

### November 12th Dinner Meeting Program, UC Berkeley Faculty Club

## Lou Harrison Residence, High-Performance Straw-Bale

David Mar of Tipping Mar + Associates

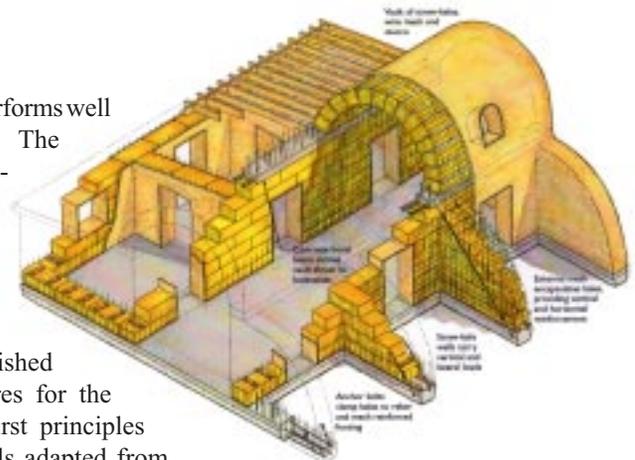
by Jamison Curry, Program Chair

Our next SEAONC dinner meeting will be held at the Faculty Club of U.C. Berkeley, November 12<sup>th</sup>. Students from the University of California at Berkeley will attend, as our guests.

David Mar will present his design of the Harrison residence. This small house, located in Joshua Tree in Southern California, is unique and experimental in nature, even in alternative building circles. The ecologically sensitive design responds to the harsh desert climate and a highly active seismic region by incorporating load bearing straw-bale wall construction and a vaulted roof of straw bales over the main room of the house. The primary structure (the vault and walls) is made entirely of straw bales, wire mesh, and stucco shells. Straw bales are a cellulose waste product from the production of cereal grains (wheat, rice, etc.). When the bales and plaster skins are made into walls, the

composite wall assembly performs well with passive solar designs. The bales provide excellent insulation and the plaster skins provide good thermal mass to regulate temperature swings.

Because there are no established structural design procedures for the vault and wall designs, first principles were used based on models adapted from reinforced concrete strut-and-tie mechanisms. The straw replaces concrete as a compression-only material working compositely with wire mesh, which substitutes for reinforcing steel in tension. To prove the applicability of the reinforced concrete theory, a destructive testing program was devised for a segment of the vault. The vault was able to carry the equivalent lateral load of over 1.0g when loaded transversely, and



it had a displacement ductility of around 16.

The overall design of the house is based on applying capacity-design principles throughout the project. As such, the design incorporates many “ductile” detailing features and multiple mechanisms to ensure redundancy. Because of the experimental nature of the project and a reluctant building official, the

*Continued on page 11*

### A Message from the President

## Turf Wars

Have you ever asked yourself why we are still using a building code based on the 1997 UBC? Well, you can blame it on the Turf Wars.

Back in the mid 1990's, the powers that be (BSSC, ASCE, NCSEA) decided that the United States should have one common building code rather than three regional ones (UBC, NBC, SBC). After countless meetings and compromises the formidable task of unifying the three codes was completed and the International Building Code (IBC) was issued in March of 2000 by the newly formed International Code Council, Inc. (ICC).

Well, it turns out that the National Fire Protection Association (NFPA), in association with the International Association of Plumbing and Mechanical Officials (IAPMO) and the Western Fire Chiefs Association (WFCA), also write codes. Unhappy with the code development process used by the ICC, the NFPA concluded they could not join forces with them. With no reasonable compromise on the horizon, the NFPA decided to develop their own building code.

The dream of having one unified code has been short lived. With no national mandate,

*Continued on page 12*

### Meeting Notice

**November Dinner Meeting  
November 12th, 2002**

**The Faculty Club,  
UC Berkeley**  
UC Berkeley Student Night  
*For directions, see newsletter insert*

*Assembly 5:45  
Dinner 6:30  
Program 7:30*

Fax registration form on the back of this newsletter to the SEAONC office by  
**12 noon Friday, November 8th.**

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# Quality Assurance Challenges Column

by Art Dell, CQA Chair

***This is the first in a series of articles about real life jobsite Quality Assurance challenges, triumphs and disasters. As testimonials or cautionary tales, these experiences can help you achieve similar success or avoid similar pitfalls. Please – contact me if you have a good story to tell. No names or specific project identification of any sort will be used.***

A Bay Area project included many thousand square feet of structural shotcrete walls. The reinforcement was detailed appropriately, the subcontractor and their nozzlepersons were well qualified, and preconstruction test panels were shot and evaluated to verify good encasement of the reinforcement. During shotcreting, full time Special Inspection was provided and test panels were shot for strength testing. The wall finishes were good and strength test results were all above the specified compressive strength.

Then, the Building Official asks: "Where are your in-place cores for visual examination for soundness?" Ooops. Take a look at UBC 1997 Section 1924.11.2: "*Completed shotcrete work shall be checked visually for reinforcing bar embedment, voids, rock pockets, sand streaks and similar deficiencies by examining a minimum of three 3-inch cores taken from three areas chosen by the design engineer which represent the worst conges-*

*tion of reinforcing bars occurring in the project. Extra reinforcing bars may be added to noncongested area and cores may be taken from these areas. The cores shall be examined by the special inspector and a report submitted to the building official prior to final approval of the shotcrete.*" Please note: this is not preconstruction testing. That is covered under Section 1924.5.

Now the Engineer is in trouble. You are not going to want to core through heavily congested boundary elements or columns. If the drawing notes or specifications did not include the extra reinforcement and coring required as part of the Contractor's work, the Contractor can simply say, "This is not my problem." What are your options now? You can try to locate the reinforcement and core or drill next to it and examine the area inside with a boroscope. You can try x-ray, pulse-echo, or other non-destructive and somewhat unsure methods of identifying changes in density. You can look at your calcs and try to demonstrate analytically that some lack of bond is acceptable. Or you can stick your neck out and write a letter with your stamp on it that says you accept the shotcrete work. None of these alternatives are particularly attractive. The best thing is to include the provisions in the contract documents.

This, however, brings up another concern. What if the cores are taken and they look terrible? First of all, what are the acceptance criteria? The code language is silent on that subject. Although you may reject them, the Contractor may say they are good enough. Here is a hint: take a look at ACI 506.2, Section 1.7 which gives criteria for grading shotcrete cores.

If the cores are confirmed as bad, now what are you going to do? You have 20,000 square feet of completed shotcrete walls and one indication of poor embedment. Do you get out the chipping hammers? Resort to the investigative methods outlined above? There is no easy solution to this problem.

