



SEAU *NEWS*

The Newsletter of the Structural Engineers Association of Utah

Volume IX- Issue VII April 2005

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



Scott M. Matheson Courthouse

IN THIS ISSUE

- Message From The Board p 1
- Focus Article p 2
- President's Message p 3
- On Ethics by Deborah Long ... p 4
- Bulletin Board p 5

APRIL EVENT

FIRE, BLAST, AND PROGRESSIVE COLLAPSE

Presented by:
Joseph P. Marlo

Date:
Thursday, April 21, 2005
8:00 a.m. Registration
8:30 a.m. - 4:00 p.m. Seminar

Location:
Sheraton City Centre Hotel

MESSAGE FROM THE BOARD

MENTORING HELPS US ALL



By Jake Watson
UEC Delegate Elect

Younger engineers often have immense energy to solve problems. Unfortunately, they often lack the backdrop of experience to color their decisions. A good mentor can harness that

energy and offer guidance towards good technical and ethical engineering. Past generations of engineers were brought up with a clear apprenticeship. Today's engineers are frequently left to solve their own problems without the proper training. As codes become more complex, budgets more aggressive, and timelines more compressed, the opportunity to make mistakes is ever increasing. Engineers with good apprenticeships are easy to spot later in their career. They are often at the head of successful firms and have a firm foundation of leadership and engineering skills.

Today's engineering companies are constantly pressured to reduce cost. Suitable and consistent training increases efficiency. As problems arise, take the time to understand and address it today. Or,

CONTINUED ON PAGE 3

Opinions expressed in the SEAU Newsletter are not necessarily those of the Structural Engineers Association of Utah. Technical information contained herein shall not be used without independent verification by an engineer. Advertising rates and information sent upon request. Acceptance of advertising and informational brochures in the SEAU Newsletter does not constitute endorsement or approval by SEAU of the products or services advertised. SEAU reserves the right to refuse any advertising or editorial comment.

FOCUS

Salt Lake City and the greater Wasatch Front are growing into a major metropolitan region with many interesting buildings that define our historical, business and cultural qualities. SEAU NEWS will highlight some of our most interesting and important buildings over the next several months. (If you have particular interest in a building you would like to see highlighted in this space, please contact the Newsletter Committee). This month the focus is on:

Scott M. Matheson Courthouse

This new 420,000 square foot complex is the largest government facility in the State of Utah. The facility houses the Utah Supreme Court, Court of Appeals, District and Juvenile Courts. The building consists of office and courts programmed space in five levels plus penthouse, with an additional three level 750-vehicle underground parking structure. The architectural design focuses on the 120-foot high rotunda.



An innovative construction sequencing technique was designed to eliminate expansion joints from this T-shaped building which is over 500 feet long. The Scott M. Matheson Courthouse is one of two structures of this size to have been constructed in a cold weather climate without an expansion joint. Special connections had to be designed by

architectural skin anchorage specialists for the attachment of the stone veneer due to the flexibility and thermal expansion and contraction of the large structure.



Two major events that occurred during the design and initial construction of the building, the Northridge earthquake and the bombing of the Okalahoma Federal Building, caused structural redesign to incorporate the latest technologies to structural system.

Northridge Earthquake: Due to the close proximity of the facility to the Wasatch Fault, the super structure of the building was designed with steel moment resisting frames. After the Northridge earthquake the construction of all moment frame buildings were put on hold. The Matheson building's moment frame was redesigned after the release of the Interim Guidelines for Moment Frames.

Okalahoma City Bombing: The construction of the facilities 4' thick mat footing was nearing completion at the time of the Okalahoma bombing. Immediately after the bombing the Utah Legislature halted construction and provided funding to incorporate blast resistance into the facility. Several blast resisting elements were subsequently incorporated into the structure.



MESSAGE FROM THE BOARD (continued from Page 1)

it will likely come back and be an issue again. It also offers the opportunity to improve the mentor's skills. Listen to the questions.

