

# SEAU NEWS

The Newsletter of the Structural Engineers Association of Utah

Volume III- Issue VI March 1999

*This newsletter is a monthly publication of the Structural Engineers Association of Utah.*

*Articles or advertisements appearing herein may be submitted by anyone interested in expressing a viewpoint on structural engineering.*

*If you wish to submit articles for publication, please contact: Scott Adan, the Editor at (801) 486-3883 or*

*E-mail [sadan@reaveley.com](mailto:sadan@reaveley.com)*



*The New Marriott Mountainside, Steel Moment Frame, Park City Utah., Structural Design By Martin/Martin-Utah, Inc.*

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## MARCH EVENT

### SEMINAR:

***“Hollow Structural Sections Short Course”***

*Seminar Date:*

**Friday, March 26, 1999**

1:00 - 1:30 p.m. Registration

1:30 - 4:15 p.m. Seminar

4:25 - 5:00 p.m. Ram International

### Presented By:

The Utah Steel Fabricators Association, SEAU and AISC

### Location:

Salt Lake Hilton  
150 West 500 South  
Salt Lake City, Utah

## MESSAGE FROM THE BOARD

### **STRENGTH AND SERVICEABILITY**



By Steve Judd, SEAU Historian/Secretary Elect

First of all I'd like to thank the Members of SEAU for nominating and subsequently voting me in as Historian/ Secretary-Elect for these two years. I have enjoyed the opportunity to serve on the Board with a wonderful group of Directors for this organization and look forward to next year when I will serve as Secretary.

I'd like to take this opportunity and format to advocate "Raising the Bar" a bit for the practitioners of our profession in our

organization. Our formal education (academia) and most of our early years of training and practice are usually spent learning and understanding design concepts focused on strength without a great deal of conscious thought about designing for serviceability – performance related to deflections, movements, vibrations, etc. This somewhat myopic view of structural design tends to focus all the attention on answering the question of “Is this strong enough?” and rarely focuses on the question of serviceability of an element or system. How strong does beam ‘A’ need to be to support load ‘B’? How big does column ‘C’ have to be to carry load combinations ‘D’, ‘E’, and ‘F’? How strong does frame ‘G’ need to be to resist lateral force ‘H’? And so on... These are the sorts of questions that become routine in the process of structural design. The part we must not ignore or assume has little relevance is designing for service performance (serviceability). The code (UBC) draws some attention to serviceability of primary structural systems by limiting story drift and requiring deflection calculations for “thin” concrete members in some circumstances,

CONTINUED ON PAGE 3

**MEMBER FORUM**

**FOCUS**

*Utah Structural Engineers provide a significant contribution to a wide variety of projects for commercial, government, industrial, and residential clients. Each month, SEAU would like to focus attention on the accomplishments, successes, and hard work of our Utah Structural Engineering firms. This month the focus is on:*

**Ensign Engineering & Land Surveying, Inc.**

Established in 1987, Ensign began as a land surveying firm, with a single office in Murray. A merger in 1995 added building design, civil, structural, land planning and landscape design services. This enables us to provide full-service design on our projects and maintain coordination of all areas of the project. With 41 employees, Ensign currently has offices in Layton and Midvale, and has completed projects for private and public clients.

Some of our most recent projects include:

**I-15 Adjacent Structures Monitoring**



Ensign has worked closely with Wasatch Constructors Segment 2 to establish baseline and monitor settlement on more than 70 structures adjacent to the I-15 reconstruction corridor. Anticipated settlement on some

structures exceeds 20 cm, requiring recommendations on mitigation and/or repair. Building structures include all types and conditions, as well as the effects of anticipated settlements on underground infrastructure.

**LDS Assembly Hall Ceiling**

Due to extreme time constraints for the completion of this project, Ensign has been involved in significant coordination with the ceiling contractors in the design of all portions of the 160,000 s.f. suspended ceiling. Special design considerations include seismic zone 4, with an importance factor of 1.5. The building design life is a minimum 150 years.