What this story illustrates is that the code requirement is a minimum and is poorly detailed. Consider taking a hint from the masonry requirements where testing during construction occurs for every 5000 square feet of wall. Or, be specific and require sacrificial rebar and cores from the first section of wall that is shot. Any problems noted can be turned back to the Contractor who can then be required to adjust the mix, processes, procedures, and/or nozzlepersons until in-place cores are satisfactory. Whatever you do, try to get specific Building Official approval up front.

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## Public Affairs & Membership Committee Update

by Derrick Roorda, Public Affairs & Membership Committee Chair

The PA&M Committee met on October 9 and is currently working on a number of exciting projects.

The first is a school outreach program aimed at introducing K-12 students to the field of structural engineering. The program, originally referred to by the PA&M committee as the Speakers Forum, is still evolving. Efforts are being made to coordinate with LEAP, an organization comprised of local artists and architects also intended to reach out to the youth in our community. (See related story in this newsletter regarding the success of SEAONC's first entry in the Sand Castle Classic event!) We are also investigating the possibility of sharing resources with the Engineers Alliance for the Arts (EAA), the organization of Bay Area structural engineers responsible for the Student

Impact Program (formerly known as the Three Brick Bridge Project), which experienced huge success in its first two years.

Another task is to coordinate and assist the Ad Hoc Committee on Membership and Participation. This project will investigate membership trends, general involvement in the Association, and committee participation. Information from the survey will be used to identify areas of improvement that will make Association involvement easier and more attractive to a larger portion of the membership and the profession.

The committee is also planning to resurrect the Mentor Program that was implemented with much success in the past. This program will seek to pair new SEAONC members with more senior members at a dinner meet-

ing to be held early next spring. More on this will be forthcoming soon.

In addition to the above, the PA&M committee is responsible for coordinating the Rebuilding Together project (formerly Christmas in April), and for soliciting nominations for the annual Community Involvement award presented by SEAONC.

PA&M Committee meetings are informal and held monthly. Tasks are taken, not assigned, and involvement is voluntary, so please give it try! New ideas are always welcomed! For a meeting schedule, more information on committee activities, or to express thoughts or concerns regarding the current state of membership in SEAONC, please contact Derrick Roorda at 415-398-5740, or at droorda@de-simone.com.

# 2002 LEAP Sandcastle Classic – a Huge Success!

by Andrew Scott

**Ocean Beach, California, September 28th, 2002.** A barren plot, a rookie team, and a desire to build a masterpiece – all Team SEAONC needed to storm the awards podium at the 2002 Sandcastle Classic. The following is an account of the path to victory:

7:00am: DPR, Rudolph & Sletten, and Howard S. Wright show up to the beach in flatbed trucks loaded with formwork, earthmoving equipment, water distribution systems and union labor. They spend the next 3 hours moving the equipment to their sites. 9:00am: A small, and seemingly inadequate, number of buckets, shovels, and shaping tools are moved from a small pickup down to the 20'x20' plot marked Site 10. 9:30am: The site sign is placed atop an easel at Site 10. The sign reads "Structural Engineers Association with Argonne Elementary". 9:35am: A ray of sunlight breaches the cloud cover, illuminating the sign and warming the sand. 9:45am: Team members begin to arrive with an array of miscellaneous buckets, shovels, and one very unassuming watering can. 9:50am: The site is raked and the buckets are filled, tension mounts. 9:55am: The school children arrive.



Chaos replaces serenity. 9:57am: Order is temporarily restored as the game plan is hastily reviewed. 9:59am: The countdown begins, the adrenaline builds, and the children anxiously await the sounding of the horn.

10:00am HORN!! 10:00:01am: The beach erupts, no tool is left behind, no grain of sand is left untouched, and chaos is quickly redefined.

Sand begins to fly from the boundaries of the site towards roughly etched patterns. The buckets are quickly emptied onto the freshly placed sand and tiny feet stomp the loose sand into compacted mounds. 10:30am: A cone begins to take shape – the first sign of progress. The mounds rise beneath the compacting feet, growing taller with each shovel load. 10:45am: The decision is made to continue building the mounds until noon, at which time shoveling will give way to shaping, allowing equal time for shaping up until the 2pm deadline. 12:00pm: Lunch arrives, all but a few builders abandon the site for the much needed nourishment. The competition is surveyed and it is quickly apparent that Team SEAONC is trailing the field. Not to worry, it's only halftime. 12:30pm: Lunch complete, the builders return. "What are we building?!" "A train!" "What does it look like?!" "I don't know, what does it look like???" Anxiety quickly replaces excitement

as the inadequacy of the planning begins to emerge. "A boiler, we need a boiler..." The shaping begins, the direction is unclear, but the enthusiasm is solid. 1:00pm: A train begins to emerge, improvements are made, failures are rebuilt. The lone cone gives way to a tee-pee. The children attempt to dig out the center, quickly receiving a lesson in slope-stability. 1:10pm: The tee-pee is rebuilt. 1:45pm Much to the amazement of the builders, the train actually looks like a train – a really good train! 1:55pm: The finishing touches are made to the masterpiece, the tracks are quickly built, the site is cleaned and raked, and the crowd begins to gather. 1:59pm: Sophie takes her seat at the tee-pee and Cliff assumes his position on the tracks. 2:00:00pm: HORN! The masterpiece is complete, it is now in the hands of the judges.

"...and the SandCraft award goes to Site 10, Structural Engineers Association of Northern California..." A noble finish – in the top 3 out of 12 teams – clearly a victory for the rookie team. And of course, it would not have been possible without the gracious financial support of the SEAONC organization, provided through the Public Relations Committee, and the wonderful volunteers who showed up on the beach and produced a miracle. I would especially like to thank James Horne, Tim Mathison, Laura Yamaguchi, Julia Hunting, Joyce Feng, Manu Garg, Brant Jones, Brian DiBarnaba, Ms. Eng and her 4th and 5th graders, and their friends and family who joined us on the beach. Next year we take Best in Show!

*Ram International*  
*Repeat Full Page Ad*

# Legislative Committee Supports Ballot Initiatives

by David Wilson, Legislative Committee Chair

As Election Day nears, this year's Legislative Committee of the Structural Engineers Association of Northern California has reviewed this year's state ballot initiatives and encourages fellow SEAONC members to pay close attention to the following issues:

## California Ballot Measures:

- 46 Housing and Emergency Shelter Trust Fund Act of 2002
- 47 Kindergarten-University Public Education Facilities Bond Act of 2002
- 50 Water Quality, Supply and Safe Drinking Water Projects, etc.
- 51 Transportation, Distribution of Existing Motor Vehicle Sales and Use Tax

Each of these initiatives will result in state spending on new construction, renovation, and engineering studies with a combined potential of up to \$18.6 billion dollars and a real impact on the near-term future health of our profession.

