



SEAU NEWS

The Newsletter of the Structural Engineers Association of Utah

Volume VIII- Issue III November 2003

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.

Articles for publication may be submitted to:

Mike Buehner, Editor

(801) 486-3883

mbuehner@reaveley.com

Advertisements for publication may be submitted to:

Jerod Johnson, Advertising

(801) 486-3883

jjohnson@reaveley.com



*Buzard Eye Institute, Las Vegas, Nevada,
by R2H Engineering, Inc.*

IN THIS ISSUE

Message From The Board p 1

Member Forum..... p 2

Bulletin Board p 4

NOVEMBER EVENT

ACI 318-02 Seminar

Presented by:

James R. Cagley, P.E., S.E.

James R. Harris, PhD

▼
Date:

Tuesday, November 18, 2003
7:45 a.m. to 5:00 p.m.

▼
Location:

Theatre Auditorium
University of Utah Union Bldg.

▼
Cost:

\$60.00 for current SEAU members.
\$30.00 for Students

MESSAGE FROM THE BOARD

QUALITY IN CONTRACT DOCUMENTS



By Kim Robinson,
SEAU Secretary/Historian

It all began innocently enough. The Vice President of Marketing at AISC decided to get together a group of design professionals in New York, representing contractors, architects, engineers, steel fabricators, owners, and developers for the express reason of discussing ideas to improve

steel construction projects. The ensuing mayhem had very little to do with steel, with the engineers yelling at the architects, and the contractors yelling at engineers, the developers yelling at the contractors, and the AISC team ducking shrapnel. I was not there, which is why I can laugh about it. What were the issues that had everybody up in arms? Very simply put, it was a battle about coordination and completeness of drawings.

It is no secret that the quality of construction drawings has gone down in the past 10 years. There have been more articles addressing this fact, and the increased incidence of liability claims also documents it. Generally, we as engineers pay for our drawing sins, if there are any, during the construction administration portion of the project, but the true sign of quality of documents from our end is the case where we are called to do

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:

SURE STEEL, Inc.

From its office in Sandy, Sure Steel is involved in projects throughout the country. Our current work load includes project in Utah, Nevada, California, Hawaii, Arizona, Minnesota and Massachusetts. During our 10 years in business we have been involved in many notable projects in the region like: The Utah State Capital Office Building Expansion, The Skywest Hangar complex at the Salt Lake Airport, The LDS Assembly Hall, The Ninegret Complex, a 1-million square foot distribution center for Ross Stores in California and a 1300-foot long Cerro Copper facility near Cedar City.



Sure Steel was responsible for the structural design and the erection of the C-130 Hangar, at Hill Field, featured in last month's newsletter. This is a two bay corrosion control hangar; one paint-off bay and one paint-on bay. It boasts two 145' X 140' clear spans and supports seven 17,000 lbs mechanical units. The single slope roof design, sloping towards the back, ensures a critical flow of air straight through the structure. The 10-foot square box truss across the front of the hangar achieved two objectives; supporting the hangar doors and distributing the horizontal and lateral loads to the braced frames.

Currently under construction is the Basin Recreation Facility near Park City. The structure, 116-foot clear span X 240 feet long and a height of 53 feet at the crown, will cover an indoor soccer facility. Originally designed as a pre-engineered building with primary framing on 20-foot centers,



We worked closely with Gem Buildings and Layton Construction to value engineer the design. By utilizing a 15-foot bowstring truss on 10-foot centers we were able to use decking to eliminate the secondary framing. This option provided a significant cost savings to the owner in material and labor costs.



The seismic retrofit of the Ogden Municipal building presented some unique challenges. It involved nearly 1,000 tons of structural steel. Some columns and braces exceeded 300 lbs per lineal foot. The steel had to be lowered through the roof to the basement 13 stories and erected inside the existing structure.

Heading up Sure Steel's Engineering Services is Blake Hoskisson. Blake received his M.S. degree at the University of Notre Dame and his B.S. degree from Utah State University in Civil Engineering. Prior to joining Sure Steel, Blake was employed by Degenkolb Engineers in Oakland, CA. Blake is a member of SEAU's Emergency Response Committee.

To learn more about Sure Steel visit our website at www.suresteel.com

MESSAGE FROM THE BOARD (continued from page 1)

construction administration for a project that someone else in the office designed. Then, a nice dartboard with the design engineers picture on it is a handy office stress reducer. Don't use this method if the offender is in any way a supervisor.

