



# SEAU NEWS

The Newsletter of the Structural Engineers Association of Utah

Volume VIII- Issue VIII May 2004

*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.*

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SEAU Newsletter Committee, Rick Seelos, Mike Buehner, and Jerod Johnson, (on lunch break)

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## MAY EVENT

### *Structural Failure: Effects of Joint Design*

Presented by:  
John M. Barsom Ph.D.

#### **Date:**

Thursday, May 13, 2004  
5:30 p.m. Social Hour  
6:00 p.m. Presentation

#### **Location:**

EMCB Room 103,  
University of Utah

## MESSAGE FROM THE BOARD

### **USING THE NEGATIVE FOR POSITIVE CHANGE**



By Ron Dunn  
SEAU President

When Mark Twain said, "Everybody talks about the weather, but nobody does anything about it," he exposed a compunction that's crucial to the smooth functioning of organizations; the urge to whine when it's clear nothing will change, or that change may be difficult.

Groups of people often complain about various things for the same reasons they complain about the weather – not because they hope to change anything but because these small rituals of negativity draw people together by affirming their shared experiences and their shared suffering.

Complaints do not always have to be negative. They can have a healing effect as one formulates their own personal investment. Personal complaints can motivate change within our own selves. Such complaints need not be vocal to others, but if so, usually provide increased determination to bring about the desired change.

Having a complaint and not sharing it with others can produce even more disastrous consequences. The art is in voicing a complaint!

I don't know of a profession that is complaint free. Certainly we feel that things could be better. Certainly we would like to make changes. We have been socializing some of the same complaints for

many years, and like the weather, we may feel as though it cannot produce change. Should we stop, accept and live with it? No; I believe we should have our complaints continue to be the object of some conversations, because I believe these conversations bring about positive change. I think we are changing. I believe that we should always seek for better ways. Recognizing what we do not desire provides options for change. Long term satisfaction is renewed by change.

We owe it to ourselves to find those complaints within our own lives that frequently surface, and strive for positive change. If our complaint is that others should change, it will always be. Misery loves company and if we change ourselves, our company usually improves. One is respected more by the company he/she keeps versus their accomplishments.

We are all familiar with the long list of things we wish to change concerning our chosen profession.

To save both my time and yours this list will remain in our minds and not on paper. Strive to keep a positive attitude and such complaints, even when warranted, will provide a basis for optimism. We should always be excited to broaden our thoughts and services to change our profession as a result of the ever changing world around us, and not because we are doing the wrong thing. Our clients', and other associates' worlds are changing as well which in turn creates more complaints from us!

Those of us who have been practicing engineers for many years may have different complaints than recent graduates. We need to listen carefully to each other as we combine new fresh concepts with the wisdom of experience. We need to also listen carefully to those who benefit from our respective services.

Like calculus, if we integrate complaints to the limit they can be very damaging. We need to caution ourselves and those around us to

stay clear of this type of damaging verbal action.

I hope that within our profession we use our complaints to foster our shared concerns to produce positive change. I hope we recognize that this so called "value engineering" of our profession can provide a better way for those that follow. I hope that we would stand up for what is right. I hope that we never compromise our ideals for the sake of gain. I hope that we use the same energy to build our profession that we do on our respective projects.

Success is what we each desire which includes the success of those projects we manage and design, as well as the financial success of our own position. Remember, executives don't measure success by the hours spent working, or the money they put in the bank. Success today is the time you spend doing what you want independent of your career, coupled with the gratification of touching lives along the way.

## MEMBER FORUM

### FOCUS

The first Member Forum Focus article appeared in the January 1998 issue of SEAU NEWS. Since then, 48 member firms have participated by sharing their challenging and interesting projects in the newsletter. Frankly, we were a bit surprised that not everyone contacted took the opportunity to contribute, however, we wish to thank all those who prepared information for these articles, which were scheduled and organized by Rick Seelos of the newsletter committee. It is very informative to see the diverse array of projects that Utah structural engineers design.

We are now set to begin a new feature column in this space starting September 2004 in which we plan to highlight outstanding and important buildings in our region. If you have particular interest in or unique information about a prominent building, let Rick know. Contact Rick at 801-486-3883 or email him at [rseelos@reaveley.com](mailto:rseelos@reaveley.com)

Thank you,  
SEAU Newsletter Committee

### PHOTO OF THE MONTH



**Clu & Les Steel Cutting Services**  
"Have Torch - will Travel!"

(Photo provided by AISC)

## NATIONAL BSSC CONVENTION REPORT

### 25 Years of the BSSC

By A. Parry Brown, SEAU delegate to the BSSC.

When I began structural engineering in 1972, you could design a whole building by hand using a slide rule and graphical analysis techniques. All of the seismic provisions were contained on a handful of 4" x 8" pages contained in the Uniform Building Code. However, by the mid-1970's, many developments were taking place which would forever change the course and complexity of the code provisions regarding the design of new buildings for resisting earthquake induced forces.