Do you understand the problem well enough to teach the solution? Provide answers with a firm foundation to today's questions and you will find the questions less frequent over time. Lastly, it usually is easier to do things right at first as opposed to correcting it after the mentor reviews the project. Engineers in your charge can't read your mind any better than your spouse. Take the time to teach your staff what you expect.

What are the consequences of an inattentive mentor? One primary code of conduct for engineers is "responsible charge". Principle engineers are frequently responsible for the work of younger engineers even when a younger engineer stamps a project.

Substantial problems with projects are often resolved at the principle level. Often it takes more time and money to address a problem after a project is released compared to solving it before it leaves the office. Principle engineers sign error and omission insurance checks and are often on the front line of firm financial responsibility. Problems can affect future work with clients and taint the reputation of a firm. In extreme cases, unsupervised engineers can lead to an office closing.

How do you know if you are a good mentor? Young engineers should be challenged to grow their skills. Give them room to explore options and examine underlying assumptions. Make sure there is open communication. If you can't review the issue immediately, agree to a future time. "Because I said so" may solve the immediate problem, but the issue will come up

again. Mentors often lead best by example. Take the time make sure your work is up to your own standards. Break off parts of a larger project. Give a framework to find the solution, and stay involved through the conclusion. Let younger engineers take part in conversations between senior staff about design issues. Often younger staff may have unique opinions. Take the time to hear the opinions and offer comments addressing their perspective. Most of all provide constructive feedback. Caustic or continual criticism reduces communication and no critique at all will likely lead to no improvement.

Well trained engineers benefit everyone. Remember the training you received and try to be the mentor you wanted.

PRESIDENT'S MESSAGE**Getting "There"**

It's not what you attain in life, but how you got "there" that is most important. Individuals who get "there" through honest, hard work built on a solid foundation of ethics, technical competence, inventiveness, teach ability and business acumen are those who we should most admire and respect.

Many people rise to great status and are esteemed by the masses. Often a serious investigation of what they did to get "there" is repulsive and loathsome. Our news is replete with individuals who got "there" through dubious methods.

Too many times we focus our respect and admiration on individuals for the wrong reasons. Accomplishments like who has the largest office, biggest project, heaviest workload, most awards, most licenses, most glamorous title(s)/position(s),

etc., cloud our judgment as to what is really important. Those who toe the line of true professionalism are the ones to be congratulated, respected and admired.

"There" is an elusive quest when we look for it by way of the things that satisfy our egos. A person who retires after running a one-man office who has done all he can to be truly professional is "there" in my opinion. That person should hold their head high and proud; there is good reason to respect and admire them. "There" for that person will be a place of the greatest satisfaction, peace and contentment, which is something that all other accomplishments will pale in comparison to.

Remember the adage: "The most important things in life aren't things."

Barry Arnold, SEAU President

ON ETHICS by DEBORAH LONG**Questions About Ethics**

As I travel around the country speaking to real estate professionals, interior designers, and other licensees, I am frequently asked questions regarding integrity, character, and other issues related to moral development. In this issue's column, I share those questions and answers with you.

If I am an ethical person, will I get what I want?

It depends on what you want. If you want money, power, and a Mercedes--no, being ethical will probably not help you achieve that kind of success. Sometimes being ethical can be expensive in terms of time and money. Doing the right thing can mean sacrifice. But if you want to be happy and help others as well as make a significant contribution to your family and society, then yes--being ethical will get you what you want. It will also make you feel good about yourself.

If people would just follow the law, would we still have ethical problems?

The law merely sets a minimum standard for what is acceptable behavior. Remember the old movie *Towering Inferno* about the brand new high-rise building that went up in flames at its gala inauguration? The builder's defense was "Hey, I built that structure to code. It's not my fault the building's on fire." Doing the minimum is not enough. We cannot create laws fast enough, nor do we wish to abdicate moral responsibility to our legislators and regulators. Our ethical judgement requires us to do more than what the law requires.

Is there one simple test of whether I am making an ethically sound decision?

