen

Jim Coughlin
Terry Lundeen
Mike Armstrong
Steve Day
Chris Duvall
Cory Hitzemann
Steve Savage
Bryan Zagers

Cale Ash, SEAW Member since 2005, is our Company Spotlight Coordinator. If you would like to see your company in the spotlight, e-mail him at cash@degenkolb.com.

PROJECTS

The Alaska Building, Seattle, Washington

Coughlin Porter Lundeen designed seismic and life safety renovations to this 1904 historic 15-story building and a 30,000 square foot addition. The 135,000 square foot adaptive reuse project is now home to a hotel.

The steel-framed tower addition seismically braced the existing building, thereby minimizing the level of intrusive upgrades to the existing historic structure. Thorough investigations of the existing building, coupled with details designed to provide for variation in the existing conditions allowed for rapid erection of the steel frame. The addition and connections to the existing structure were constructed in less than three months.

The Alaska Building was awarded the 2009 Northwest Construction Best Historic Renovation Award.

Image courtesy of Coughlin Porter Lundeen

Western Washington University Academic Instruction Center, Bellingham, Washington

Ben Benschneider

The Academic Instruction Center was designed to meet Western Washington University's growing need for classroom, laboratory and office space. At 127,000 square feet, the facility consolidates the Communications Sciences and Disorders and Psychology Departments. The two wings are joined by a fourth-floor skywalk.

Coughlin Porter Lundeen designed the building's structure with post-tensioned concrete floors and shear walls to accommodate the University's request for both an efficient and flexible design. The thermal lag properties of the concrete provide added benefit for increased energy savings.

As part of basic design services, we detailed a uniquely assembled cladding system for the LEED-certified building that combined precast concrete elements, intricately detailed wood, steel, and metal sunscreen assemblies, metal siding, full story window systems, and brick masonry veneer elements. In 2009, the project won a Civic Design Honor Award from the AIA Washington Council.

Steve Wanke

Salem Hospital, Salem Oregon

Coughlin Porter Lundeen recently completed design services for Salem Hospital's replacement program which includes 28 acres of campus master planning, 477,000 square feet of new construction, and existing facility renovation at connection points. .

New construction included a patient care tower and a central plant facility. The team participated in an integrated design delivery process that enabled fast-tracking of the structural design. The steel detailers and fabricators participated in the process and much of the structural framing was produced in advance of the final construction documents. Our BIM model allowed the team to thoroughly coordinate highly complex systems in a tight time period.

Meeting Recap

By Jessica Jenness

At the joint ACI/SEAW dinner meeting in February, hosted by ACI, David Goodyear from T.Y. Lin International presented the new Colorado River Bridge at Hoover Dam. The bridge is a bypass to the current crossing over the Hoover Dam. The idea for the bridge was conceived in the 1960's by the Bureau of Reclamation and construction recently started due to increased terrorism concerns. The overall project includes the bridge as well as a 1.5 mile approach on the Arizona side of the river and 2.5 miles of approach on the Nevada side. Each approach also has its own bridges.

A Design Advisory Panel was formed to determine the best bridge type and materials for the project. Due to the size of the canyon only two reasonable solutions were considered: a suspension bridge or a deck arch. The suspension bridge was ruled out due to the high wind conditions in the area and security and maintenance challenges. Various locations and span lengths were considered as well as steel and concrete alternatives for the deck arch option. Ultimately the shortest span, 1,060 feet, was chosen. The arch material is concrete primarily to coordinate with the existing historical concrete dam.

Site specific ground motion and wind studies were performed. In the first study, the seismic exposure was determined to be 0.7g for a maximum 20,000 year return period. Deeming this unreasonable, a 1,000 year return period was considered which determined a 0.2g maximum for the site response spectrum. Wind data was collected at the site for six months and correlated with 25 years of data from the airport. This yielded a 98 mph mean hourly wind and 126 mph three-second gust.

The final bridge design is a twin ridge concrete segmented arch with concrete segmented columns. There are steel struts at each column along the arch.

The bridge deck serves as a diaphragm. High strength 10,000 psi concrete was selected early for the arch only to control creep and deflection. Thermal design criteria created a challenge with 115-120° typical temperatures at the precast yard and significant thermal extremes on site. The arch corners have a chamfer which was a construction challenge but cut the wind loads by 1/3.

