



SEAU *NEWS*

The Newsletter of the Structural Engineers Association of Utah

Volume V- Issue VI April 2001

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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:
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*Advertisements for publication may be submitted to:
Mike Buehner, Advertising
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mbuehner@reaveley.com*



Oquirrh Park Olympic Speed Skating Oval, roof steel open web joists engineered and fabricated by Vulcraft.

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APRIL EVENT

I-15 Bridge and Highway Reconstruction Project

▼
Presented by:
Paul B. Blackham, P.E.,
Structures Section Lead

▼
Program Date:
Thursday April 19, 2001
5:30 p.m. Social
6:00 p.m. Meeting and Program

▼
Location:
University of Utah
Engineering and Mines Building
Room 104

MESSAGE FROM THE BOARD

THINKING "OUT OF THE BOX"



By A. David Alter, SEAU
Member of the Board

The other day, as one of my colleagues and I were traveling to a jobsite, he noted that, with the structural engineering advances that have developed over the past few years, it seems that we have just about covered everything related to structural engineering, and are now incorporating them into our designs.

Another colleague of mine related to me that early this last

century (yes, I am referring to the 20th century), someone suggested that the U.S. Patent office be closed, because pretty much everything had been invented, and nothing new was likely to be thought of. After all, cars, airplanes, and the telephone had all been invented. Since then, ideas in every field (including structural engineering advances) far beyond anyone's comprehension have now been conceived. This is all because there were those willing to *think out of the box*.

I attended a TQM (Total Quality Management) Seminar years ago, where the instructor told us of a group of college students who had been challenged by their physics professor to design a vehicle that would accelerate at a rapid rate. The only limitations imposed on the students were the maximum horsepower of the vehicle, and that it was required to transport a minimum weight at the required acceleration, and for a minimum distance.

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:

Karen & Associates, P.C.

After serving a long stint as a BYU civil engineering professor and as a consultant for Hercules, Inc., Ken Karren began practicing structural engineering in Salt Lake City in 1981. The name was shortly changed from Karren Engineering to Karren and Associates. The office was moved to Provo in 1990.

Karren & Associates has prepared structural designs for a large number of new structures including school, college, church, industrial, commercial, and government buildings, roller-coaster structures, bridges, towers, tanks, and residential structures. Karen & Associates has also conducted review studies and repair documents for many existing structures. Several recent projects include the following:

Stein Eriksen Conference Center and Condominiums



This recent addition to the Stein Eriksen complex in Deer Valley incorporates a variety of structural systems. The conference center was

framed with composite concrete and steel beams. The upper deck serves as an outdoor plaza. Some wood-framed structures and some planting areas were located on this upper deck. The condominiums are wood-framed two and three story structures above two levels of underground parking constructed with post-tensioned concrete.

Sandy Courthouse



This two-story courthouse and jail has reinforced masonry exterior walls. The floors are framed with open web steel joists, steel deck, and concrete. The columns are of both steel tubular and reinforced concrete sections. This building is complicated with architectural requirements for traffic flow, security, and aesthetics. The basic design is currently under reconstruction in Vernal as the Uintah County Courthouse.

Gardner Center

Along with several other firms, an extensive structural study was performed on the Gardner Student Center at Dixie College in St. George. After the DFCM and the University staff reviewed all of the studies they chose to construct an entirely new building rather than to do an addition. The new three-story student center building also has reinforced masonry exterior walls. The floors were framed with composite concrete/steel beams and open web steel joists. The roof was framed with open web steel joists and steel deck.

Joseph Smith Building



This is a three-story class room building on the Brigham Young University Campus in Provo. The structure was framed with steel beams, columns, and open web joists. Lateral forces are resisted with reinforced concrete shear walls located in each of the four corners of the building.

Non-Building Projects

Karren & Associates has also performed non-building analyses. The firm recently performed a finite element analysis/design for a unique condominium project. Several buildings in the project were to be located on an earthquake fault surface trace. Measured vertical displacements of up to 13 inches were possible.

In the FEM model, the soil was modeled with spring elements. The bottom spring nodes on one side of the hypothetical fault lines were displaced vertically. Spring elements showing tension were inactivated and the analysis was repeated. The resulting moments and forces were used to design the footings and walls.

This detailed procedure was expensive from the standpoint of design time and is hard to justify on typical projects. However, finite element analysis is a powerful tool with which to solve challenging design and analysis problems. Ken Karren has served SEAU as President and currently serves as the Audit committee chairperson.

MESSAGE FROM THE BOARD (continued from page 1)

The students ran the required calculations, and determined that it was physically impossible to produce the required acceleration with the limited horsepower rating of the vehicle. This is where many of the students gave up. One team, however, decided to think “out of the box”. Before our instructor told us how they accomplished their goal, he challenged us to come up with some ideas. None of us could figure it out. We had built an imaginary box around our way of thinking, and it seemed impossible.