The easiest test is to ask yourself, "How would I want to be treated?" In other words, use the Golden Rule: Do unto others as you would want done unto yourself. My real estate students often face dilemmas that involve fiduciary relationships and client confidentialities. They are torn between giving the buyer information that is not legally material but that many buyers would consider relevant, such as information regarding the whereabouts of sex offenders in a neighborhood or unnatural deaths that may have occurred on the property. Deciding whether or no to provide this information is an ethical judgement often best decided by the Golden Rule.

Isn't making ethical decisions playing God? It's not up to me to make these types of decisions.

In most ethical dilemmas, you can rely on rules, policies, and laws that provide you with reasonable answers to the dilemma. In other cases, you may have to search your soul or conscience. Some believe our conscience is the divine spark within us. And remember, there are consequences for not making a decision as well as consequences for whatever decision we make or action we take. We are not powerless to act. Govern yourself accordingly.

Is it possible some adults are incapable of becoming better people?

Sure. If adults are in a work environment or social environment where integrity is

not valued or opportunities to exercise moral reasoning are limited or non-existent, there will be little moral development. But few adults live or work in an ethics-free zone. Everyday we encounter opportunities to make ethical judgements. If we are exposed to ethical leadership and/or work where ethical conduct is expected, we are likely to experience cognitive moral growth.

On the other hand, if we are debased by everyday encounters with violence, anti-social behavior, and ethical illiteracy, it is unlikely that we will demonstrate ethical conduct, much less get better at behaving ethically ourselves. That's why we all have a responsibility to act as moral mentors.

What can we do to become more ethical people?

First, start at home. Be a role model to your children, your spouse, and your relatives. Second, do the right thing at work and in your community. Third, support those around you and those in the news who do the right thing. Fourth, talk about issues with ethical dimensions--exercise your ethical intellect as well as those around you. Fifth, avoid cynicism. Remember what Anne Frank wrote in her diary: "Isn't it wonderful that we don't have to wait a single moment to improve the world?"

Deborah H. Long, Pd.D., DREI
Continuing Education Programs
for Licensed Professionals
(919) 968-3742
www.deborahlong.com
Copyright © Deborah Long
2003

BULLETIN BOARD

BULLETIN BOARD SPECIAL FEATURE

As part of the SEAU News feature articles dealing with code and technical issues, the 'Did You Know' segment will be featuring common misconceptions and the often overlooked code provisions that can make our lives and possibly the lives of those with whom we work more manageable.

Did You Know....?

by Jerod Johnson

How many times have you had to deal with this scenario?; You get a call from a contractor planning to place a large volume of concrete the next day. Final inspection of rebar placement has occurred and the inspector has found, due to some unknown error, that all of the lap splices on a particular size bar in a mat foundation are short by 6 inches. The contractor is asking for advice. Do you a) instruct him to cancel his concrete pour until the problem can be fixed? b) allow him to continue as planned provided more bars are added at the lap splice that will effectively lap with each of the bars in question? c) tell him he can proceed if he splices the bars with mechanical couplers? d) allow him to proceed without changes, telling him your design was conservative to begin with? Certainly any of these options might be pursued. However options a, b and c are not likely to be favored by the contractor and may in fact be injurious to the good working relationship you've been striving to foster with this particular contractor for many years. The contractor may certainly favor option d, but may wonder how much money is being wasted on the project due to your conservative design approach. Is there another option?

If you are like most structural engineers, you use the provisions of ACI 318-12.2.2 as a basis for your lap splice calculations. This provision deals with basic development lengths (l_d) which are then converted to lap splice lengths per ACI 318-12.15, using a 1.0 modifier for Class A lap splices and a 1.3 modifier for Class B lap splices. You may have used these equations to develop your own lap splice schedules to specify your instructions to the contractor or you may even use the standard CRSI schedules for lap splices that are developed from these same equations.