Special design considerations of the project were: arch deflection during erection, concern of columns not being constructed plumb, arch side-sway during erection, spandrel demands due to arch creep, the restoring force of tall columns, stiffness and displacement-induced demands, the effect of seismic loads on a classical arch form, and lateral frame strength and ductility demands. Some solutions to these issues included: crown expansion bearings for arch deflection, end pier expansion joints for deflection movement, and abutment springs and bumpers for bracing and slender column restoring forces.

The rock excavation was a construction challenge with the river below and the existing dam and its buildings. Limits were set with regard to the rock fall into the river as well as the velocities of rocks at site boundaries to minimize the chance of damage to buildings outside of and below the site.

The bridge engineers designed an erection scheme on the plans for the contractor. The intent of their design was to use as many permanent structures as possible to support temporary loads and minimize construction of extra temporary supports. However the general contractor, Obayashi/PSM, choose to design their own erection plan and wanted to minimize interaction with permanent works to help with their critical path.

The bridge construction utilized a highline crane system. The schedule suffered a year-and-a-half setback when one of the highline crane towers collapsed and had to be reconstructed. Cable stay towers supported the arch during construction and allowed for easier fine-tuning to ensure the arch met in the middle. The arch itself is constructed using self advancing form travelers with a pump that walks out with the arch from each side of the canyon.

The project was bid September 2004 for $114 million. Work was started on site January 2005. With 16 months lost to the highline failure the bridge is set to open to the public by Fall 2010. The bridge is 800 feet above the river, 1,060 feet long (the 4th largest concrete arch), with 290-foot concrete precast columns which are the tallest built to date. The project includes 6 million pounds of steel in the composite deck, 3.3 million pounds of rebar, 700,000 PT cables in column caps, and 8,000 cubic yards of 10,000 psi concrete in the arch. The bridge's official name is the Mike O'Callaghan – Pat Tillman Memorial Bridge.

Jessica Jenness is a 3 1/2 year member of SEAW. She currently chairs the YMF, serves on the chapter board and the membership committee.

SEAW Dues Invoices Have Been Emailed!

Please pay your dues online or send your check to

SEAW
PO Box 44
Olympia WA 98507

At press time, 350 Members have paid their 2010 dues.

Have You?

INSTRUCTIONS FOR PAYING YOUR DUES ONLINE:

1. Go to www.seaw.org
2. Log in to the member area (Default login name is your email address; password is your first name.
3. Click on "My Membership" in the menu bar
4. Select "Membership Renewal" in the gray menu bar to see if there is an outstanding invoice.
5. Select the invoice and Follow the prompts to pay your dues online using your VISA or Mastercard.
6. When your payment has been made, you will receive an automated receipt by email.

Forgot your Login Information? Simply click on "Forgot Password" under the Member sign in area and enter your email address. Your information will be emailed to you.