**Honda of Orem**



Curved beams at the front elevation are one of the required design features Ensign accommodated at the new Honda dealership facility, located on 1200 S. in Orem. Ensign has also designed the West Valley Dodge dealership, and is currently working on Toyota of Provo. All three dealerships are type II construction, with boundary collector elements transferring lateral loads to reinforced masonry piers.

**Layton Cineplex Theater**



This nine-plex facility includes stadium seating and handicap access to the upper seats by means of elevator access. Stringent Sound Transmission Ratios (STRs) between theaters normally require five layers of 5/8" gypsum. To reduce construction time (due to the significant sheetrock subcontractor work), the owner elected to try foam-formed concrete walls. The height of the walls required that they span horizontally to wide flange steel columns. At the top of the wall, concrete beams within the walls carry the roof loads to the columns. The design significantly reduced construction time, with essentially no increase in cost.

**Presidential Business Center**

Located in West Valley City, this 84 acre business park will eventually consist of more than 600,000 s.f. of commercial and industrial floor space. Ensign has provided the complete design of the park, which is currently in Phase VI. Buildings consist of concrete tilt-up construction, with truck dock and overhead door access.

**Summit Hotel, Big Sky, Montana**



Ensign provided the design and detailing of the exterior panel system for this nine-story condominium and retail space, located at Big Sky Resort. The design requirements included seismic zone 4, 80 MPH Exp. "C" wind load, and 165 psf roof snow load, 100% in combination with seismic loading. The project is scheduled for completion late this year, with most of the exterior

panels hung during winter weather  
conditions.

## MESSAGE FROM THE BOARD (continued from page 1)

but, on the whole, the School of Hard Knocks tends to provide the basis for most of our education and awareness on this subject.

To further draw our attention away from service performance concerns we all have heard of and think about the horror stories of structural collapse failures. These are the things that make headlines and tend to shorten one's career. Strength of members and systems are very important issues, without a doubt, but are not the only ones to be concerned with. Of nearly equal importance are the less flamboyant 'failures' that can occur due to poor design for service performance.

Bouncy floors are rarely the stuff headlines are made of, but they can render a facility as unusable as a collapse, if the furnishings (people and equipment) are not vibration tolerant. Shrinkage and creep of wood or heavy timber can cause cracks in rigid materials it is attached to, create inappropriate load paths, and cause failure of connections. Shrinkage and creep of concrete can load non-load bearing elements, create cracks that initiate structural failures, and cause ponding and overload conditions. Repetitive loading that creates large rotations and cyclical length changes of long span precast members can cause crushing of bearing supports and 'walk-off' at bearing pads. Long term shortening and creep of pre-stressed (precast and post-tensioned) members can dump excessive amounts of load in rigid walls that may cause shear failures. Designing rigid connections where flexibility is warranted can initiate connection failures. Differential elastic shortening in systems that combine gravity columns with high axial stress (efficient design) with low axially stressed moment

frame columns or bearing walls can accumulate over 8 to 10 floors to create floor framing that is not level and out of tolerance by as much as 1" depending on floor height. The list goes on and on...

L/360 as a deflection limitation is not the panacea of all design! Rigid masonry veneers may require L/600 or less deflection to avoid cracking. Elevator support beams require L/1200 or stiffer for impact loads. Deflection limitations for some concrete members must account for long term shrinkage and creep. Vibration sensitive equipment may require floor members that carry massive floor dead loads to generate enough dampening to quell vibrations – mass works better than stiffness. Almost all exterior enclosure systems use joint sealants that have a warrantable maximum movement of +/- 50%. It has been my experience that few spandrel beams are designed stiff enough to accommodate the architectural detailing for doors and window systems.

