



SEAU *NEWS*

The Newsletter of the Structural Engineers Association of Utah

Volume IX- Issue III November 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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*Joseph Smith Memorial Building
(Focus Article for January 2005)*

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NOVEMBER EVENT

STRUCTURAL PLAN REVIEW

Date:

Thursday, November 18, 2004
4:00 – 6:00 p.m.

Location:

Salt Lake County Council Chamber

Cost:

No charge for all attendees

MESSAGE FROM THE BOARD

RECENT TRENDS



By Kimberley Robinson,
SEAU Treasurer

Through my work with AISC, I get a chance to interact with people across the nation. As I do this, I can identify issues and trends that are occurring in the design and construction industry. Some of these trends you may have seen or heard of, and some you may not have, but I thought it worthy to discuss a few.

Material Volatility

One of the most dominant issues facing the construction industry today is material volatility. This volatility has impacted the costs of projects and the availability of materials required to complete projects. As of mid-October typical price increases in projects are ranging from 12 to 20 percent. No matter whether the focus of attention is on copper piping, gypsum products, plywood, sprinkler pipe, duct work, structural steel, concrete, or reinforcing steel, the last nine months bear more resemblance to a trip to an amusement park than orderly commerce. In some cases the volatility has expressed itself primarily in terms of price, in other cases availability. Even within components with the same base material the impact has been different. Wide flange structural steel has increased in price at the mill level by 50% but is readily available in the marketplace. Reinforcing steel for concrete

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applications has increased 65% in cost and has been in short supply. Plate steel, deck, and hollow structural shapes are even worse. Ready-mix concrete has increased in cost by 20% and has been on allocation. Plywood is up 260% since January 2003 as part of an overall lumber increase of 52%. And this is the time that I chose to strip my kitchen down to the joists and start over. Lucky me!

Since I am getting a little older, my tolerance for thrill rides has come down a little, especially riding blind-folded. Maybe I am alone in this, but finding a way off of the roller coaster that we are on sounds good to me. I wish that I had a crystal ball that would tell me when the end was coming, or what bend or loop was coming next, but I work for a non prophet organization. Perhaps looking back at where we have been and seeing exactly what caused those bumps will give some clue to as to what to expect.

In the initial stages of the current round of instability all fingers pointed to China as a source of growing demand for raw materials, particularly scrap materials. Yet over the past several months the market for various materials has been impacted by events without any direct connection to Chinese scrap demand. Global demand for construction materials has increased, ocean shipping resources have been in short supply and of high cost, rail cars are unavailable to move product within the United States, other nations have limited or terminated exports of scrap and construction materials, the U.S. dollar has weakened limiting imports, material producers have modified their processes and product mixes as a function of energy and demand requirements resulting in increased domestic competition for resources, and price speculation on the part of raw material purchasers has created uneven demand cycles. Another thing to consider is that a transition is occurring from the pricing of domestic construction materials

being based on a cost of production model to pricing being based on a global demand model. The United States construction market is changing. No longer will prices be determined by domestic production and demand, but by the relative value of products as part of the global market. As other countries, such as China and India, grow in their demand for construction materials, U.S. builders will see materials priced on a global basis. Why? Their appetite for these materials will exceed our domestic consumption. This transition is already occurring. Taking structural steel for example, the current price of steel in the US is about \$100/ton less than others are charging outside of the US. Our current baseline price has come up \$80/ton based on global pricing issues. However, a strong dollar and technological advances in manufacturing had been holding the price artificially low for some time.

The bottom line is that volatility is a trend that will be present on a long-term basis. It will continue to affect all construction materials. Even when brief periods of stability occur, it should be anticipated that volatility will return to the marketplace in the near term. The best way to handle the risk associated with material volatility is to involve or incorporate specialty contractors into your team. Go directly to your favorite sources to ask for design ideas and an update on the status of the industry. They could have warned you about those hollow structural sections or that plywood that bit you on your last project.