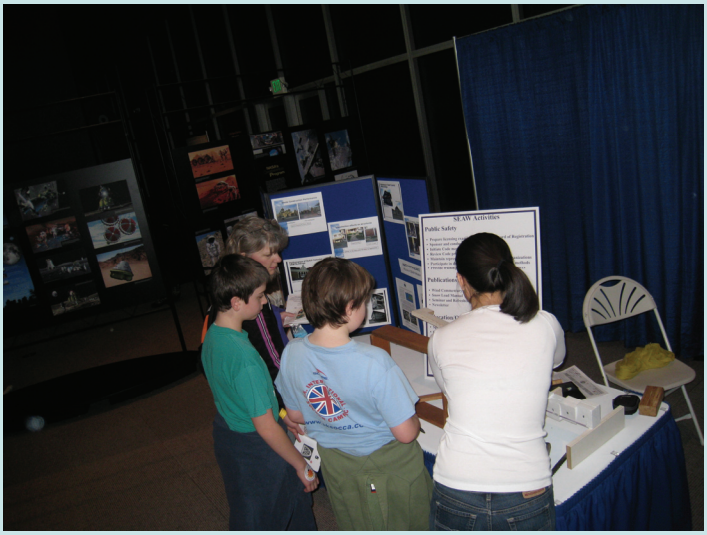
YMF Corner

PSEC Engineering Fair Recap

By Jessica Jenness

On Saturday February 13th, PSEC hosted their annual Engineering Fair at the Museum of Flight to kick-off National Engineering Week. The Fair had about 20 display booths staffed by practicing engineers and technical people representing many types of engineering disciplines. In addition, the Fair also featured a hands-on design competition on site (The Popsicle Stick Bridge Load Competition sponsored by the American Society of Civil Engineers). The event was open to the public, with the target audience being K-12 students and their parents.

The SEAW YMF staffed a booth at the Fair to show kids what a structural engineer does. A total of six YMF members volunteered during the day: Jerry Lee, Jenny Ahlport, Alisa Ma, Wayne Brown, Dan Yeager, and Jessica Jenness. Jenny deserves a big pat on the back for coordinating volunteers and updating all of the displays this year. Thanks to her hard work and the contributions of YMF members our booth featured photos from recent earthquakes that showed poorly reinforced columns, and side-by-side pictures showing the same structure as a 3D computer model and actual real-life building. Hands on displays included a hinged frame with removable brace and moment frame, a broken steel tensile test sample, reinforcement bar samples (including a #18, wow!), and lumber and engineered wood product samples.



Students visiting the SEAW booth at the February 13th PSEC Engineering Fair observe how a brace resists horizontal forces applied to a simple frame.

Jessica Jenness points out structural elements of the Museum of Flight to a student and parent.

I was surprised by the quantity and diversity of students we talked with. They ranged from kindergarteners who shared that they learned in school how plywood and particle board are made, to high school students thinking about career paths and college plans. It was very rewarding to share my passion for the structural engineering industry with kids and I encourage others to participate next year.

YMF Habitat for Humanity Day

When: March 27th, 2009
8:30 AM to 5:00 PM

Where: Rainier Vista Site

For more information on Habitat please visit their website:
http://www.seattle-habitat.org/

No Construction work experience required

Lunch will be provided by YMF

Contact Dan Yeager for Info
dyeager@dci-engineers.com

Happy Hours

Tuesday March 9, 5 PM
Triple Door—Seattle

Wednesday March 17, 5 PM
Vertigo—Bellevue

Tuesday April 13, 5 PM
The Library Bistro—Seattle

Come Join Us!

YMF Leadership

President
Jessica Jenness
jessicajenness@hotmail.com

Vice President
Dan Yeager
dyeager@dci-engineers.com

Outreach Representative:
Robyn Yang
ryang@dci-engineers.com

Social Representative:
Jerry Lee
jerryjlee@gmail.com

Created in 2007, the Younger Member Forum provides networking and social opportunities to SEAW members 35 and under, as well as new non-member engineers and students. All SEAW members are welcome to participate in YMF functions.

Senior Design Engineer - Structural

By Air, Land and Sea, the Port of Seattle brings international trade and transportation to the Puget Sound region, supporting a strong economy, providing a diverse base of well-paying local jobs and adding to the quality of life. Moving toward its goal of becoming the cleanest, greenest and most energy-efficient port in the nation, the Port is balancing a Triple Bottom Line: economic development, environmental stewardship and social responsibility. The Port of Seattle is seeking a forward-thinking, detail and results-oriented Senior Design Engineer (Structural) to work with our Design Services team to provide structural design engineering services for Seaport and Airport facilities construction projects.

Minimum Requirements

- Bachelor's degree in Civil Engineering
- Must pass FBI and TSA background checks
- Licensed Civil Professional Engineer in the State of Washington
- Eight (8) years of structural design experience or equivalent

Interested candidates who want to work *where a sustainable world is headed*,
please apply to Job ID# 5125 online at:
http://www.portseattle.org/about/employment/
Then select: current openings

Meetings, Seminars, Announcements

aci international

April 1, 2010

ACI will be coming to Seattle with their One-day Seminar :

Concrete Slabs on Ground

Learn to design, specify, and construct quality concrete floors by attending this seminar.

Who should attend?