There are some very great reasons that the industry has for the reduction in drawing quality. One idea is that the relative design fees have come down by as much as 20% while the work required to produce a comparable project has only declined marginally. We love the computer, but along with the increase in production that it was supposed to create, it has allowed endless tinkering and line-changing that the industry would in no way have tolerated in the past. Other reasons point to a reduction in experienced staff, as experienced engineers and architects jump ship to go into a field that actually pays. I am sure that there are many other reasons, but to dwell on them can only lead to looking at them as excuses and thereby limiting our own personal power to change the situation.

About four years ago, a very active committee of the Structural Engineers Association of Colorado, the Steel Liaison Committee, undertook the coordination and completeness problem as one of their projects. Over the course of about 6 months they produced a pre-detailing checklist and a sample agenda for their proposed pre-detailing meeting. Their list has things on it like "are the specifications in agreement with the contract drawings" (well, duh). Then, this last spring, they went after this issue again and had gotten so far as to produce a spreadsheet entitled "Drawing Set Requirements for Pricing and Information". They were hoping that their work could make a contribution nationally, but they were beaten to the punch by CASE, the Council of American Structural Engineers.

Released last June, CASE Document 962 D 2003, titled "A Guideline Addressing Coordination and Completeness of Structural Construction Documents", available at www.acec.org, attempts to address these issues. It was drafted to be for information purposes only, but it will no doubt be drug into the courtroom regardless of its original intent. Although it will certainly affect those who practice engineering by drive-by shooting, it will also affect a broader range of engineers because it does not necessarily take a sub-standard engineer to produce a lousy set of drawings. The ability to perform engineering and the ability to clearly communicate what has been engineered are two separate skills, as is the experience and ability to effectively communicate and coordinate with the other disciplines during the design phase. The CASE document has basic information on

relationships, communication, meetings, agenda, pre-bid conferences, checklists, dimension requirements (yes, you read that right, dimension requirements), etc. to help engineers produce more complete drawings and be more proactive in staying on top of their clients.

At the root of the coordination issue, of course, is that small fact that generally the architect is the prime consultant and is therefore responsible to make sure everything is coordinated. However, the engineer is responsible to ensure that all work that effects their design is communicated and an experienced engineer won't simply rely on what they are told, but will anticipate coordination issues based on what has been encountered on previous projects. Back in the days of office buildings (remember what those are?) I used a list that would be handed to the architect on the first project meeting with them that had what was needed from each consultant and when it was needed. I imagine that it struck the architect as odd that the list was asking for information on the window washing system when they had not fully hammered out the column layout, but, hey, there was a whole 6 weeks to get it. This little "dumb stuff you gotta do" list had benefits besides the obvious coordination purpose that it was put together for. Really, it made the architect's work easier and made them look like they had a firm grasp on the project coordination, and anything you can give them that makes their life easier and makes them look good is good for your firm's competitive advantage. The second more insidious benefit that this coordination list had was that if they did not provide something that was needed, it was very clear that the question had been asked in writing six or whatever weeks in advance. It made it possible to be the person working as a team member to fix someone else's mistake and oversight, not the person on their heels fishing for excuses. Not that it's not fun being the target.

The CASE document is merely a primer, a relatively basic 35-page guide to follow. They will be offering a series of seminars throughout the nation to coincide with the publication, with the first one being held last month.

The CASE document is just one of many ways in which engineering groups are trying to raise the bar in their profession. Consistent, high quality drawings will raise the professionals in other discipline's level of respect for structural engineers. This, when combined with other efforts of this nature, gives us as engineers more of a chance to be paid more adequately and treated with more respect. I am pleased to have been offered the opportunity to serve on this year's SEAU board, which has expressed this same goal.

BULLETIN BOARD

MESSAGE FROM THE PRESIDENT

I am convinced that we as engineers do not want to become rich. The logic of the tortoise and the hare is the essence what we truly admire. After all, running creates risk, and risk is what we strive to avoid. We therefore slowly gain ground. Engineering and other well established professions – namely, architects, accountants, lawyers, etc. – have been around for 100+ years. We seem to rely on the slow movement of society and expectations of others to progress and evolve financially. Ours is perceived as a service to the masses, as opposed to a solution to a personal problem, where one is willing to pay dearly to escape or avoid. Thrills and excitement are also absent from that we have to offer.

Compare our services to all of the jobs that have been created, and essentially invented, in the last 20 years. These services and gadgets are things that satisfy our immediate needs, desires, and can easily be measured and compared. Without a long history of slow growth, such services establish their worth with current business demands. The “we want it now” mentality has created value for these industries. Why would your boss be willing to pay more to the Xerox repair person than he/she bills you to your company’s clients?