Fire Design

Perhaps you are an engineer who feels that the fire protection requirements are all the responsibility of the architect, and was surprised to receive a call asking whether the system being used is classified as restrained or unrestrained. Was your first thought "what are you asking me for, that's your job"? The upcoming trend is for the engineer to be significantly more involved in fire design on their projects.

Everything from fire studies to determine realistic fire loads based on building geometry to additional load cases for fire loads are being used in design of buildings. This spring, SEAU has a seminar planned that will go over fire design concepts that engineers will see coming in the near future.

Blast and Progressive Collapse

Blast design and progressive collapse design are being incorporated into more and more buildings. Any tenant who feels that they may be at risk for terrorism may have additional criteria incorporated into the design of their office building or other structure. As such, there are more and more designers expanding into this field. It is no longer just those few who worked on petrochemical facilities.

Design Build

Design-build continues to be a strong trend in the construction market. Studies have shown that project costs and schedules can be greatly reduced using this method of project delivery. However, it is interesting to also look at studies done at Penn State that demonstrate the cost-trust relationship. Intuitively, we already knew this. In order to really save the money and the time off the schedule you need to be working with a team that you trust and work well with. Penn State just was able to quantify it and prove it on paper.

Interoperability

According to the National Institute of Standards and Technology (NIST), interoperability relates to both the exchange and management of electronic information, where individuals and systems are able to identify and access information seamlessly, as well as comprehend and integrate information across multiple software systems. In design, it can provide the capability to pull into the architectural model the structural, sprinkler, and mechanical models, etc. to check for conflicts and communicate information. (As if the mechanical

engineer will have their drawings done in time for it to do any good.) It also deals with the use of those files in the fabrication of the components of a structure. It is priceless for a Frank Gehry project, or any other project where the building drawings are done in topographic format. For his Experience Music project the architectural drawings were used by the exterior façade panel manufacturer, and the fabrication of the panels was done by computerized equipment. Design drawings in, product out, what

could be simpler? Structural steel can also be done this way: Engineers 3-D model into the detailing software which is then sent to the CNC equipment in the fabricator's shop. The concept of fluid and seamless data management encompasses all process data directly related to the construction and facility-management process, including initial designs, procurement information, and engineering specifications for operations and management. A study commissioned by the National

Institute of Standards and Technology says that the lack of interoperability in the construction industry cost the industry \$15.8 billion in 2002.

The design and construction industry is truly a changing place. These are just a few of the items that are definite trends that are worthy of pointing out.

One last note: Included in this issue are "Help Wanted" ads from several of the committees. Here is your chance to get involved and make a difference on a local level. Give a call and get involved!

ON ETHICS by DEBORAH LONG

Federal Sentencing Guidelines

Of all the means at our disposal to compel people to virtue, one of the least effective is government regulation. Professional standards, adequate supervision and training; peer pressure within an organization, and personal integrity are all better guidance systems for ethical conduct than government regulation.

Nevertheless, a powerful deterrent to ethical misconduct was created in 1991 with the enactment of the Federal Sentencing Guidelines. The Federal Sentencing Guidelines (FSG) overhauled the potential penalties for all types of federal crimes. In the past, it was possible for corporations and other organizations to avoid penalties for the criminal misconduct of their employees. They would state in their defense that their managers were unaware of their employees' misdeeds. Typically, corporate fines were relatively modest and jail time for corporate CEOs was rare.

The new sentencing guidelines, however, have a severe impact on all organizations as well as on those individuals who did not properly supervise their employees when any felony or Class A

misdeed is committed. Witness the Archer-Daniels-Midland Co fine of \$100 million imposed in 1998 on a plea of guilty to a two count charge of price-fixing.