## Other measures and initiatives:

- BB BART Seismic Measure, \$1.4 Billion
- A San Francisco Water Bond Proposition, \$1.7 Billion

In addition to the coming election, here is a brief status report on bills in the California State Legislature that this committee has been following:

<b>AB 857 (Wiggins/Sher)</b> Infrastructure planning: priorities and funding	Passed
<b>AB 1309 (Goldberg)</b> Employment: reports on gender and ethnicity	Vetoed
<b>SB 238 (Kuehl)</b> Measure to enable more NIMBY lawsuits designed to stop needed infrastructure and housing development projects.	Passed
<b>SB 688 (Burton)</b> "The Frivolous Lawsuit Expansion Act" Civil actions: limitation of actions	Passed
<b>SB 800 (Burton)</b> Liability: construction defects	Passed
<b>SB 1828 (Burton)</b> Mining: historical resources: affected Native American sacred sites	Vetoed

If you would like more information about the SEAONC Legislative Committee, please contact David Wilson, Chair, at <dwilson@cdengineers.com>.

## YMF NEWS

by Laura Yamaguchi, YMF Chair

Greetings Fellow SEAONC Members! YMF invites Senior Structural Engineers with 15-25 years of professional work experience to share their experiences with junior engineers in a lecture series. Any thoughts are welcome for the lecture topic. We would especially like to hear about your various experiences and interactions among other engineers and professional consultants, especially architects. Please contact YMF Vice-Chair Ali Afrasiabi at 415-348-8948 or alia@ansariinc.com if you are interested in sharing your lumps, bruises, and other learning experiences with younger engineers.

UC Berkeley Student Night will coincide with the November 12th monthly dinner meeting held at the Faculty Club at the UC Berkeley campus. All Undergraduate and Graduate Berkeley students are encouraged to come to the office visit and dinner presentation. Please contact YMF Chair Laura Yamaguchi at 510-549-1906 or lauray@tippingmar.com for more information.

SEAONC YMF will be holding our winter social jointly with ASCE and EERI this year on Wednesday night, December 11th, from 7:15 to 9:15pm, at the Yerba Buena Ice Skating Rink! All SEAONC members are encouraged to join the fun, and to bring along guests! YMF will pay for all SEAONC young members 34 years of age and younger, others will be asked to pay a fee to cover some of their food and ice skating costs. More details will follow in next month's newsletter. To RSVP for yourself and guests, or for questions, please e-mail lauray@tippingmar.com.

Last but not least, the next YMF committee meeting is scheduled for November 19th. Send Ali or myself any suggestions for the time and place. By the way, the LEAP Sandcastle event organized by Andrew Scott was a blast, and I encourage all of you to come out and play in the water and sand next year!

## SEAONC Treasurer's Report Fiscal Year 2001-2002

by Simin Naaseh, 2001-2002 SEAONC Treasurer

This report summarizes SEAONC's financial statement for the last fiscal year 2001-2002. SEAONC's budget was projected to be close to "break even." The revenues were \$561,751, and the expenses were \$570,524. The year ended with a loss of \$8,773 for the general fund.

Our revenues are largely from the membership dues (48%), Seminars (21%), Newsletter advertising (9%), meetings (7%), and website advertising (3%).

Our expenses are primarily Management Fees (26%), SEAOC Dues (21%), Meetings (11%), Board and Committee expenses (8%), Newsletter expenses (8%), and Seminar expenses (8%). While we charge our members for the dinner meetings, SEAONC subsidizes the meetings because of their high cost. Last year SEAONC subsidized \$22,591 of the meeting costs (a 36% subsidy).

In addition to SEAONC's general funds,

the Board spent some time on establishing the goals for the Scholarship Fund, and on soliciting contributions from members. Our year-end balance for the Scholarship Fund was \$66,267. Last year, the members contributed \$8,036 to the Fund. SEAONC contributed \$10,000 out of the General Funds to the Scholarship Fund. These contributions allowed SEAONC to award \$5,000 scholarships to three applicants.

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## **BUSINESS FORUM NOVEMBER PROGRAM:**

### ***Subcontract Services and Contracts: Examples and Case Studies***

**Date:** Wednesday, November 20, 2002  
**Time:** 12:00 – 1:30 p.m., Lunch/Program  
**Place:** City Club  
155 Sansome Street  
San Francisco, California

**Roundtable Forum:**

**Firms Requested to Participate:**

Degenkolb  
C+D Consulting Engineers  
H.J. Brunner  
Rutherford & Chekene  
Forell/Elsesser  
Tipping - Mar & Associates  
All other members (firms) who attend

**Meal Choice:** Chicken, Beef, or Pasta

This will be our first 2002-2003 Roundtable Forum meeting format where SEAONC Business Forum members will discuss their business practices. Firms will bring examples of subcontract forms and provisions they have signed as consultants under other Prime (Architect) contracts and subcontract forms Structural Firms use for subconsultants that work under their Structural Engineer Prime contracts. This meeting offers firms an opportunity to learn from other firm's successes and failures in contracting engineering services. Contract scope, costs, budgets, schedules and client expectations will be discussed.

New small Structural Engineering firms have expressed an interest in learning from firms that have been in business for many years. This is an opportunity for you to share and learn business practices from other firms. The Business Forum welcomes all SEAONC members to attend this meeting.

We request all those who attend provide sample(s) of subcontracts that you use in your business, which will be distributed to attendees of the meeting. If you are able to provide these documents to the SEAONC office by noon, November 19<sup>th</sup>, the SEAONC office will make copies to distribute. If you cannot provide the SEAONC office with the documents by noon on November 19<sup>th</sup>, please bring to the meeting enough copies to distribute to all (call the SEAONC office after the sign-up deadline for the number of attendees).

**Make reservations by calling the SEAONC office (415-974-5147) by noon, Monday, November 18, 2002.**

**Cost:** \$20.00 Business Forum Member  
\$30.00 Non-Business Forum Member

*Join the Business Forum and save \$10.00 a month on the luncheon! Yearly dues is \$150 for firms of 6+ employees and only \$75 for 5 employees or less. Call the SEAONC office directly at 415/974-5147 to join. This is an opportunity to join a committee whose only requirement is that you eat a great lunch each month with us and receive some good information about running your business.*

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## ***Business Forum September Meeting Summary:***

### **SB1953 HOSPITAL SEISMIC PERFORMANCE PLAN**

On September 18, 2002, the SEAONC Business Forum presented a talk on the SB1953 Hospital Seismic Performance Plan. The basic requirements of SB1953 include evaluations, compliance plans, bracing of key systems, life safety and, finally, substantial compliance by the year 2030.