Example: Window systems typically have perimeter joints that are detailed to be 3/8" to 1/2". Primary structural elements that support exterior wall systems must then have the maximum live load deflection limited to 3/16" to 1/4", respectively, or window failure may occur. Let's assume the spandrel beam spans 20'-0" and is not part of a moment frame (carries gravity load only). The typical L/360 approach for that beam would generate live load deflections of over 5/8". This is about 3 times what the sealant can tolerate and may be sufficient to cause window breakage. The problem gets worse for longer spans because the deflection limit (based on the sealant

performance) is a real fixed number related to joint size not a ratio of span length. Increasing the joint size may cost more than a stiffer beam. The ultimate solution is likely to be a combination of a stiffer beam and a larger joint.

In conclusion, the point I would like to make is this: Building service performance (serviceability) is an important aspect of our responsibility that needs to be understood by designers, discussed with clients (architects and owners), and appropriately accommodated in the design and detailing of the primary structure. I would also like to strongly advocate that Structural Engineers clearly identify, on the bid documents, all typical and special service performance criteria used in design for benefit of those who design and/or detail systems attached to or supported by the primary structure. For instance: Elastic ( $\Delta_s$ ) and amplified ( $\Delta_m$ ) lateral story drift should be documented so the building enclosure system(s) can be properly detailed per section 1633.2.4.2 of the UBC; Spandrel beam deflections should be identified so the windows, doors and typical enclosure walls can be properly designed and detailed for the movement; If the building includes expansion joints, the elastic and amplified story drift movements should be identified so the M/E/P consultant(s) and contractors know how much building movement their systems must accommodate.

If we can do these things, I believe clients get a better product, our work will be more valuable, buildings will perform better and the public, at large, will be safer.

Good luck and thanks for your indulgence.

**BULLETIN BOARD**

**UTAH ENGINEERS COUNCIL  
ENGINEER OF THE YEAR 1999**



Congratulations to Mr. James Bailey, P.E., S.E., President of Allen & Bailey Engineers. Mr. Bailey was voted this years Engineer of the Year 1999 by the Utah Engineers Council.

**UTAH ENGINEERS COUNCIL  
ENGINEERING EDUCATOR OF  
THE YEAR 1999**



Congratulations to Dr. Chris Pantelides, Ph.D., P.E., Associate Professor, Department of Civil &

Environmental Engineering, University of Utah. Dr. Pantelides was voted this years Engineering Educator of the Year 1999 by the Utah Eningeers Council.

**CLASSIFIED**

**STRUCTURAL ENGINEER**

Established architectural firm with in house structural engineering department seeking engineer with minimum 8 years experience in structural design of buildings in seismic zones 3 and 4. Bachelor's degree in architectural or civil engineering and professional registration preferred. Work includes framing concept, engineering calculations, and supervision of engineering and drafting staff through design and construction. Competitive salary and benefit package, friendly office environment bayside in San Diego's Gaslamp District. Reply in confidence to SLA, Attention: M. Romanowski, 363 5th Ave, #300, San Diego, CA 92101

**CLASSIFIED**

**STRUCTURAL ENGINEER**

**Allen & Bailey Engineers** is seeking an engineer with two plus years in designing structural systems for buildings. Individual should have familiarity designing with all types of common building materials and a strong code

background. Good verbal and writing skills preferable. Salary commensurate with experience. Send Resume to: Allen & Bailey Engineers, 16 Exchange Place, Salt Lake City, UT 84111, Atten: Stephen Cohen, Fax (801) 328-0270

**NEWLETTER SUBMITALS**

This SEAU Newsletter is designed to keep you informed of events and activities that affect our association and your involvement with SEAU. In addition, the newsletter can be a forum for you to share your views with your fellow engineers, post advertisements, or target a very select group of professionals.

Please have articles delivered to Scott Adan, c/o Reaveley Engineers & Associates, Inc., 1515 East 1100 East, SLC, UT 84105, Phone 486-3883, Fax 485-0911, Email: sadan@reaveley.com.