What types of organizations are at risk under the Federal Sentencing Guidelines? All organizations including corporations, non-profit organizations, associations, unions, pension funds, and government entities. When an employee of such an organization commits a federal crime, such as fraud, bribery, giving or receiving kickbacks, money-laundering or other regulatory violation on the behalf of the organization, the organization and its managers are at risk. Offenses involving drugs, public safety, immigration, national defense, food laws, the environment, antitrust, taxation are other potential areas of application under the FSG.

Virtually every professional licensee and an employing firm have exposure to millions of dollars of fines as well as imprisonment under these guidelines. The purpose of the Guidelines is to assure that sanctions imposed on organizations and their employees will provide not only just punishment but also

adequate deterrence and incentives to organizations to maintain internal controls for preventing criminal conduct. The guidelines require judges to determine the culpability of an organization by looking at the seriousness of the offense, the role of senior management, the effectiveness of a compliance programs and other factors.

In order to mitigate punishment in the event a company's employee has committed a serious crime, an organization must demonstrate that it had a program in place to deter unlawful conduct. Part of the program must have been an effective comprehensive ethics training component where company standards and policies were communicated. Company brochures on the subject of ethics or compliance without actual training is unlikely to be sufficient to demonstrate that a firm has an effective ethics training program.

Furthermore, the FSG require that a specific high level executive must have been designated with the ultimate responsibility to assure compliance with the organization's standards and procedures. The company must not have delegated discretion to a person with a propensity to engage in unlawful conduct.

The effect of the FSG is significant in terms of ethics in the workplace. These guidelines mandate that all firms institute comprehensive effective ethics compliance programs or face very stiff penalties. Supervisors, sales managers, and other company executives are now charged with the responsibility of being ethical mentors for their firms. Further, this statute creates an affirmative obligation on the part of all organizations to

prevent, detect and report criminal conduct. The burden of proof is on the organization to prove that its ethics program was comprehensive and effective. The degree to which an organization can demonstrate due diligence in this regard may result in a decision by an attorney general not to prosecute the company.

In view of these guidelines, it's not just good business to

have an ethics program--it's required.

(For more information regarding the Federal Sentencing Guidelines, go to www.whitehorseinc.com)

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

PRESIDENT'S MESSAGE

Thank You Ron Dunn

Ron Dunn was the SEAU president this past year. He did an outstanding job! At last year's opening social Ron stated that "the hard part of the social next year would be that you have to find something nice to say about me." Contrary to his belief, I could fill pages with good things to say about Ron. Because Ron was celebrating his wedding anniversary during this year's social and I was unable to publicly express my feelings of appreciation and respect for him there, I will do it now. I want to discuss two of the many admirable traits I learned about Ron while watching and working with him this past year.

The first admirable trait Ron has is his deep love and respect for the engineering profession. He has a great desire to make something more of engineering than have it be just a business/job. He sees engineering as a glorious profession worthy or respect by all. Ron has tried diligently this past year to get the rest of us to see engineering in this light. The emotion that Ron has regarding the engineering profession often bubbles to the surface

when he talks about what 'we' (meaning all engineers) could be.

The second admirable trait is the way he treats his employees. Ron realizes the enormous weight and responsibility an engineering career has and he supports his employees in many ways. He fully sponsors his employees' membership in SEAU and encourages their attendance at SEAU membership meetings and seminars. There aren't too many SEAU committees that do not have one of Ron's employees in them. "Encouraging continued growth in my staff is the right thing to do for the profession" he once told me. He also encourages his employees to grow on a personal basis - to expand and grow in all areas of their personality. All of Ron's employees speak very highly of him.

Thank you, Ron for your example and concern for the profession. Thank you for showing, by example, the SEAU membership a new and brighter view of the structural engineering profession. Your efforts this past year are greatly appreciated.

Barry Arnold, SEAU President



"This is OK isn't it? Well, all right, I understand, but . . ."



"this is OK, though, right?."