Thankfully, the instructor guided us through the solution, as our curiosity was driving us nuts. The students had designed and built a cart utilizing the small engine to store up potential energy in the form of fluid pressure, which was then released at a rapid rate, pushing the vehicle at the required acceleration while carrying the required load. Like many solutions to our problems, it was *so* simple! Like many great inventions or ideas, they often originate with a simple thought. I submit that many of our most successful engineering solutions are derived by thinking out of the box..

Like most of you, I enjoy a challenge. I enjoy designing a building with unusual deflection criteria, or that needs to resist or re-direct blast forces, or the owner

wants to avoid columns or bearing walls (or shear walls) in certain locations, or any number of other design challenges that put my knowledge and creativity to the test. Isn't this what makes our job fun?

A few weeks ago, I had the pleasure of attending the annual Engineering Week Banquet at Abravanel Hall, sponsored by Utah Engineers Council. It has been my pleasure to represent SEAU this year at UEC, and I have benefited greatly by associating with some of the best engineers of other disciplines here in Utah. (Yes, there are other engineering disciplines, and yes, they are pretty darn smart, too).

During the banquet, we heard from the Governor's council on technology in Utah, and how we hope to provide a home for more engineers and other technical disciplines here in the state. This goes along with the need for those of us already here to “raise the bar” when it comes to our engineering designs and creativity. If there is a better way to do our work, we should consider it. We should be the ones that other states are looking to for creative design solutions in our field of expertise.

We should be proud of one of our SEAU members, Ron Reaveley, who received the award for

Engineer of the Year. Parry Brown, SEAU past president, was also nominated for this award. Kudos to these and other engineers who have gone above and beyond in our field. They make us all look good by raising the bar in Utah for our profession.

Think about what the future has to offer in structural engineering. We are likely to see significant advances in material science or design methods which will affect our industry. Many of you have already engineered steel moment frames with the new dog-bone connections. What a simple and cost-effective, yet highly effective method of obtaining better ductility! And what about fiber-composite design and construction? We have just finished our first full-blown use of this product on the seismic retrofit of an existing facility. Both the contractor and owner are pleased with the results, and we have a high degree of confidence in the performance of the building during a seismic event.

There are unlimited means and methods of doing our work that have not even been considered yet. It becomes our responsibility to *think out of the box*, and come up with techniques of providing our clients with more cost-effective and safer structures. Not to mention, it will make our jobs a lot more fun!

SEAU OFFICER NOMINEES

LETTER FROM THE SEAU NOMINATING COMMITTEE



By James William, SEAU President Elect

I would like to start by thanking the members of SEAU that were elected and participated on the nominating committee. I would also like to thank the members who were nominated by the committee and who accepted their nomination. SEAU is a non-profit organization and requires donated service from its members in order to function. I am always thankful for those members who are willing and able to contribute their time and talents towards a worthwhile organization such as this.

You may have already noticed that this year we have only one nominee for president elect. I am excited that Larry Reaveley has accepted the nomination. As all of you are already aware, Dr. Reaveley has much to contribute to our organization.

The members of SEAU should be aware that they still have an opportunity to add other nominees to the election. This may be done up to the April general membership meeting. Additional nominations may be made by petition of at least 5% of the voting grade members.

Before May 1, all PROFESSIONAL grade members shall be sent a ballot listing the nominees for the various offices. The signed ballot shall be sealed and returned to the Association office before noon of the day of the regular meeting in May. The ballots shall then be counted and those receiving the highest votes shall be declared elected at the May meeting. In case of a tie, the President-Elect shall cast the deciding vote.



President -Elect Nominee

Name: Lawrence D. Reaveley,
Ph.D., P.E.,

Current Employment: Chair, Dept. of Civil and Environmental Engineering, University of Utah.

Education: Ph.D. Civil Engineering, University of New Mexico, 1971

Engineering Specialties: Structural Engineering

Past SEAU Assignments:

SEAU Founding Member

Member of the Board 1980-1981

Representative Projects:

Utah Capital Building Evaluation

Historic Hotel Utah Remodel and Seismic Upgrade

Inn at Temple Square Seismic Upgrade and Remodel

Important Issues for SEAU:

Upholding the principals and by-laws of the organization



***Board Member (Historian)
Nominee***

Name: Jay Adams, P.E., S.E.