The United States Congress passed the Earthquake Hazards Reduction Act in October 1977 and the National Earthquake Hazards Reduction Program (NEHRP) was created. Through the National Bureau of Standards (NBS), the Applied Technology Council (ATC) began working on new innovations in seismic design methods that would produce safer buildings. In 1978, ATC, published a document titled "Tentative Provisions for the Development of Seismic Regulations for Buildings", ATC 3-06.

The *Tentative Provisions* included many innovations regarding seismic design of buildings that needed careful assessment before they could be incorporated into future editions of the model building codes. The NBS issued a plan for the assessment and implementation of seismic design provisions for buildings in November 1978 as its final submission to the National Science Foundation. This plan included the following tasks:

1. A thorough review of the *Tentative Provisions* by all interested organizations.
2. The conduct of trial designs to establish the technical validity of the new provisions and to predict their economic impact.
3. The establishment of a mechanism to encourage consideration and adoption of the new provisions by organizations promulgating the appropriate national standards and model codes.
4. Educational, technical, and administrative assistance to facilitate implantation and enforcement.

The Building Seismic Safety Council (BSSC) was created in 1979. Manned by a small band of dedicated volunteers, the BSSC's main directive was to address these four tasks. As a part of this effort, design firms across the country were offered stipends to apply the *Tentative Provisions* to design selected structures and compare the results with designs produced under the current building code. The result of this effort was the first edition of the

"NEHRP Recommended Provisions for the Development of Seismic Regulations for New Buildings", 1985. The 1985 document and future editions would henceforth be referred to as the NEHRP *Provisions*. Some of the original band of dedicated engineers are still active participants of the BSSC today.

Today the BSSC is a volunteer organization comprised of structural engineers, geotechnical engineers, geologists, architects, building officials, contractors, and college professors from across the country and in spite of the involvement from many different government agencies, it remains an efficient and effective organization. SEAU has been an active member organization from the beginning of the BSSC. The primary responsibility of the BSSC is to develop and maintain the NEHRP *Provisions* and *Commentary*. The *Provisions* are used to formulate seismic code requirements for the IBC, NFPA, ASCE and other codes. The *Commentary* is a great resource for seismic design issues providing a wealth of information and explanations for the seismic design code requirements.

The BSSC is federally funded and published by the Federal Emergency Management Agency (FEMA) with officers and committee chairmen committed to three-year publication cycles. The limited funds provided by FEMA pay the salaries of a small administrative staff, travel expenses of the board members, limited research projects, and publication and distribution costs of the *Provisions* and *Commentary*. These documents are available free of charge by calling the BSSC administrative office, (800) 480-2520. The 2003 edition of the NEHRP *Provisions* will be published in the fall of 2004 and is intended to be incorporated into the 2006 codes. The 2003 edition of the *Provisions* will be the last version to be written in prescriptive code (legal) language. ASCE-7 will carry the mantle of producing prescriptive code language documents for future codes so that the *Provisions* can return to its original function as a resource document promoting innovation and commentary of state-of-the-art technology in earthquake engineering.

SEAU participates in the BSSC by selecting one delegate and one alternate. Through representation of the delegate, SEAU proposes revisions, suggests changes to proposals made by others and votes on acceptance of all proposed revisions. This effort focuses on packets of proposed revisions assembled by the provisions update committee (PUC) distributed one or more times per year. This is a significant effort performed by the BSSC committee comprised of Parry Brown (delegate), Dave Pierson (alternate) and Kim Robinson (committee member).

The BSSC is an important organization where SEAU has a real impact on the development of the seismic design requirements in our building codes.

Some highlights of significant proposed changes are:

- New ground motion maps produced by USGS
- Major revisions to the redundancy requirements
- Revised R values based on a more consistent methodology
- Improvements to the simplified seismic procedure
- Re-vamping the commentary
- Introduction of performance based design provisions

Another major, on-going effort is to completely reformat the *Provisions* to make it more consistent

and less complicated. This task is a major undertaking and has been in progress for over a year. Preliminary ballot versions are making good progress.

The evolution of seismic design in the building codes is in a process of rapid and substantial change based on a rapidly growing knowledge of seismology, improved analysis methods, more sophisticated analysis software, and more powerful computers. With these new tools, we are able to more accurately predict the performance of various structural systems during seismic events and design safer structures. The state of seismic analysis and design will continue to progress until the procedures are perfected then revisions will no longer needed and the BSSC will become obsolete; but not in my lifetime or yours.

**BULLETIN BOARD**

**SEAU MEMBERSHIP APPLICANTS**

The following individuals have submitted applications for approval by the SEAU membership committee for new members:

- Chandra Clyde – Professional
- David N. Hooley – Professional
- Carmen E. Larrea – Professional
- David Platt – Associate
- Benjamin Thomas – Associate

**CLASSIFIEDS**

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## BULLETIN BOARD

## BULLETIN BOARD SPECIAL FEATURE

**E**ach month this year SEAU will feature recent building code developments and design requirements. This month our focus is on:

**MASONRY VENEER ATTACHMENT AND JOINTS PER IBC 2003 (ACI 530-02)**

by Jerod Johnson P.E.