Our history has perhaps caused us to be like the tortoise. Architects do not expect us to suddenly move faster with respect to compensation, only with respect to delivery. This is analogous to replacing two of the tortoise’s legs with the hare’s. This creates an obvious state of imbalance. How can we replace those other two legs? The reality is that everybody else has or is finding a way to replace them. Again, moving slow is much safer. No broken bones, setbacks, or financial surprises. Again, we don’t want the risk.

Why is it that on a daily basis we take upon ourselves a tremendous amount of risk by virtue of what we do, yet shudder at the financial risk of what we can become? Before you think ahead and draw the conclusion that all of us should take the “risk” and become independent consultants, read the following carefully.

Eighty-five percent of all employees working in the AE profession want to own their own firm. Also seventy-five percent of the engineering wealth occurs in larger firms. That is to say that leaders (not necessarily owners) in larger firms are financially better off than owners of small companies. This is true for all professions. This is the case primarily because of “overhead”. Overhead allows you to become better. A common

argument that a small firm may use to compete against a larger firm is lower or lack of overhead expenses. This is how they justify a lower fee for their professional services. Over the long run however the opposite is true. Overhead allows you to focus on your highest and best use, and that is engineering. I believe that the front legs of the hare represent overhead and balance, and the very powerful back legs are the essence of its strength.

As I look back over my 25 years of consulting experience, the very best engineers I’ve seen are those who associate themselves with other good engineers whether in the same office, or through outside associations. We as members of SEAU have a great opportunity to associate with others. I would hope that all of our member firms encourage their staff to associate with other engineers within our organization.

A recent salary survey published by CE News revealed some disappointing news. State-by-state statistics indicate that only 3 states have lower median salaries than here in Utah. (North Dakota, Missouri, Puerto Rico). Our numbers came in at only 75% of the national average. We are better than that! Not only do we buy into the tortoise scenario, we don’t give it any caffeine either.

We live in a great time, among great individuals within our society, and have a great service to render no matter what our position may be. However we are exactly what we want to be. I am sure that should we live 100 years the tortoise will win in the end.

Ron Dunn
President, SEAU

BULLETIN BOARD

BULLETIN BOARD SPECIAL FEATURE

Beginning this month SEAU will feature recent building code developments and design requirements. This month our focus is on:

HORIZONS – SPECTRAL ACCELERATION MAPS

Many structural engineers practicing in Utah have at times been a little disillusioned by the spectral acceleration maps used for calculating lateral forces per IBC 2000. A question of focus presented by many deals with the differences between the deterministic MCE maps vs. the probabilistic 2% in 50 year maps. Clearly the IBC 2000 and the future IBC 2003 state that the MCE maps are to be used when calculating lateral forces. However, web sites developed by USGS and other source list only the probabilistic mapped values for determining spectral accelerations with vague allusions regarding the equality of the two. Even earlier versions of FEMA documents dealing with the renovation and rehabilitation of existing structures (as well as draft copies of IBC 2000) seemed to waffle between the 2% in 50 year probabilistic event and the MCE.

A valid question might be; What is the difference between the MCE maps and the 2% in 50 year maps? Examination reveals that for a majority of the state, the spectral accelerations are exactly the same. Hence, one might conclude that either of the maps is appropriate. Unfortunately, the primary disparity between the maps occurs along the most heavily populated corridor from approximately Provo to Brigham City. Figure 1 illustrates the differences in spectral acceleration contours of the MCE map and the 2% in 50 year map for 5% damping and a 1-second period for this region. Whereas the 2% in 50 year maps depict three clear peaks of spectral acceleration separated by ‘saddles’, the MCE maps have inter-connected peaks thereby eliminating the saddles. This results in spectral accelerations that are slightly higher for most sites within this region.

So one map is slightly higher than the other, that doesn’t significantly change the way we do our seismic designs does it? Unfortunately it does. Where the maps begin to diverge roughly correlates to spectral accelerations (for a 1-second period) of about 0.60g. Many of the sites within this area have 1-second spectral accelerations of 0.75g or greater, thus requiring an alternate seismic design category per Tables 1616.3(1,2) of IBC 2000. The alternate seismic design categories would be either E or F as prescribed and would result in far more restrictive license regarding the allowable plan and vertical irregularities permitted for a particular structure. The long and short of it is, the accelerations resulting from the 2% in 50 year maps may allow for structures with certain irregularities using the IBC provisions ($S_1 < 0.75g$) whereas the accelerations resulting from the MCE maps may expressly prohibit the same irregularities per IBC ($S_1 \geq 0.75g$). It all depends on the site spectral acceleration for a 1-second period (S_1).