Current Employment: J.M. William & Associates (Orem Office)

Education: M.S. Civil Engineering, Brigham Young University, 1994

Engineering Specialties: Buildings, remodels, seismic upgrades, forensics and resorts

Past SEAU Assignments:

Membership Committee Chairperson

Licensing Committee Chairperson

Representative Projects:

Thanksgiving Point in Lehi

Exotic Imports in Draper

Legacy Lodge in Park City

Atlantis resort in the Bahamas

Important Issues for SEAU:

Provide a voice for SEAU representing those practicing in Utah Valley and other outlying areas and be able to address some of the unique challenges that they face.



***Board Member (Historian)
Nominee***

Name: Barry Arnold, P.E.

Current Employment: ARW Engineers

Education: B.S., Civil Engineering, 1988

M.S., Structural Engineering, 1989

Engineering Specialties:

Restoration/Renovation of Existing Structures

Steel Structures

Past SEAU Assignments:

Wind Committee

Representative Projects:

David Eccles Conference Ctr. & Peery's Egyptian Theatre - Ogden, Utah

Weber State University Browning Performing Arts Center - Ogden, Utah

UTA Riverside Maintenance/Operations Facility - Riverside, UT

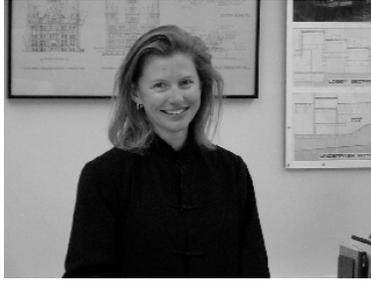
Autoliv Corporate Office - Ogden, Utah

Sysco Foods - Salt Lake City, Utah

Important Issues for SEAU:

Promote member participation

Promote the ideals of the Association



**Board Member (UEC
Delagate) Nominee**
Name: Julie Ott, P.E.

Current Employment: Allen & Bailey Engineers
Education: B.S. Civil & Environmental Eng., Utah State University 1994
Engineering Specialties:
 Structural Engineering
Past SEAU Assignments:
 Programs Committee, 1994-Present
Representative Projects:
 Jeanné Wagner Theatre
 American Fork Police & Courts
 Mesquite City Hall
 Skaggs Catholic Center Elementary School
Important Issues for SEAU:
 Increased participation of ALL SEAU members.
 Statewide adoption and enforcement of UCBC (or equivalent)
 IBC 2000 Continuing Education
 Continue SEAU's growth in Code regulation, adoption, and enforcement.
 SEAU ties with other associations must be developed and strengthened.



**Board Member (UEC
Delagate) Nominee**
Name: Paul Nelson, P.E.

Current Employment: Dunn Associates
Education: B.S. Degree in Civil Engineering, University of Utah, 1990
 M.S. Degree in Civil Engineering, University of Utah, 1993
Engineering Specialty:
 Structural Engineering
Representative Projects:
 Gateway Project Block A
 Southtowne Entrepreneurship Training Center
 Union Park Office Building
 Murray High School
 Old Mill Corporate Center West Phase II
Important Issues for SEAU:
 Improve community awareness of seismic related issues.
 Provide quality continuing education for SEAU members
 Improve the value structural engineers place on their services

UPCOMING EVENTS

2001 STRUCTURES CONGRESS

**2001 Structures Congress &
Exposition**
“A Structural Engineering Odyssey”

Presented By:
 The Structural Engineering Institute of the American
 Society of Civil Engineers presents:

May 21-23, 2001

Location:
 Washington Renaissance Hotel
 Washington, D.C.

For more information, check
www.asce.org/conferences/structures2001

2001 NASCC

**North American Steel Construction
Conference 2001**

Presented By:
 The American Institute of Steel Construction

May 9-12, 2001

Location:
 Ft. Lauderdale Convention Center

For more information on the 2001 NASCC call (312)
 670-2400; FAX (312) 670-5403; or consult AISC's
 website at: www.aisc.org

BULLETIN BOARD

BULLETIN BOARD OLYMPIC FEATURE

Each month from this issue to the 2002 Winter Games, the SEAU News will be highlighting an Olympic venue, particularly with respect to the structural engineering aspects of the venue. This month's feature is the following:

"E" Center, West Valley City



When Utah was chosen to host the Winter Olympic Games in 2002, West Valley City seized the opportunity to lure the IHL Grizzlies hockey club to their city and provide a venue for Olympic events. The agreement between West Valley City and the Grizzlies required that the facility be completed for the start of the '97-'98 hockey season! That left an extremely limited time frame of only 24 months from the conceptual design through construction. The "E" Center represents an unprecedented level of cooperation between members of the building design and construction teams to facilitate this fast track schedule. The arena was expressly designed to be, first and foremost, a hockey venue. The parameters were to insure that all seats possess a clear site line to the ice rink, making every seat the best seat in the house. The special cantilevered club seats overhang the seats at the main concourse level, insuring that no seat is too far from the ice. A specially designed sound system, attuned to the acoustical environment of this arena, insures excellent sound at each seat. Attention to all details insure this facility will be utilized for numerous events and reward the city for their investment. The world spotlight will shine on West Valley City's "E" Center as it hosts the men's ice hockey and short track speed skating events for the 2002 Olympic Games.