Recent years have seen significant changes to the structural provisions of adopted building codes in Utah. Perhaps most notably are the changes to the Chapter 16 seismic provisions which have progressed in a short ten years from a simple ZIC/Rw base shear calculation to the spectral acceleration maps that we use today. Throughout this SEAU year, this feature's purpose has been primarily to inform the general SEAU membership of the subtle, and sometimes not-so-subtle changes and revisions to the adopted building codes. The SEAU Newsletter Committee hopes that this information has been received well.

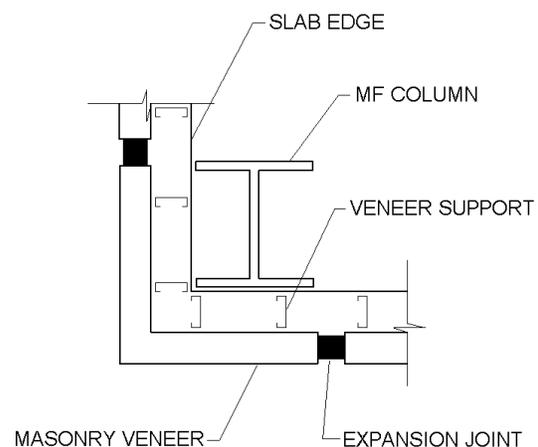
The attachment of masonry veneer is a subject that many times is overlooked by us as structural engineers. The reason for this oversight is simple; structural engineers are not typically the member of the design team that specifies veneers. The responsibility for the design and detailing of veneers typically falls to and is often readily assumed by the architect. Nonetheless, as structural engineers we are duty-bound to educate our clients and sometimes enforce the code driven mandates for veneer attachments. Some may have the attitude that, "It's just veneer, ...let it fall", which is just fine if your comfortable with life threatening projectiles in addition to overlooking the code.

In general, for non-seismic areas the requirements for the attachment of masonry veneer has not significantly changed in the recent past. However, the requirements of ACI 530-02 (referenced masonry standard in IBC 2003) regarding the seismic anchorage of masonry veneers is quite progressive with respect to the support and detailing of veneer. For seismic design category C, veneers are required to be isolated (jointed) on the sides and top so that the masonry veneers do not attract in-plane loads due to their stiffness (6.2.2.10.1). For category D, the category C provision applies with the added provision of supporting the weight of anchored veneer at each story independent of other stories. Category D also requires reductions in the typical maximum areas that can be supported by a single anchor. In addition, for a category D structure the veneer must be reinforced with continuous joint reinforcing (6.2.2.10.2). For seismic design categories E and F, all of the category C and D provisions apply in addition to

providing vertical expansion joints at all returns and corners and mechanically attaching anchors to the joint reinforcement (6.2.2.10.3).

So what does this mean? So we have to anchor the veneer and provide vertical expansion joints... that's not a big deal... is it? If the inter-story drifts of your structure are small (i.e. shearwall building) then this is probably not a big deal. The veneer joints can be relatively narrow and inconspicuous (in other words, not a big problem architecturally). However, if inter-story drifts are large (i.e. moment frame building) the joints can be very large. Nonetheless, creative architectural detailing can often disguise an unsightly control joint away from building corners. But what about the corners? For seismic categories E and F, expansion joints must be provided at returns and corners. These joints can be somewhat difficult to handle since they must accommodate both x and y plan motion (see Figure). Creatively disguising such joints behind an aesthetically pleasing façade can be a challenge, but can be adequately addressed with innovative architecture and engineering.

Although significant and perhaps difficult, the use of expansion joints and attachments of veneer per ACI 530-02 is rational. Adherence to the provisions will provide facilities with greater safety and less repair than those built in accordance with previous codes. Recent earthquakes and other learning experiences have demonstrated that projectile veneers are a major seismic hazard. The ACI 530-02 provisions for veneer design and detailing are rational and are provisions that should be implemented for many projects in Utah.



*SEAU Presents:*

**T.R. HIGGINS LECTURE**

**STRUCTURAL FAILURES:**

**EFFECTS OF JOINT DESIGN**

Presenter: John M. Barsom Ph.D., President, Barsom Consulting, Ltd.  
Winner of the 2003 T.R. Higgins Award

Date: Thursday, May 13, 2004 (2<sup>nd</sup> Thursday of the month!)

Place: University of Utah  
EMCB Room 103

Time: 5:30 p.m. Social Hour  
6:00 p.m. Presentation

Mr. Barsom is on several AISC committees including the Committee on Specifications and is the recipient of the AISC Lifetime Achievement Award. The T.R. Higgins Award Jury selected him as the winner of the 2003 award for his paper, *Development of Fracture Toughness Requirements for Weld Metals in Seismic Applications*. His presentation will discuss the role of design configuration and geometry in failure of otherwise properly designed structures, the effect of joint design on the deformation and fracture toughness of steels and weld metals, and examples of structural failures that demonstrate the effects of joint design on the fracture behavior of structural components.

**STRUCTURAL ENGINEERS ASSOCIATION OF UTAH**

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