Please have advertisements delivered to Mike Buehner, c/o Reaveley Engineers & Associates, Inc., 1515 South 1100 East, SLC, UT 84105, Phone 486-3883, Fax 485-0911, Email: mbuehner@reaveley.com.

April Deadline: April 9, 1999  
May Deadline: May 7, 1999

**MARCH EVENT**

**SEMINAR:  
"Hollow Structural Sections  
Short Course"**

*Seminar Date:*  
**Friday, March 26, 1999**  
1:00 - 1:30 p.m. Registration  
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**Location:**

Salt Lake Hilton  
150 West 500 South  
Salt Lake City, Utah

The short course has been organized to cover the essentials of the new *AISC Hollow Structural*

*Section (HSS) Specification* and the application of these rules to connection design. The program augments the new AISC publication, HSS Connections Manual introduced in January, 1998.

The availability of the HSS connections manual is expected to make a market impact on the use of

HSS in many types of structures. The manual includes selection tables, economic details and design procedures that will simplify the use of tubular products. The HSS faculty includes several of the key leaders of the two-year development project, and those attending will learn how to extend steel connection knowledge to include hollow structural sections.

The program will cover material and specifications for both rectangular and round sections. Welding and bolting, shear connections, moment connections, tension & compression connections, column splices, base plates and truss connections. This will be followed with a series of slides discussing constructability of project all over

the U.S. Ram International will present new products that will include the Ram Structural System, Ram Base Plate, and Xlinear (for non-linear analysis and performance base design).

**UPCOMING EVENTS**

**EERI SEMINAR**

EERI Student Chapter  
Brigham Young University  
PO Box 24081  
Provo, UT 84602-4081

**Special Learning from Earthquakes Seminar:**

The Brigham Young University Student Chapter of the Earthquake Engineering Research Institute (EERI) cordially invites you to a Learning from Earthquakes Seminar. The purpose of this seminar is to discuss what lessons we have been learned from past earthquakes, and what we will be able to learn from future earthquakes. Dr. Loring Wyllie, Jr., former president of EERI, currently Chief Structural Engineer, Degenkolb Engineers, San Francisco, will talk about the lessons structural engineers can learn from earthquakes. Dr. T. Leslie Youd, Chairman of Brigham Young University's Civil and Environmental Engineering Department, will cover the soil-structure interaction lessons learned in earthquakes. Both speakers are experts and have extensive experience in post-earthquake investigations.

The seminar will be held in room 3280 of the Wilkinson Center on BYU campus Thursday, March 25 from 5-8 p.m. Dinner will be served following the speakers. The cost is \$12. Please R.V.S.P. by Monday, March 22nd, 1999 and send checks made payable to EERI BYU Student Chapter to the address above, Attention: Wendy Silker.

For more information please contact Melanie Burgoyne at 378-7921, 796-9310, or email mcvick@et.byu.edu.

Please provide the following information with your payment by March 22<sup>nd</sup>:

1. Company Name
2. Address
3. Phone Number
4. Number of Attendants

(Please Make checks payable to: EERI BYU Student Chapter)

**APRIL MEETING & SEMINAR**

**Title: "Concrete Y2K; "Fax" for the New Millennium"**

**Joint Meeting Sponsored By:**  
SEAU and ACI

**Thursday April 15, 1999**  
230 p.m. - 7:00 p.m.

**Location:**  
University Park Hotel  
500 Wakara Way  
Salt Lake City, Utah

**Registration:**  
\$30 Per Person. Includes break, dinner, and technical handouts. Look for upcoming registration materials.

The seminar will cover a variety of concrete topics including:

The Feasibility of Concrete Moment Frames,  
Seismic Concerns for Concrete Tilt-up Buildings,  
& Performance Materials for the 21<sup>st</sup> Century.