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BULLETIN BOARD SPECIAL FEATURE

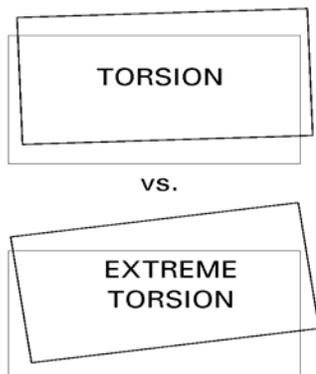
This month SEAU would like to feature:

EXTREME TORSIONAL IRREGULARITY

by Jerod Johnson, P.E.

Among categorizations for seismic behavior that have been adopted in recent codes is Extreme Torsional Irregularity. Torsional Irregularity is not an unfamiliar concept and is an issue that engineers have learned to deal with, particularly in seismic country. Extreme Torsional Irregularity however is a fairly new concept and one that can greatly limit and restrict flexibility in choosing seismic systems and configurations.

So, what is Extreme Torsional Irregularity? Recent codes have defined Torsional Irregularity as the condition where the maximum story drift, including accidental torsion at one end of the structure transverse to an axis is more than 1.2 times the average of the story drifts at the two ends of the structure. Fundamentally, this means that if one end of a rectangular structure drifts more than 1.5 times the other end, Torsional irregularity is said to exist. For the newer categorization of Extreme Torsional Irregularity, the calculation steps are fundamentally the same, except that Extreme Torsional Irregularity is assigned to structures where the maximum story drift, including accidental torsion at one end of the structure transverse to an axis is more than 1.4 times the average of the story drifts at the two ends of the structure. Again, in the most simple terms this means that if one end of a rectangular structure drifts in excess of 2.33 times the other end, the structure is classified with Extreme Torsional Irregularity.



What difference does this make in design? Today's sophisticated analysis software is capable of handling any degree of torsion. As far as basic analysis goes, there is fundamentally no difference between "regular" Torsional Irregularity and Extreme Torsional Irregularity. The major difference can be found in structures assigned to Seismic Design Category E or F. To put it simply, section 1620.5.1 of

IBC 2003 states that structures having plan irregularity Type 1b of Table 1616.5.1.1 (Extreme Torsional Irregularity)...shall not be permitted. In other words, any structure assigned to Seismic Design Category E or F *shall not be permitted* to have Extreme Torsional Irregularity. Typically, assignments of Seismic Design Category E or F pertain to structures with long period spectral accelerations (S_1) of 0.75g or greater. Unfortunately, this pertains to a great many sites along the Wasatch Front. The current MCE maps indicate "hot spots" of spectral acceleration enveloped by the 0.75g contour extending from Ogden on the north to American Fork on the south and from the foothills of the Wasatch mountains to the approximate midpoints of the associated valleys. Hence, the most heavily populated areas are affected. For the current code, designers of projects within this area must be aware of the Extreme Torsional Irregularity issue and design buildings accordingly.

There may be hope in future codes for structures with Extreme Torsional Irregularity. The November 2003 edition of *SEAU News* contained the feature "Horizons – Spectral Acceleration Maps". This article presented the new spectral acceleration maps proposed for adoption in ASCE 7-2005 and IBC 2006. For the new maps the "trigger boundary" for assigning a structure to Seismic Design Category E or F has changed. Hence, a structure currently classified as E or F may in fact be classified as D in future codes. However, the reverse could also hold true.

An issue of contention many designers have raised regarding the classification of torsional irregularity is that the methodology does not address the magnitude of relative story drifts. Using values derived from the fundamental rectangular model mentioned previously, if one end of a rectangular structure drifts 0.8 inches and the other end drifts 1.2 inches, the average drift is 1.0 inches and since the maximum drift is at least 1.2 times the average drift, the structure is said to have Torsional Irregularity. For the same model, if one end of the structure drifts 0.6 inches and the other end drifts 1.4 inches, the average again is 1.0 but the structure is now said to have Extreme Torsional Irregularity since the maximum drift is at least 1.4 times the average. Next, consider a similar structure with a lateral force resisting system composed of concrete shear walls. Perhaps the drifts are 0.008 inches on one end, 0.012 inches on the other end for an average of 0.010 inches. Although the deflections are miniscule, the structure is nonetheless classified as having Torsional Irregularity. Likewise, for drifts of 0.006 on one end, 0.014 on the other, the maximum drift divided by the