Mr. Roger Richter, Sr. Vice President of California Healthcare Association (CHA) spoke about the status and future of the hospital seismic safety mandate. Of the 474 hospitals under SB 1953, 436 have met the seismic evaluation submittal deadline. The cost of SB 1953 has been estimated at \$24 billion. Costs could be much higher, but much of the cost is not because of seismic requirements, but because of old infrastructure. CHA will likely advocate loans, grants, and tax relief to help fund costs for the retrofits. In addition to cost, future problems will include OSHPD staffing and designer quality control. Provisions in the regulations allow hospitals to apply for an extension up to 2013 to achieve compliance with SB1953.

Bob Eisenman, PhD, of Kaiser Permanente then spoke about Kaiser's approach to handling the SB 1953 requirements. Of

Kaiser's 28 California hospitals, 11 meet the 2030 standards, 4 meet the standards up until 2030 and 13 will be retrofitted, replaced or out of service by 2013. After consideration of three main options: retrofit, putting hospitals out of service and rebuilding, Kaiser ended up choosing the latter. Retrofit was rejected based on high cost, service disruption and the fact that the hospitals would still be older. Putting hospitals out of service was not an option due to lack of community capacity, and partnering with other hospitals too complicated and uncertain. In the end Kaiser has decided to rebuild the 13 medical centers by 2013 at an estimated cost of over \$4 billion. Kurt Schaefer, Deputy Director of OSHPD, attended the meeting and provided comments about the challenges that OSHPD faces with State budget limitations, and the huge volume of work required to review the reports and construction documents that this SB1953 program will generate over the next ten years.

Based on the attendance and lively discussion afterward, this topic is very important to structural engineers, and we trust the luncheon was useful and informative.

# Bulletin Board

## ALX Engineering Merges with Interactive Resources

Interactive Resources is pleased to formally announce our successful merge with ALX Engineering, and welcomes Don Cushing, Principal and Owner of ALX Engineering, to our team. Don brings with him over twenty-two years of professional experience, a varied client base, and an approach to client selection, project management and service delivery that complements and enhances Interactive Resources' business philosophy and objectives.

As the newest Principal at Interactive Resources, his responsibilities include project management, marketing, contract negotiation and staffing for both structural and civil engineering services. We welcome Don to our team!

Interactive Resources is a multidisciplinary architecture, engineering and planning firm founded in 1973 in Point Richmond, California. Our staff of dedicated professional architects, structural and civil engineers, designers and planners — the "interactive resources" of our name — has given the firm a reputation for versatility and efficiency.

## CALL FOR PAPERS

### 2003 LA Tall Buildings Structural Design Council Annual Meeting

The Los Angeles Tall Buildings Structural Design Council is calling for papers for the 2003 Annual meeting to be held in Los Angeles on May 9, 2003 at USC's Davidson Center. This year's focus will be on the prevention of building collapse, blast-resistant design, and how the principles of seismic design can be applied to these types of building behavior.

Suggested topics for papers include:

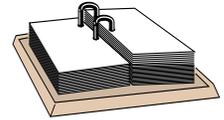
- Definition of collapse
- Consequences of different types of collapse (partial, progressive)
- Analytical models for predicting collapse
- Analytical models for assessing the consequences of collapse or blast damage
- Integration of seismic design principles into collapse-prevention
- Application of current collapse-prevention or blast-resistant design standards
- Recommendations for future collapse-prevention design provisions

A one-page abstract describing the content of the paper must be received by December 16, 2002. Final papers are due March 17, 2003. Submit abstracts to: Dr. Gregg E. Brandow, LATBSDC Executive Director, Brandow & Johnston Associates, 1660 West

Third Street, Los Angeles, California 90017,  
E-mail: gbrandow@bjase.com

## EVENT CALENDAR

**Nov. 12 East Bay Dinner Meeting at UC Berkeley Faculty Club--UC Berkeley Student Night**



**Nov. 14 & 21 SEAONC Seminar: Practical Wood Design and Construction**

**Nov. 19 YMF Committee Meeting**

**Nov. 20 Business Forum Luncheon Meeting, San Francisco City Club**

**Dec. 3 Dinner Meeting, San Francisco City Club**

**Dec. 11 YMF Social (with EERI and ASCE)**

## Committee Chairs

### **Business Forum**

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### **Young Members Forum**

Laura Yamaguchi  
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# Design Approach for Analysis of Diaphragms

by Badri Prasad, Chair of Detailing Requirements  
Subcommittee of Seismology and Structural  
Standards

One of the issues that the Seismology and Structural Standards Committee has been working on is that of diaphragm analysis and design. This topic was introduced by the concrete subcommittee, which has been working on the evaluation of collector design in cast-in-place concrete structures.

Of particular concern is the prevalence of the belief that the only way to design diaphragms is to assume that the diaphragm acts like a simple beam (tributary method) spanning between vertical lateral-load-resisting (VLLR) elements such as Shear Walls, Braced Frames, Moment Frames etc., with a uniform distribution of shear in the direction normal to the lateral span and with linearly increasing axial force in collectors aligned with the VLLR elements. This implies that the flexural action is predominant and the distribution of horizontal forces to VLLR

elements is by the flexural behavior of diaphragm the acting as a beam. This method of diaphragm analysis is illustrated in Figure 1.

The first diagram shows the whole diaphragm; the second (Section 'a'), is a free-body diagram of a portion of the diaphragm, with shear varying linearly along the span and collector forces confined to the VLLR lines; and the third (Section 'b'), is a free-body diagram of a section cut the other way, showing uniform shear and chord forces at the diaphragm boundaries. This method neglects any capacity of the diaphragm to transfer forces through distributed tension or compression in the direction of lateral forces. This method does not enforce strain compatibility.