So, can the 2% in 50 year maps be used in lieu of the MCE maps so that I can possibly avoid the problems resulting from an S_1 value of 0.75g or greater? This is a difficult question. Upon reading the NEHRP commentary one might conclude that the lesser of the MCE and the 2% in 50 spectral accelerations is acceptable. However, the commentary does not explicitly state this. In fact the available commentary regarding this issue appears to operate under the assumption that the MCE spectral accelerations are lower than the 2% in 50 year accelerations. The opposite is true for the most heavily populated areas in Utah.

Future code revisions may resolve this issue. Currently, a proposal for change has been issued for review regarding the current MCE spectral acceleration maps. The proposal is to replace the 1997/2000 Maximum Considered Earthquake maps with new

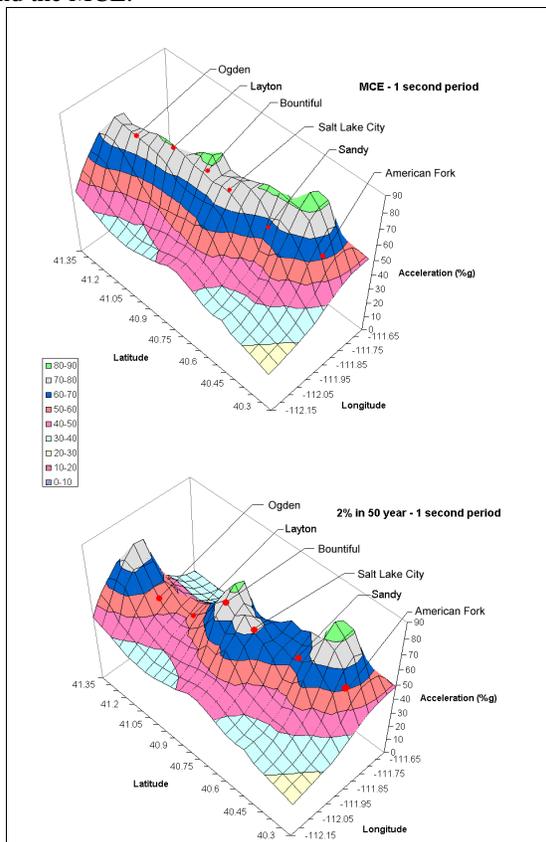


Figure 1 – MCE and 2% in 50 year Contours

BULLETIN BOARD

2003 Maximum Considered Earthquake maps based on the 2002 USGS 2% in 50 year maps (see Figure 2). Examination of the maps shows the proposed NEHRP MCE maps and the 2002 - 2% in 50 year USGS map to be the same (at least for Utah). In addition, the accelerations indicated on the maps have decreased marginally (approximately 10 to 15 percent).

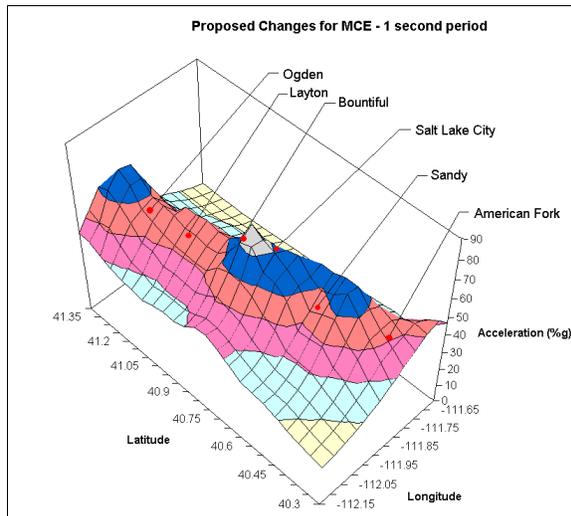


Figure 2 – Proposed Changes to MCE Contours

So, why the change? The primary reason for change is that USGS data has improved since 1996.

With the reduction in accelerations does that mean I no longer need to worry as much about my structure being bumped to Seismic Design Category E or F? No. Along with reduced accelerations, the proposed provisions include a lowering of the trigger bumping a Seismic Category D structure to an E or F from S_1 of 0.75g to S_1 of 0.60g. Hence, it is likely that many sites along the Wasatch Front will still be bumped to a higher seismic design category. The 0.60g envelope of the new maps can be less extensive than the 0.75g envelope of the current MCE maps for a 1-second period (see Figure 3). This is especially true for the Ogden-Layton area. However, the 0.60g envelope appears to encompass more area within the Salt Lake, Bountiful, and Brigham City areas. Hence, the shape of the envelope will change, but the area encompassed by the envelope is still very large and heavily populated which means a fair likelihood of being bumped to Seismic Category E or F for many projects along the Wasatch Front.