SEAU MEMBERSHIP APPLICANTS

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

1. Tony Pawloski, *Affiliate*

The following individuals have submitted applications for approval by the SEAU membership committee for membership upgrades

1. Tait A. Ketcham, *Associate to Professional*
2. S. Clark Seaman, *Associate to Professional*
3. Kimberly S. Robinson, *Associate to Professional*

SEISMIC CODE ISSUE

The following excerpt was taken for a recent issue of the SEAOC newsletter:

Rho Factors

The November meeting provided clear motivation to move forward with development of code change proposals regarding redundancy/reliability factors. It was the consensus of the 21 members present that:

- (i) Calculation of ρ should not have to consider the effects of either accidental torsion (5%) or the torsional amplification factor, A_x .
- (ii) It makes sense to waive the cap of 1.25 for special moment-resisting frames if the maximum allowable drifts are reduced by a factor of $1/\rho$.
- (iii) ρ may be taken equal to 1.0 for overturning calculations, foundation design, existing structures for which the code is not triggered, elements of structures, nonstructural components, and equipment (section 1632).

The ρ factor subcommittee, led by Gary Searer, expects to draft a position statement for discussion at the next meeting of the full Committee on February 27. The paper will cite theoretical and real-life examples to illustrate a "pros and cons" discussion of the infamous factor and its effects on design, both intended and unintended. The Committee's goal is to shepherd a code change proposal through SEAOC in time for the 2002 IBC Supplement.

THIS SPACE FOR RENT

The newsletter can be an excellent forum to advertise and target a very select group of professionals. To find out more contact:

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

IBC 2000 CODES AVAILABLE

SEAU has 11 copies of the IBC 2000 code available at a special discount price of \$55. To take advantage of the special price, call Steve Cohn @ (801) 328-0278. Hurry and call now.

SEAU HAS MOVED!



SEAU has a new address, and now has a phone number:

SEAU
 P.O. Box 742
 Centerville, Utah 84014-0742
 Phone: (801) 321-0259

When you call, either Peggy Ogzewalla or Danelle Washburn will answer. Peggy is now the executive Director for SEAU.

Please make a note of our new address, and get it changed in your records. Also, just a reminder that our web site is seau.org – check it out.

CLASSIFIEDS

STRUCTURAL ENGINEER

Knighton and Crow, Inc., an established multidiscipline engineering firm in Logan has an opening for a Structural Engineer with a minimum of 2 years experience, P.E. preferred, but not required. Opportunity for growth while working on a wide variety of projects ranging from commercial buildings to specialty structures. Send resume to:

Knighton and Crow, Inc.
 95 West Golf Course Road, Suite 101
 Logan, UT 84321



APRIL MEETING

I-15 Bridge and Highway Reconstruction Project



Sponsored By:
 SEAU

Presented By:
 Paul B. Blckham, P.E.,
 Structures Section Lead, Sverdrup Civil Incorporation
 Majority partner of the design joint venture team

Thursday April 19, 2001

5:30 p.m. Social
 6:00 p.m. Meeting and Program

Location:
 University of Utah
 Engineering and Mines Classroom Building
 Room 104

The interest locally in the I-15 reconstruction is high with recent announcements that full freeway closures will occur in the next few weeks in order to provide a fully functional project by May of this year. Several of the aspects of this project are of particular interest to structural engineers, since there are over 140 bridge structures included in the project. In the presentation planned for the SEAU meeting on April 19, the presentation will focus on the following issues:

1. “Why this massive project was undertaken”.
2. Project geometric complexities.
3. Project structural innovations.
4. Project seismic criteria.
5. Economic use of girders, including a new set of prestressed concrete girder sections.
6. Project advanced traffic management system.

SEAU Presents:

I-15 Bridge and Highway Reconstruction Project

Presented By:

Paul B. Blackham, P.E.,
Structures Section Lead, Sverdrup Civil, Inc., (majority partner of the I-15 joint venture team)

Thursday April 19, 2001

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University of Utah
Engineering and Mines Classroom Building
Room 104

STRUCTURAL ENGINEERS ASSOCIATION OF UTAH

P.O. Box 58628

Salt Lake City, Utah 84158-0628



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David Alter, *Member of the Board/UEC Delegate*

Wm. Chris Barker, *Member of the Board/Historian*

David P. Brown, *Member of the Board/UEC Delegate Elect*