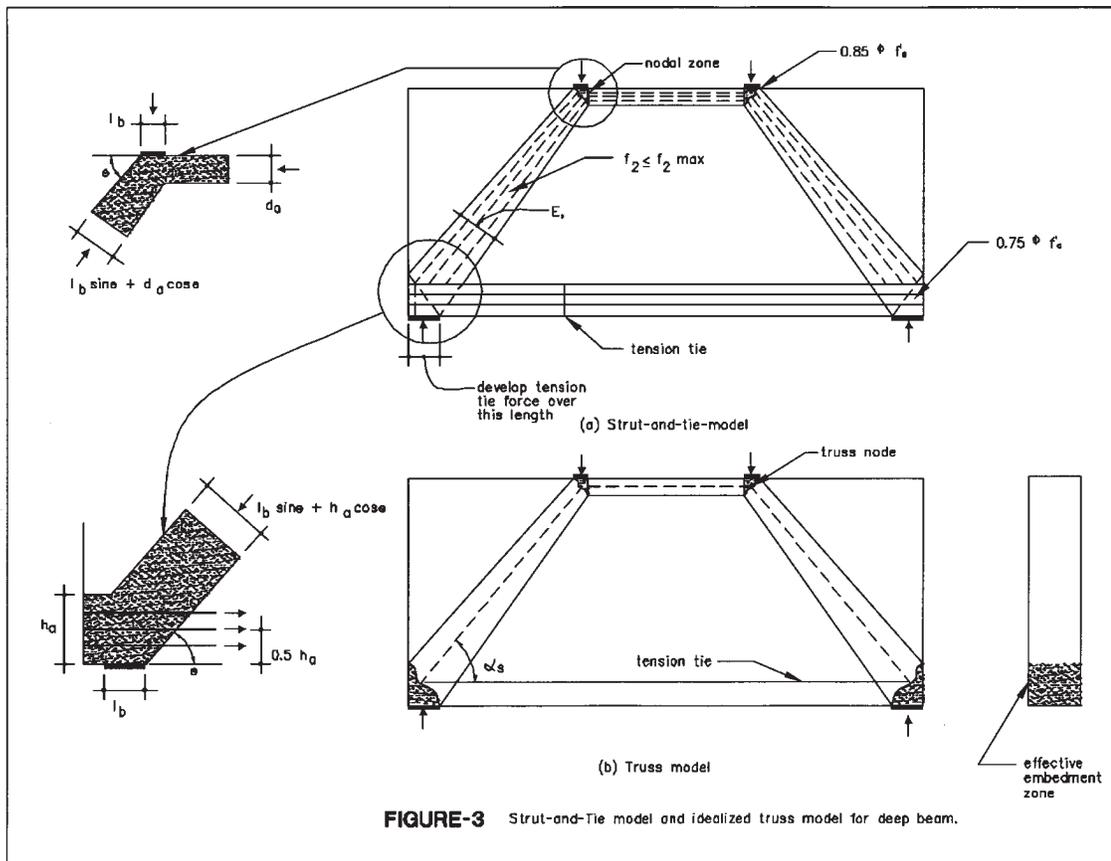
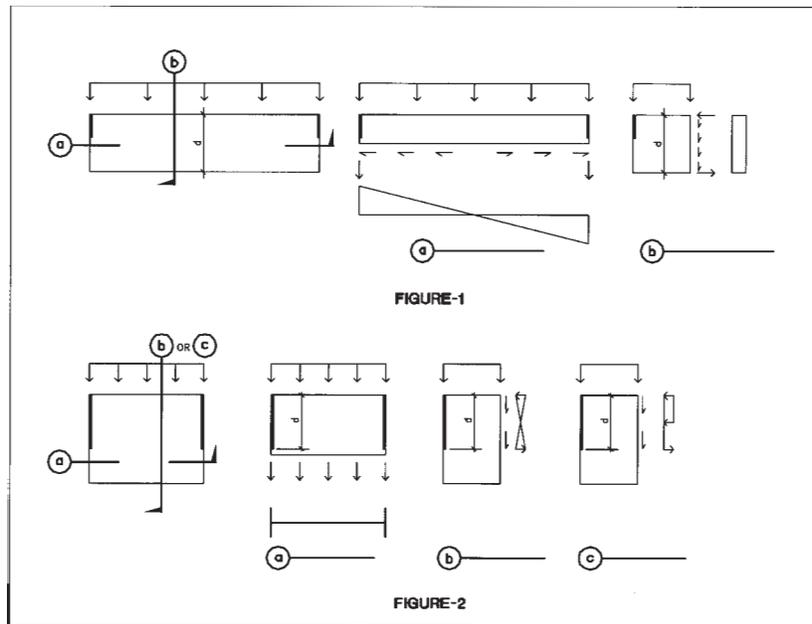
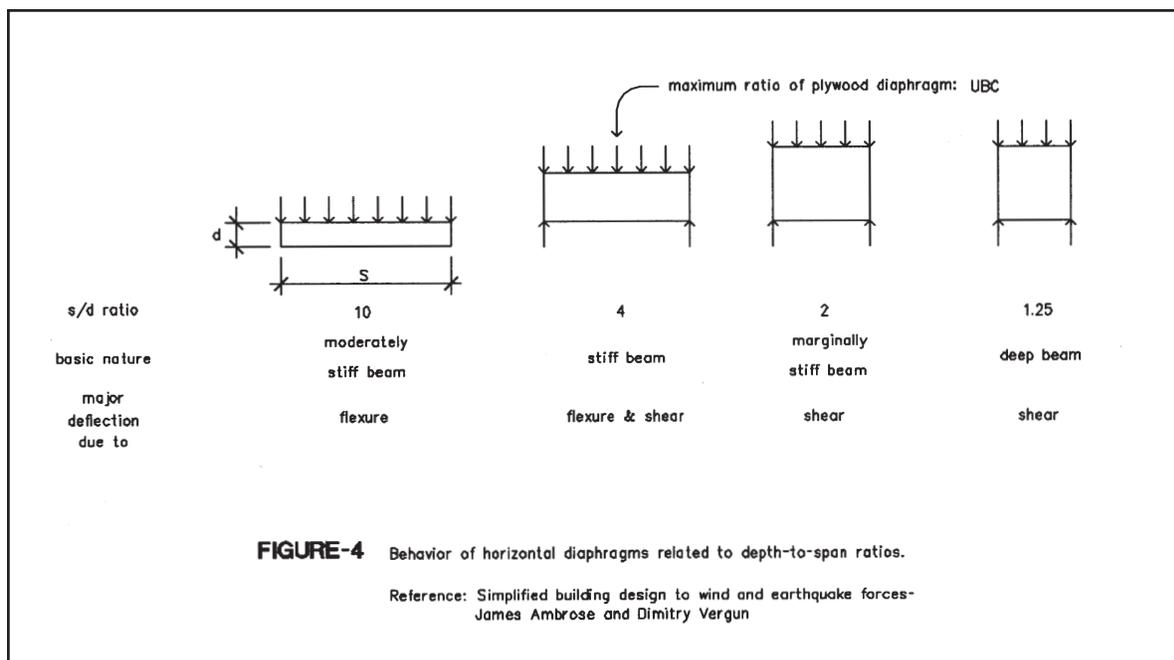