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average is still 1.4 and the structure has an Extreme Torsional Irregularity, forbidden for Category E or F. In summary, story drifts may be immeasurably small, yet the structure may violate adopted code standards regarding torsion and may require a major re-configuration of the lateral force resisting system.

Perhaps future research and code developments will incorporate magnitudes of displacements when computing torsional effects. Clearly, for miniscule story drifts, the effects of torsion cannot be expected to contribute significantly to overall seismic behavior.

SEAU News invites your feedback regarding this and any other code topic. Please submit your comments to Jerod Johnson, SEAU Newsletter Committee; jjohnson@reaveley.com.

SEAU HELP WANTED**Positions Available****SEAU Programs Committee**

Needed; 2 people to help coordinate seminars (locations, food, speakers, registration, etc), and make arrangements for out of town guests at the monthly membership meetings and seminars. No prior experience required – but should be interested in meeting fascinating engineers. Contact Larry Reaveley (Chairperson) at Ph: (801) 581-6931, Fax: (801) 585-5477 or Email: reaveley@civil.utah.edu

SEAU Fall Social Committee

Needed: four people interested in helping plan the SEAU Fall Social. No prior experience needed. If you think you can do as good or better than what has been done in the past – now is your chance to show us how it should be done. Applicants should be able to work within a set budget. Contact Julie Ott (SEAU President Elect) at Ph: (801) 328-0278, Fax: (801) 333-7677 or Email: jott@absconsulting.com

**SEER (Structural Engineers
Emergency Response) Committee**

Looking for several new participants to be actively involved in the committee. If interested please contact Barry H. Welliver (Chairman) at Ph: (801) 553-0162, Fax: (801) 553-0163 or Email: wellive@attglobal.net

SEAU Ethics / Standard of Care Committee

Needed: four new committee members to actively participate. Exciting opportunities exist to really have an impact on the engineering profession. Contact JR (Chairman) at Ph: (801) 466-1699, Fax: (801) 467-2495 or Email: jr@rcgengineers.com

SEAU Advertising Committee

Applicants should be willing to contact suppliers/fabricators to advertise in the SEAU Newsletter. This is a great opportunity to help finance SEAU activities. Current positions available: Chairperson and committee members. Contact any member of the SEAU Board if interested.

SEAU Student Relations Committee

Position Available: Chairperson and committee members. Applicants will be responsible for interfacing with the universities and colleges within the state to enhance student awareness about SEAU. A recent (within the past four years) graduate would be ideal but all applicants will be considered. If interested contact any member of the SEAU Board.

SEAU Technical Committee

The Technical Committee is actively seeking motivated engineers to fill vacant positions within the committee. People driven with the desire to help and educate others are requested to contact: Tim Nordstrom (Chairman) at Ph: (801) 575-8877, Fax: (801) 575-8875 or Email: engineers@dunn-se.com

SEAU MEMBERSHIP APPLICANTS

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

Jon P. Allen	Associate
Ben Andersen	Associate
Ramin Mohabati-Arani	Affiliate
Charles Ross Anderson	Professional
Jack H. Boggs	Professional
Charles B. Elliott III	Professional
Steven J. Hoggan	Professional
George R. Jacklin	Professional
Jared E. Lee	Professional
Boyd Pickering, P.E.	Professional

JANUARY 2005 EVENT

The SEAU General Membership Meeting for January 2005 is:

Post Tensioning Institute Seminar
January 20th, 2005
University of Utah
All day event.

More information to follow. Stay tuned.