Did you know that these equations can be very conservative? Have you noticed that these equations do not implicitly account for factors such as bar spacing, ties and stirrups, or clear cover? Certainly these variables are considered as a pretext for determining which of the 4 equations in ACI 318-12.2.2 to use, but they are not found at all in the actual equations. In fact, the only difference in the equations are the coefficients at the beginning:

$$l_d = \left(\frac{1}{25}, \frac{1}{20}, \frac{3}{50}, \text{or } \frac{3}{40} \right) \frac{f_y \alpha \beta \lambda}{\sqrt{f'_c}} d_b$$

As you might have already considered, the organization of this equation is such that you could revert to older methodologies of specifying development lengths and lap splices as a function of bar diameter. For instance if the material properties are consistent; $f_y = 60,000$ psi, $f'_c = 4000$ psi, no epoxy coated bars or lightweight aggregate, bar spacing is typically greater than $2d_b$ and cover is greater than d_b then you could specify all development lengths and Class A lap splices for No. 6 and smaller bars as 38 bar diameters.

Getting back to the contractor in trouble... It is not likely that he has a clear understanding of the code provisions behind the development lengths that you've specified. Though we would like him to consider our specifications as absolute, he's hoping you can find a way to validate the work he's done so that his schedule will not be subject to delay.

Did you know that ACI 318 Chapter 12 contains provisions that may help our troubled contractor? First and easiest is the "Excess Reinforcement" multiplier from ACI 318-12.2.5. Simply stated, a reduction in development length (and hence lap splice length) may be in order if more reinforcement is provided than is actually required by analysis. Development length may be prorated accordingly by multiplying the calculated value by $(A_s \text{ required}) / (A_s \text{ provided})$. This may be the simplest way to reduce the lap splice length, but might not be acceptable in seismic applications. The next provision to consider is ACI 318-12.2.3 which provides an alternate equation for development length (and hence lap splices):

$$l_d = \left(\frac{3}{40} \frac{f_y}{\sqrt{f'_c}} \frac{\alpha \beta \gamma \lambda}{\left(\frac{c + K_{tr}}{d_b} \right)} \right) d_b$$

Unlike the equations from 12.2.2, this equation does implicitly account for bar spacing, ties and stirrups, and clear cover. These variables come into play in the $(c + K_{tr})/d_b$ portion of the equation where c is the spacing or cover dimension, and K_{tr} is the transverse reinforcing index (see ACI 12.2.4 for more info). It is not uncommon for the 12.2.3 provision to yield development length reductions by as much as 40% from those calculated using the provisions from 12.2.2. So, it is likely that this provision may provide the means of "bailing out" the contractor, though he may ask if lap splices can be reduced globally in accordance with this

BULLETIN BOARD

provision to save the project budget. To that, you as the engineer might explain that for a fee, you will examine the entire project, applying provision 12.2.3 of ACI 318 in every different case for development length and lap splices. With all of the different subtleties and variations that occur on a job, this could be a considerable effort, one that the contractor is not likely to elect over usage of the lap splice schedule you've already provided.

If you know of a 'common misconception' or 'often overlooked' code provision that could be highlighted in SEAU News, please contact a member of the newsletter committee or email Jerod Johnson (jjohnson@reaveley.com).

NOMINATING COMMITTEE

The following people were elected to be on this year's Nominating Committee:

Kelly Calder
Eric Kankainen
Brent Maxfield
Jeff Miller

SEAU wishes to thank these members for their willingness to help our association in the selection of outstanding board members and officers.



What geotech report?

CALL FOR ENTRIES

The National Council of Structural Engineers Associations (NCSEA) announces the Call for Entries for the 2005 NCSEA Excellence in Structural Engineering Awards Program. The purpose of the program is to recognize creative achievement and innovation in structural engineering.

Entry must be submitted by a licensed Professional Engineer (P.E.) or Structural Engineer (S.E.) whose practice or activity is primarily in the field of structural engineering.

Projects must have been completed after January 1, 2002, or must be sufficiently complete such that they clearly show the basic design of the structural system. The submittals will be judged based on the quality of the structural "design" portion of the project. Within the context of this awards program, "design" refers to the overall concept of any structure or structural system within a project. New projects, renovations, rehabilitation, structural upgrades and adaptive reuse of buildings, other structures, and bridges are eligible. Projects may be located anywhere in the world.