Figure 2 shows an alternative mechanism of force delivery to the VLLR elements based on diaphragm shear capacity: the first diagram shows the entire diaphragm; the second (Section 'a') is a free-body diagram of a portion of the diaphragm with uniformly distributed collector forces and



Reprint of Figure 6.7 from "Simplified Building Design for Wind and Earthquake forces," by James Ambrose and Dimitry Vergun, copyright 1995 John Wiley & Sons. Reprinted by permission of John Wiley & Sons, Inc

**Continued from page 8**

no shear at the section cut; and the third (Section 'b', or 'c') is a free-body diagram of a section cut the other way, showing shear forces concentrated near the VLLR elements and a corresponding concentration of the resulting flexural forces. These resulting flexural forces may be resisted by chord forces or other flexural couples (note that UBC section 1921.6.7 specifically requires diaphragm boundary members to be sized for chord forces). This method neglects the excess shear capacity of the diaphragm and the capacity of collector beams beyond the depth of diaphragm required for shear strength. This method also does not enforce strain compatibility.

The behavior of a diaphragm with a high span to depth ratio, where the flexural behavior of the diaphragm is predominant, may be closer to that shown in Figure 1 than to that in Figure 2. The behavior of a diaphragm with a low span-to-depth ratio, where the diaphragm behavior approaches that of a deep beam with shear deformations governing the behavior of the diaphragm, may be closer to that shown in Figure 2. It may be inappropriate to assume that plane sections remain plane or that shear stress is uniform over the depth of the diaphragm for diaphragms with low span-to-depth ratios. Figure 3 shows another approach to diaphragm design: the "Strut-and-Tie" model for a diaphragm with a low span-to-depth

ratio. A detailed explanation of this method is covered in chapter 6 of ACI-ASCE Committee 445 report.

Yet another approach is modeling the diaphragm using plate elements that capture the elastic properties, or (preferably) a force-displacement relationship including post-elastic behavior. Some software programs have this capability.

Figure 4 shows the influence of span-to-depth ratio on the behavior of horizontal diaphragms. As the span-to-depth ratio falls, the deformation characteristic of the diaphragm approaches that of a deep beam in which deflection is primarily caused by shear strain rather than by flexure.

It is recognized that the actual behavior of diaphragms will lie between the two extremes of flexure-governed and shear-governed deformation.

Any of the mechanisms of force delivery represented by the four figures can be used in design, provided that adequate collector and shear strength, as well as the required corresponding flexural strength, is demonstrated, and ductile detailing is provided where yielding is possible (specifically, at collectors near the VLLR elements). Chords that are proportioned for simple beam moments should be detailed such that they are

continuous over the length of the building. A rigorous analysis is usually time consuming and is seldom justifiable in terms of accuracy of the results.

**References:**

1. Simplified Building Design to Wind and Earthquake Forces – James Ambrose and Dimitry Vergun
2. The Seismic Design Handbook – Farzad Naeim
3. ACI 318-02 – Building Code Requirements for Structural Concrete and Commentary
4. Seismic Design for Buildings – Department of the Army, Navy and the Air Force

**FOR RENT: SEAONC  
Multimedia Projector &  
Digital Camera**

SEAONC's multimedia projector is available for rental! Voting members can rent the projector for only \$100 a day (plus a \$1000 security deposit) SEAONC also has a SONY digital camera available for rental. Voting members can rent the camera for only \$25 a day (plus a \$1000 security deposit). Contact the SEAONC office at 415/974-5147 for details.

**Ahearn, Knox & Hyde, Inc.** is a medium size structural firm in San Jose providing design services to the bay area for the past 32 yrs. We are looking for a self-motivated engineer with a minimum of 5 yrs. of experience in analysis & design of various types of buildings. We offer a very good benefits package along with SEP IRA plan, all fully funded by the firm. Salary is competitive & commensurate with experience & skills. Superb working conditions with congenial atmosphere. Fax résumés to 408/267-7919 or e-mail [hyde@akhse.com](mailto:hyde@akhse.com).

**Biggs Cardosa Associates** has an immediate opening for a structural project manager for its San Jose office. Minimum of 15 years experience in building design and a California SE required. Visit our website at [www.biggs-cardosa.com](http://www.biggs-cardosa.com) for more info and to apply. EOE.

**DeSimone Consulting Engineers (DCE)** has immediate openings in our San Francisco office for outstanding P.E. or S.E.-licensed Project Engineers and Project Managers with excellent communications skills and varying levels of experience in design of new buildings and seismic rehabilitation of existing buildings. DCE has designed significant projects such as the Sony Metreon and Four Seasons Hotel. Our booked backlog is solid, which provides a unique opportunity for creative and ambitious design engineers to participate in exciting and challenging projects and to grow with our firm. Founded in 1969, DCE is headquartered in New York City with a major office in Miami. We offer a competitive benefits package and a great work environment. Please fax resume to Ron Polivka, DCE, 10 United Nations Plaza, Suite 410, San Francisco, CA 94102 (415/398-9834) or e-mail to [rpolivka@de-simone.com](mailto:rpolivka@de-simone.com)

**Forell/Elsesser Engineers**, an award-winning structural/civil engineering firm, offers outstanding career opportunities to engineers and CAD drafters with all levels of experience who seek a dynamic, challenging and rewarding work environment ([www.forell.com](http://www.forell.com)). Work on exciting projects and collaborate with innovative design engineers. We offer an unparalleled salary & benefits package, including employer matched 401(k), pension and incentive compensation plans. Contact: Jim Guthrie, 160

Pine St. #600, San Francisco, CA 94111; fax 415/837-0800 or [jim@forell.com](mailto:jim@forell.com)

Structural designer position available with a Modesto based structural consulting office. 3 years experience in designing concrete, CMU, steel, and wood structures. Must have good communication skills and be conversant in AutoCad, SAP 2000, ETABS. Send résumé to **Lawder Engineering**, PO Box 3206, Modesto, CA, or fax to 209/521-1166.

**RPSE**, [www.rpse.com](http://www.rpse.com), in business since 1960, has a long AND successful track record of innovative and creative structural solutions. Projects range from relocating historic buildings to retrofitting health care facilities. Our name is well known for quality – something we earned via our quality team members. If your strengths include communication and critical thinking, e-mail: [sharonberman@rpse.com](mailto:sharonberman@rpse.com) or fax cover letter and resume to HR-Sharon, 650/428-2861.