**PROFESSIONAL PRACTICES AND ETHICS COMMITTEE UPDATE**

**REPORT FROM THE PROFESSIONAL PRACTICES AND ETHICS COMMITTEE**

by **Jonathan W. Richards, S.E.,**  
Chairperson

A committee meeting was held last week to discuss committee goals and establish a plan of attack for the upcoming months. The main focus will be to help improve our position as structural engineers by providing information to help in

obtaining fair compensation for our services.

This month we have included the following chart which outlines some "approximate" Architectural Fee Schedules based on past types of projects. Typically, 10% to 14% of

the Architect's fee is allocated for the Structural Engineer but obviously this varies based on the scope of services. Is your firm obtaining it's fair share of the Architect's total design fee?

It would be illegal for SEAU as an organization to "fix" our fees; however, we would ask that you try and determine what the Architect is obtaining for a fee when considering your next proposal.

In the future, we hope to provide more information such as this to help inform our SEAU members. If anyone has similar information they would like to share or a suggestion, please contact one of the committee members

**APPROXIMATE ARCHITECTURAL FEE SCHEDULES (% of Construction Cost)**

|                        | Construction Cost       | Type of Construction  |                               |
|------------------------|-------------------------|-----------------------|-------------------------------|
|                        |                         | New                   | Remodel                       |
| School Projects (1)    | 0-\$1 million           | 7.55% - 6.74          | 9.55% - 8.74                  |
|                        | \$1 mill - \$3 mill     | 6.47% - 6.25          | 8.47% - 8.25                  |
|                        | \$3 mill - \$5 mill     | 6.22% - 6.00          | 8.22% - 8.00                  |
|                        | \$5 mill - \$10 & above | 5.95% - 5.50          | 7.95% - 7.50                  |
| Past DFCM Projects (2) | \$1 - \$5 million       | Standard Bldgs. 6.00% | Technical Bldgs/Remodels 7.5% |

(1) These figures do not represent all school districts.

It appears that in the past few years, DFCM has changed policy to a negotiated fee structure

**UTAH STATE LEGISLATURE UPDATE**

**REPORT ON THE UTAH STATE LEGISLATURE -1999 GENERAL SESSION**



by **David P. Brown, Chairman SEAU Legislative Committee**

**B**y the time you read this article the General Session of the 1999 Utah State Legislature will be history. From the standpoint of our profession this legislature is as much noteworthy for the insignificance of legislation content as it is for the volume of legislation.

I was asked to chair the legislative committee in October, 1998. In preparation for the 1999 General Session, I attended all of the DOPL Professional Engineer/Land Surveyor Board meetings (to get a "flavor" for current DOPL issues), contacted legislators who I am

familiar with, and spent lots of time on the internet. I must admit that I was not familiar with the legislative process when I started this assignment, but I have learned a lot, which I will share with you.

A Law, or change in a law, starts out as a "bill". A bill can be initiated by anyone or any entity that sees a need for a new law or a change to an existing law. This is usually done before the General Session begins. All bills must have a sponsor, who is either a Senator or Representative. The sponsor mentors the bill as it proceeds through the process. Bills are given numbers and are assigned to a Standing Committee in either the Senate or House. After review, debate, amendment, and/or substitution, a bill is passed by constitutional majority of the Senate or House, then is sent to the other for further action. If passed there, it becomes a law, which is effective 60 days following adjournment.

My original intention for this article was to report on details of specific bills that were of interest to us as professional engineers. During the course of the legislative session I had identified and monitored the

day to day progress of a half a dozen bills. As it turned out, only one of these bills was of any significant professional interest to us and by the time it was passed as law it was amended to the point that it was no longer significant. I'll get into details later.

The State of Utah has done an excellent job of making information available on the Internet. I was able to intuitively find and navigate through their website and get to the information I needed. Information was updated daily and it seemed to be current. Agendas for subcommittee meetings were published about a week in advance, and minutes for those meetings were posted within a day or two of the meetings. The actual text of number bills was easily accessible and printable or downloadable directly from the website. Biographies of Senators and Representatives, including photographs, are also easily accessible. Information on the legislative process and step by step instructions for citizens who want to lobby the legislature are available and are user friendly. I recommend that anyone who has even a slight curiosity about the legislature or

new laws visit the website and test drive it.