BULLETIN BOARD

"LESSONS I'VE LEARNED"

by Omer Blodgett

1. Nothing beats hands on experience.
2. You'll never know it all, so become a life-long student.
3. Solutions to real world problems seldom appear in the classroom.
4. Sometimes great gems learned at a young age and ignored for years never lose their sparkle.
5. You've got to have the courage of your convictions.
6. Honesty is always the best policy.
7. Codes are not always clear as to their intent and purpose.
8. Codes always lag industry.
9. Welding is not a fastener; it is a method of design.
10. Don't hold back on accepting new ideas, or you may be left behind.
11. Don't design with your heart.
12. Learn from other industries.
13. Never be afraid to ask questions.
14. Don't panic!
15. Don't put welds in bending.
16. The centerline of the flange is critical for ductility.
17. A good picture is worth a 1,000 words.
18. We stand on the shoulders of giants.

For a complete discussion on these topics, see *Modern Steel Construction* May 2004

Dr. Omer Blodgett is Senior Design Consultant with The Lincoln Electric Company, Cleveland, Ohio. He is world renowned for his knowledge of welded design, and his outstanding ability to communicate, dramatize and illustrate it. His background includes civil, mechanical, and metallurgical engineering. Dr. Blodgett is well known as the author of the classic texts *Design of Weldments* and *Design of Welded Structures*, which have been in print for more than three decades. Dr. Blodgett is a Fellow of the American Welding Society and was inducted into the first class of Fellows in 1991.

CLASSIFIEDS**STRUCTURAL ENGINEER**

Roggenkamp Erickson & Associates, P.C., a consulting structural engineering firm located in Vancouver, WA, near Portland, OR, is looking to expand its team of dedicated professionals. We're seeking a **structural engineer** with 3 to 5 years of professional experience, who is a licensed PE, has excellent verbal and written communication skills, who is comfortable with client interaction and has familiarity with the design of a wide range of building structural systems. Preference will be given to candidates with an MS degree, demonstrated familiarity with FEMA seismic rehabilitation documents, current seismic design provisions and a proven track record of successful client relations. We offer a competitive salary, a full benefits package, paid vacations and holidays, relocation assistance, a relaxed office environment, and an opportunity to play an integral role in our growing firm. The Pacific Northwest is a great place to live! We have nearby ocean beaches, the Columbia River, the Cascade Mountains and a great quality of life. To apply, submit a cover letter describing your career aspirations, a copy of your resume, a list of references, and salary requirements to:

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SEAU Presents:
In Partnership with the Utah and Bonneville Chapters of ICC

RESIDENTIAL SUBMITTAL REQUIREMENTS

SEAU is assembling a seminar on what is required for a residential submittal. The seminar will be at the Salt Lake County Council Chambers; 2001 South State Street, North Building main entrance from 4:00 P.M. to 6:00 P.M. on November 18th. We are extending invitations to anyone wishing to attend. The seminar will be free. Please bring questions and opinions, we will have some of the most experienced residential design professionals in Utah on hand!

- Overview of Home Design
- IBC / IRC Submittal Requirements
- State Amendments
- SEAU Minimum Residential Requirements
- What is typically missing in residential submittals
- Importance of technical reviews

November 18th, 2004
4:00 to 6:00 P.M.
Salt Lake County Council
Chambers
2001 South State,
North Building,
Main Entrance

Modern homes are among the most complex structures that a building department will see. Even for the engineers, they are among the most difficult to analyze properly. Our panel of experts will discuss what is currently required in residential design. The *2003 International Building Code* & the *2003 International Residential Code* both have explicit requirements for what must be included in a plan set. Additionally, the State of Utah has additional amendments to the codes. All this has led to confusion as to what must be done to properly design a home. SEAU would like to improve the standard of practice in residential design by bringing together building officials, architects and engineers and educating everyone on minimum standards.

STRUCTURAL ENGINEERS ASSOCIATION OF UTAH

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