The new MCE maps and new seismic provisions are likely to be incorporated into the 2005 version of ASCE 7 which will be adopted by reference in IBC 2006.

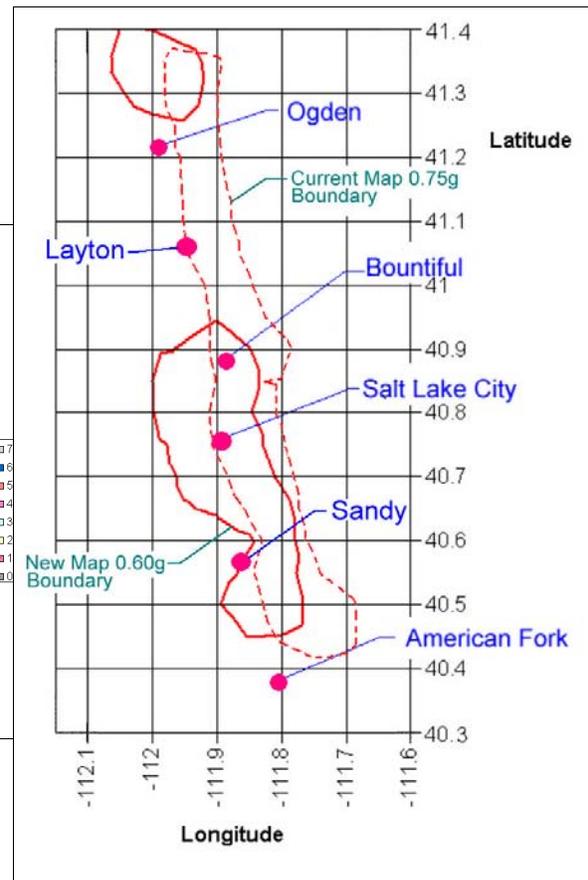


Figure 3 – Trigger Boundaries for Seismic Category E and F

SEAU MEMBERSHIP APPLICANTS

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

- Andrew J. Hinchmann – Professional
- Max E. Reiche – Professional

announcing
ePubs
www.aisc.org

ePubs gives AISC members free access 24 hours a day, seven days a week to more than **10,000 pages** of technical information via AISC's website.

newmemberbenefit

INCLUDES FREE ACCESS TO:

- All 17 AISC Design Guides
- AISC Specifications and Codes
- All *Engineering Journal* papers
- Conference Proceedings

plusplusplus

Discounts and substantial savings on AISC printed publications, Seminars and NASCC Registration and much more.

New member dues making AISC membership more accessible and affordable.

Your Staff	Total Fees	Your Staff	Total Fees
1	\$ 135	20-99	\$ 300
2-6	\$ 160	100-499	\$ 500
7-19	\$ 200	500-1000	\$ 1,000

joinaisctoday

To take advantage of this new member offer and for a complete list of benefits, please visit www.aisc.org/membership or contact the AISC membership department by calling 312.670.2400.



structural steel: the material of choice

312.670.2400

www.aisc.org

SEAU Presents:

ACI 318-02 ONE-DAY SEMINAR

Date: Tuesday November 18, 2003

Time: 7:45 a.m. registration
Program 8:00 a.m. – 5:00 p.m.

Presenters:

James R. Cagley, PE, SE, President, Cagley & Associates, Inc., Immediate Past Chair of ACI Committee 318
James R. Harris, President, J.R. Harris & Company, ACI318-99 Code Revision Committee member

Theatre Auditorium
University of Utah Union Building

Registration Deadline: November 11, 2003, - see separate email announcement and registration sheet.

Parking: Pay lot is available east of the Union Building

Lunch is on your own. There is a large cafeteria with several different food vendors in the Union Building Lower Level.

Cost: \$60.00 for current SEAU members*, \$30.00 for students, \$100.00 all others

See insert for topics covered in this seminar.

***Partial funding has been provided by the Division of Occupational & Professional Licensing from the 1% surcharge funds on all building permits.**

STRUCTURAL ENGINEERS ASSOCIATION OF UTAH

P.O. Box 58628

Salt Lake City, Utah 84158-0628

www.seau.org



Board of Directors

Ron Dunn, *President*

Barry Arnold, *Vice Pres./Pres. Elect*

Larry Reaveley, *Past President*

Jeff Miller, *Treasurer*

Kim Robinson, *Secretary/Historian*

Carl Eriksson, *Member of the Board/UEC Delegate*

Brent Maxfield, *Member of the Board/UEC Delegate Elect*