**Structural Design Group of Santa Rosa**, is looking for a highly motivated, technically skilled engineer looking for a leadership position in an exciting young firm. Associate position available for a bright, creative individual with 2 years minimum design experience in educational facilities, low rise commercial, or residential structures. We offer unlimited opportunities for career advancement and an excellent salary/bonus/benefit package. Please fax résumé to 707/284-3646 or e-mail: [RichB@s-d-g.net](mailto:RichB@s-d-g.net)

**Watry Design, Inc.** which is located in the San Francisco Bay Area, is in search of highly motivated engineers to join our rapidly growing team. Watry is a full service Architectural/Engineering Firm specializing in the design of large concrete structures, including high-rise hotels and apartments as well as award-winning parking structures. This position offers the right individual an opportunity to play an integral role in the design of multi-million dollar projects with a firm that fosters a cohesive family like environment. The applicant must possess a B.S. in Structural Engineering (or equivalent) with a P.E. or S.E license being highly desirable. A background in the design of concrete and post-tensioned structures, strong computer skills, and excellent com-

munication skills are beneficial. If you would like further information regarding Watry Design, Inc., please visit our web site at [www.watrydesign.com](http://www.watrydesign.com). Submit all résumés to: Watry Design Inc., 815 Hamilton Street, Redwood City, CA 94063 attn: Lisa Blanton or you can send electronically to [lblanton@watrydesign.com](mailto:lblanton@watrydesign.com)

Dean, College of Architecture and Environmental Design, **Cal Poly State University**, San Luis Obispo, CA. Cal Poly is seeking a dean of the College of Architecture and Environmental Design (CAED). The CAED is one of the largest of its kind in the country with seven accredited degree programs in architectural engineering, architecture, city and regional planning, construction management, and landscape architecture. The preferred starting date is July 1, 2003. For additional information contact: Academic Personnel Office, Phone: 805/756-2844, Fax: 805/756-2916 or 756-5185 e-mail: [academicpersonnel@calpoly.edu](mailto:academicpersonnel@calpoly.edu)

**DASSE Design Inc.** has opportunities for a project engineer and staff engineer in its Oakland office for people who are passionate about structural engineering. Minimum qualifications are: Staff Engineer - BSCE (MSCE preferred) with 1-3 years structural design experience; Project Engineer - BSCE (MSCE preferred), PE or SE license and 3-8 years experience on a variety of structures of increasing size and complexity. DSA and OSHPD experience a plus. Positions require strong computer skills, excellent verbal/written abilities and a desire to grow in a collaborative, professional environment. DASSE works with award-winning architects on health care, civic, K-12 schools, college/university and corporate facilities, using steel, concrete, timber, and masonry, in both new construction and renovation. Our projects are challenging and diverse. Send resumes with cover letters to the attention of William Andrews by fax 415/243-9165 or e-mail ([andrews@dasse.com](mailto:andrews@dasse.com)). Learn more about our firm at [www.dasse.com](http://www.dasse.com)

**Kutzmann & Associates, Inc.** has an opening for an engineer (prefer CA licensed SE or CE) to do structural plan checking. Salary is negotiable DOQ. The benefit package is quite nice and includes a profit sharing program. Additionally, flexible working hours are available for those who don't like to sit

## Job Forum, continued

in rush hour traffic. Good written and oral communications skills are essential and Certification as a Plans Examiner through the International Conference of Building Officials is a plus. Send résumé to: Kutzmann and Associates, Inc. 39355 California St., Suite 200 Fremont California 94538 You may also FAX to: 510/796-9422 or e-mail [kutz@pacbell.net](mailto:kutz@pacbell.net)

Maui Firm - Established, very busy, small structural firm in beautiful upcountry Maui, Hawaii needs experienced Structural Engineer, with extensive AutoCAD background and/or a highly skilled and self-motivated structural draftsman/CAD manager with minimum 3 years experience. Competitive salary, great benefits, excellent location. Fax resumes to **Walter Vorfeld & Associates**, 808/572-3616 or e-mail to [wva@aloha.net](mailto:wva@aloha.net)

**Nichols, Melburg & Rossetto** is seeking a licensed engineer or a graduate with a Bachelor's degree in Civil or Architectural Engineering and 2+ years related design experience to work as a Project Engineer in the Chico Office. Projects include schools, hospitals, and commercial buildings. Applicants should be familiar with wood, concrete, CMU and steel design. For information visit our employment page at [www.nmrdesign.com](http://www.nmrdesign.com)

### Job Forum Insertion Fee:

**\$150 up to 450 characters/spaces  
\$15 for each 45 characters/  
spaces thereafter. All job forum  
ads will be posted on the  
SEAONC web site.**

### Reminder:

**December  
Newsletter Deadline:  
Friday, December 8, 2002**

**submit to:  
[seaonc@ix.netcom.com](mailto:seaonc@ix.netcom.com)**

## Posting for Membership

### Member SE

Eric Anderson  
Wiss, Janney, Elstner  
Craig Cole, Principal  
Degenkolb Engineers

### Associate

Chee-Hoang Goo, Engineer  
Rinne & Peterson  
Morgan Griffith, Staff Engineer  
Mesti-Miller Engineering, Inc.  
Keith Ma, Structural Designer  
Holmes Culley  
John Wiley, Designer  
Degenkolb Engineers

### Student

Mikael Gartner, Graduate Student  
University of California Berkeley

## SEAONC NEWS DISPLAY ADS

<b>Full Page</b>	<b>\$900/mo.</b>
<b>2/3 Page</b>	<b>\$600/mo.</b>
<b>1/2 Page</b>	<b>\$480/mo.</b>
<b>1/3 Page</b>	<b>\$360/mo.</b>
<b>1/4 Page</b>	<b>\$270/mo.</b>
<b>1/6 Page</b>	<b>\$225/mo.</b>

**Rates are for finished camera-ready black and white ads. Full payment is required at time of insertion order. For advertising contract, specifications, and special rates for running an ad multiple months, contact the SEAONC Office at [seaonc@ix.netcom.com](mailto:seaonc@ix.netcom.com)**

## New Members

### Life Member SE

Richard Biggs  
Structural Engineer  
Donald Peterson, Structural Engineer  
Rinne & Peterson

### Member SE

Andrew McNulty, Project Engineer  
Structural, Culp & Tanner, Inc.  
Manwendra Sinha, Supervising Engr  
Parsons Corp.

### Member

Michael Dadik, Engineer  
Carollo Engineers  
Steven Oh, Project Engineer  
Tipping Mar & Associates  
Sergio Zilli, Senior Associate  
Gale Associates

### Associate

John Evans, Staff Engineer  
DASSE Design  
Alexander Lornie  
Lloyd Gossen & Company  
Charles Sandschafer  
Murphy Burr Curry, Inc.