Specifiers, engineers, architects, contractors, building owners, government agencies, and all others seeking the most up-to-date information on concrete slabs on ground.

Click here for complete details.

Or visit:

http://www.concrete.org/education/edu_SeminarDetails.Asp?SeminarID=28

Haitian and Chilean Earthquakes Compared – Lessons for the Pacific Northwest

CREW along with PNSN, EERI, USGS and UDP invite you to a discussion of the lessons for the Pacific Northwest, and the local and global impacts and responses to the Haitian and Chilean earthquakes.

Where: University of Washington Campus, Room 102 Johnson Hall

When: March 23th, 4:00p to 6:00p

For further information visit WWW.CREW.org

Or click for Program Flier

Opportunities

Senior Structural Engineer

M.A. Wright, llc, a Capitol Hill structural engineering firm performing a wide range of projects on new and existing structures is in need of a senior structural engineer. Requirements include a Structural Engineering license, ten years experience in the A/E industry designing new wood, timber, steel, masonry and concrete structures and excellent communication and business development skills.

Please reply to mike@mawright.com

Mark Your Calendar!

2010 Western Council SEA Roundup

Telus Whistler Conference Centre Whistler, BC October 21—23, 2010

Preliminary Program:

Thursday October 21, 2010

10:00 AM - 12 PM - NWCSEA Council Meeting

1.45 - 4.45 PM - WCSEA Council Meeting

4.45 - 6.30 PM - Exhibitor Event

7.00 PM - 12.00 AM - Social Event

Friday October 22, 2010

9.00 AM - 4.45 PM - Annual Conference (Structural Engineering Sessions)

6.30 PM - 12.00 AM - President's Awards Gala

Saturday October 23, 2010

Social Activities

Notes: The highway between Vancouver and Whistler has been recently upgraded as part of the 2010 Olympic Games Transportation plan, making travel to-and-from Whistler safer and more convenient than previously. Passports are required for visitors from the US traveling to Canada.

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Project Engineering Consultants Ltd.

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Slate of Candidates Named

The 2010 Nominating Committee has submitted the following slate of candidates for the 2010-2011 Seattle Chapter Board

President: Andrew McGlenn **Vice President:** Howard Burton

Directors (two positions open):
Cale Ash Mike Dunn
Lara Simmons Michael Wright

Voting will take place electronically beginning March 20th. Chapter MEMBERS (S.E.s) and Professional Associate members are eligible to vote.

Calendar

MARCH, 2010

Tuesday	9	YMF Happy Hour 5:00 PM Triple Door, Seattle
Fri-Sat	12-13	NCSEA Winter Institute www.ncsea.com
Wednesday	17	YMF Happy Hour 5:00 PM Vertigo, Bellevue
Tuesday	23	Seattle Chapter Dinner Meeting We host ASCE
Friday	26	Seattle/State Boards meet
Saturday	27	YMF Habitat for Humanity Day contact Dan Yeager dyeager@dci-engineers.com

APRIL, 2010

Tuesday	13	YMF Happy Hour 5:00 PM
Wednesday	21	Seattle/Southwest Chapters Joint Dinner meeting (SW Chapter hosts)
Tuesday	27	Seattle Chapter Board meeting

MAY, 2010

TBA		Spring Seminar
Tuesday	13	YMF Happy Hour 5:00 PM
Wednesday	19	YMF Happy Hour 5:00 PM The Parlor, Bellevue
Tuesday	25	Spring Social and Awards Event **Mark your calendar!**

Membership

Membership Applications

Eric Kelley
Parsons Brinckerhoff, Inc
BS 2003 UC San Diego
MS 2004 UC San Diego
Licensed P.E. WA
Class: Professional Associate

Applications Accepted

Joe Galusha MEMBER
Elizabeth Lozner Associate

Membership Classification Changes

Cale Ash: Professional Associate to MEMBER
Rick Unruh: Associate to Professional Associate
Janette Siu: Student Comp to Student
Chad Taylor: Associate to Professional Associate
Brian Walkenhauer: Student Comp to Student
David Thomas: MEMBER to LIFE MEMBER

DUES DUE!!!

2010 dues invoices were emailed on January 21, and were due on February 28.

Have you paid yours??