Awards will be presented in five project categories:

- New buildings under \$10M.
- New buildings \$10M to \$30M.
- New buildings over \$30M.
- New bridge and transportation structures
- Other structural design projects

Up to three entries in each category will be chosen to receive the NCSEA Excellence in Structural Engineering Award. From those three winners, one will be chosen as an "Outstanding Project". Firms may enter as many projects as they wish, however each firm will be entitled to have only one project as an award winner in any given year. Multi-office firms will be considered one firm. Non-winning projects from last year's program may be re-submitted as long as they are still eligible based on completion date.

For complete information, rules, and entry forms, visit www.ncsea.com.

SEAU MEMBERSHIP APPLICANTS

The following individuals have submitted an application for approval by the SEAU Membership Committee for new members:

Michael A Sotoyo – Professional
Curtis L. Earl – Student

CLASSIFIEDS**STRUCTURAL ENGINEER**

R&M Engineering, a locally-owned Murray firm, has an immediate full-time opening for an experienced Structural Engineer with 3-4 years experience. Industrial design and structural analysis experience, proficiency in AutoCAD, MathCAD, RISA desired. A Utah P.E. is preferred. Individual will need strong communication skills, sense of humor, and ability to interact well with others.

Fax resume with references to (801) 263-0128 or email them to the address listed:

kayk@rmstructural.com

NEW TECHNOLOGY FROM CSI

FREE PRODUCT DEMO EVENTS

Computers & Structures, Inc. cordially invites you to a free enlightening half day product demonstration of its industry leading software

The free demonstration will present a high level overview of the capabilities of the software in addition to examples of real life applications in the industry. A wide range of new innovative concepts and techniques that are redefining standards of Productivity and Integration in Software for Structural and Earthquake Engineering will be presented.

Come and experience first hand how new software developments from CSI can give you a distinct technological edge while skyrocketing your productivity.

The event is free but pre-registration is required. If you would like to attend, please send an email with your name, address, phone number and the name of the city where you wish to attend to product_demo_reg@csiberkeley.com



ARIZONA CARDINALS STADIUM

SAP 2000

ETABS

SAFE

The Product Demonstrations will be conducted from 8am - 12noon at the following locations:

APRIL 2005

April 20 - Salt Lake City - Sheraton City Centre Hotel



COMPUTERS & STRUCTURES, INC.

COMPUTERS & STRUCTURES, Inc.

1995 University Avenue, Berkeley, California USA 94704
info@csiberkeley.com (510) 845-2177 www.csiberkeley.com

APRIL 2005

SEAU Presents:

FIRE, BLAST, AND PROGRESSIVE COLLAPSE

*AISC Seminar**Presented by:***Joseph P. Marlo****April 21, 2005****Sheraton City Centre Hotel****150 West 500 South, Salt Lake City****8:00 a.m. Registration****8:30 a.m. – 4:00 p.m. Seminar (lunch is provided)**

Mr. Marlo is a project engineer with Structural Affiliates International, Inc., headquartered in Nashville, TN. He has been an active contributor to the AISC Fire Initiative and is currently involved in research relative to intumescent coating protections of steel elements. He is the co-author of this seminar as well as the AISC Design Guide 19: Fire Resistance of Structural Steel Framing.

Registration is required. See separate registration flier for complete information. Registration flier can be found on SEAU's website: www.seau.org in the Upcoming Events section. Cost is \$100 for SEAU/AIA/ICC members, \$50 for students, and \$150 for all others.

Partial funding has been provided by the Utah Division of Occupational & Professional Licensing from the 1% surcharge on all building permits. We wish to thank them for their support.

STRUCTURAL ENGINEERS ASSOCIATION OF UTAH

P.O. Box 581292

Salt Lake City, Utah 84158-1292

www.seau.org

Board of Directors

Barry Arnold, *President*Julie Ott, *Vice Pres./Pres. Elect*Ronald H. Dunn, *Past President*Kimberley Robinson, *Treasurer*Donald Barfuss, *Secretary/Historian*Brent Maxfield, *Member of the Board/UEC Delegate*Jake Watson, *Member of the Board/UEC Delegate Elect*