### Corresponding

Michael Ballou, Sr. Structural Engineer  
Ammann & Whitney

## Harrison Residence

### Continued from page 1

design languished in plan check for over a year. The breakthrough came when the design team and building official negotiated to accept the findings of a third party peer review. The project was reviewed and approved by Wiss, Janey, Elstner Associates, Incorporated.

This project is important because it incorporates many current capacity design philosophies in the use of an environmentally friendly material—straw bale. The project received an Excellence in Structural Engineering Award from the Structural Engineers Association of Northern California.

More detailed information on this project can be found at the Tipping Mar website ([www.tippingmar.com](http://www.tippingmar.com)) and a website made for the owner ([www.harrisondocumentary.com](http://www.harrisondocumentary.com)).

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# SEAONC SCHOLARSHIP FUND

The SEAONC Board of Directors established The SEAONC Scholarship Fund to assist the organization in promoting the future well being of the profession by encouraging engineering students to select structural engineering as their field of study. The fund was established with a contribution of \$50,000 from the reserves of the organization in 2000-2001. Fund growth that will allow increased size and/or number of scholarships and amounts is a goal. In addition to the initial SEAONC contribution, annual contributions will also be required to ensure the success of this program. These annual contributions will come from individual members and member firms. The Board's goal is to establish a fund that will grow to a point that it becomes self-sustaining within approximately 10 years.

The initial concept is for the scholarships to be awarded to undergraduate engineering students that are about to make decisions about their future professional direction. We believe that this program will help to signal to young engineering students of the vitality and professionalism of the structural engineering field. As appropriate, future boards may expand the program to also include graduate scholarships or other activities of this type.

We appreciate the contributions that have already come to the fund this year from members contributing through their annual dues statement. If you missed this opportunity, we encourage you to send a contribution to the SEAONC office. Member donations will be acknowledged in future newsletters. All funds that are donated by members or member firms will be strictly held for use as part of the scholarship fund.

**We acknowledge the generous contributions to the fund this year from the following members:**

## **\$100-\$500**

*Adamo & Associates*  
*Mehri Ansari*  
*Richard Bettinger*  
*Donald David*  
*Carl Goepfert*  
*George E. Greenwood*  
*Steven K. Harris*  
*Walter Hensolt*  
*Loren Hinkelman*  
*Ephraim Hirsch*  
*OLMM Consulting Engineers*  
*James Murray*  
*Kevin Powers*  
*F. Robert Preece*  
*Daniel Shapiro*  
*Roland Sharpe*  
*Kenneth Smetts*  
*Waleed Mari & Associates*

## **\$50-\$99**

*William Alsmeyer*  
*Robert Bentson*  
*Charles De Maria*  
*William Fennell*  
*Sunil Gupta*  
*David Hammond*  
*Tim Hart*  
*William Kaplan*  
*Arnold Kohnert*  
*Eugene Miller*  
*Lowell Napper*  
*Harry Okino*  
*Burr Randolph*  
*Constantine Shkapsky*  
*Gregory Shriver*  
*Steven Tipping*  
*Erwin Wollak*  
*Thomas Wosser*

## **Under \$50**

*Richard Bauman*  
*Pedro Bello*  
*Lawrence Chan*  
*Harold Engle, Jr.*  
*Matthew Engle*  
*Samuel Fletcher*  
*Toma Goncerenco*  
*Larry Kulchin*  
*James Leach*  
*Frank Linhart*  
*John Lowney*  
*William Price*  
*Frank Valavanis*  
*Homer Wong*

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## **President's Message**

*Continued from page 1*

the states are left to adopt the code of their choice. The NFPA building code was published on October 1, 2002. The states now have to decide which code to adopt. For California, this decision will be made by the California Building Standards Commission.

While the ICC and NFPA officials are battling over turf, the structural engineers are

seeking a compromise through the use of ASCE 7, *Minimum Design Loads for Buildings and other Structures*. The plan is to have both codes adopt an updated ASCE 7 by reference. If this is done, then both codes will basically be the same, and we as structural engineers won't care which code is adopted. Unfortunately, this probably won't happen until 2006.

Opinions expressed in the SEAONC NEWS are not necessarily those of the Structural Engineers Association of Northern California. Advertising rates and information sent upon request. Acceptance of advertising and informational brochures in the SEAONC NEWS does not constitute endorsement or approval by SEAONC of the products or services advertised. SEAONC reserves the right to refuse any advertising.

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*Repeat Ad for  
Computers and Structures*

upcoming events

NOV

12 East Bay Dinner Meeting/UCB Student Night--UC Berkeley Faculty Club

14, 21 SEAONC Seminar: Practical Wood Design and Construction

19 YMF Committee Meeting

20 Business Forum Luncheon

DEC

3 San Francisco Dinner Meeting

11 YMF Social

Registration

**Structural Engineers Association of Northern California  
NOVEMBER 12th SEAONC DINNER PROGRAM, UC BERKELEY FACULTY CLUB**

5:45 PM  
General Assembly

6:30 PM  
Dinner

7:30 PM  
Program

*"Lou Harrison  
Residence, High-  
Performance Straw  
Bale"*

Location:  
UC Berkeley Faculty  
Club

**For directions and  
parking information,  
see flyer inserted in  
this newsletter**

If no label is shown above, or for guests, please fill in the form below.

NAME \_\_\_\_\_

COMPANY \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ STATE \_\_\_\_\_ ZIP \_\_\_\_\_

PHONE \_\_\_\_\_ FAX \_\_\_\_\_

**RSVP by fax to: 415/764-4915** or phone: 415/974-5147  
Make check payable to **SEAONC** and bring with you to the door.

**Deadline for pre-registration: 12 noon, Friday, November 8, 2002**  
Dinner and program reservations are limited. Register early! No cancellations after 12 noon, Friday, November 8, 2002. *No-shows will be invoiced. Tickets not claimed by 6:45 p.m. on the night of the event are subject to being sold. Note: Individuals with outstanding monthly meeting balances are required to pay in advance for a meeting reservation and pay all outstanding monthly meeting invoices.*

<b>COST:</b>	<b>PRE-REGISTERED</b>	<b>LATE REGISTRATION</b>
SEAONC Member	<input type="checkbox"/> \$34	<input type="checkbox"/> \$39
Junior Mbr (29 and under)	<input type="checkbox"/> \$28	<input type="checkbox"/> \$33
Non-Member	<input type="checkbox"/> \$39	<input type="checkbox"/> \$44
Student	<input type="checkbox"/> \$15	<input type="checkbox"/> \$15

← NOTE: New prices, and new age for Junior Member