Now the specifics. The one bill mentioned above was a SB0110 sponsored by Senator Michael G. Waddoups. The intent of the original bill was to limit "taxation by fees" by municipalities for charging fees for engineering plan checks. Contractors and others applying for permits felt that they were being charged in some cases for a "service" (plan review) that was not being rendered. The solution in the original bill was to make it illegal for a municipality to charge a fee for a review of plans that had been stamped by an engineer. Kelly Calder and others attended subcommittee meetings and wrote letters to committee members objecting to the bill as written. As a result, in part, the bill was rewritten and submitted as a substitute bill,

then amended, and finally passed as law substantially different than the original bill. The law stipulates that a municipality may collect a fee for the actual cost of reviewing plans, with a limit of 60% of the cost of the permit. There is no mention of plan stamping. This is an example of direct citizen influence on the outcome of legislation.

Of the other bills that I monitored none are really worthy of discussion here.

As a follow-up I contacted Mr. David Fairhurst of DOPL to get his opinion of the outcome of the legislative session. He said that there were over 40 bills of interest to DOPL addressed by the legislature this year. Higher than normal, but the resulting laws were relatively minor as compared to other years. Most of the bills were

appropriation and administration related rather than policy and procedures.

In conclusion, I enjoyed the challenge of this assignment, especially learning something I have been curious about for years-how the legislature works. It was a good year for learning because there were no major bills or related controversies. I intend to continue attending the DOPL board meetings and I look forward to the 2000 General Session, which I will monitor whether or not I chair this committee.

For those who are interested, try out the legislative website at [www.le.state.ut.us](http://www.le.state.ut.us). You can get to know your state legislators and the new laws that may be of interest to you.

**BY-LAWS COMMITTEE UPDATE**

**REPORT FROM THE BY-LAWS COMMITTEE**

by Brent Maxfield, Chairman  
SEAU By-Laws Committee

This year's goals of the By-Laws Committee were printed in the October 1998 SEAU NEWS. The following is a summary of the four goals: 1) Clarify the use of "MEMBER" and "member" in the By-Laws; 2) Clarify dues for individuals joining mid-year; 3) Clean up minor items in the By-Laws; 4) Make recommendations to the Board and solicit comments from the members.

We have met all these goals except soliciting your comments. Included in this month's newsletter is a proposed draft of By-Laws changes. We have used a "~~strikeout~~"/"underline" approach. Any existing language which is removed is in ~~strikeout~~. Any new text is in underline.

If you are like me, most of you probably have never critically read the current By-Laws. They are printed in the back of your SEAU Membership Directory. I encourage you to read them. You will find that there are many problems in the

current By-Laws. The By-Laws Committee in association with the Board of Directors has tried to make the By-Laws easier to read and to understand. We ask you to read the proposed changes, and we ask you for your input and comments. A final proposal will be voted on during the upcoming election in April.

Please e-mail comments to Brent Maxfield: [maxfieldba@ldschurch.org](mailto:maxfieldba@ldschurch.org). You may also fax your comments at 240-1689.

**THE UTAH STEEL FABRICATORS ASSOCIATION, IN  
CONJUNCTION WITH THE STRUCTURAL ENGINEERS  
ASSOCIATION OF UTAH AND AISC**

**Present:**

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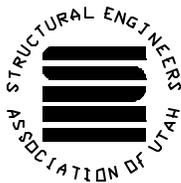
Salt Lake Hilton  
150 West 500 South  
Salt Lake City, Utah

(For Additional Information Please Contact: Newland Malmquist, Programs Chairman (801) 972-2634)

***STRUCTURAL ENGINEERS ASSOCIATION OF UTAH***

P.O. Box 58628

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