



# SEAU NEWS

The Newsletter of the Structural Engineers Association of Utah

Volume VII- Issue V February 2003

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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.*

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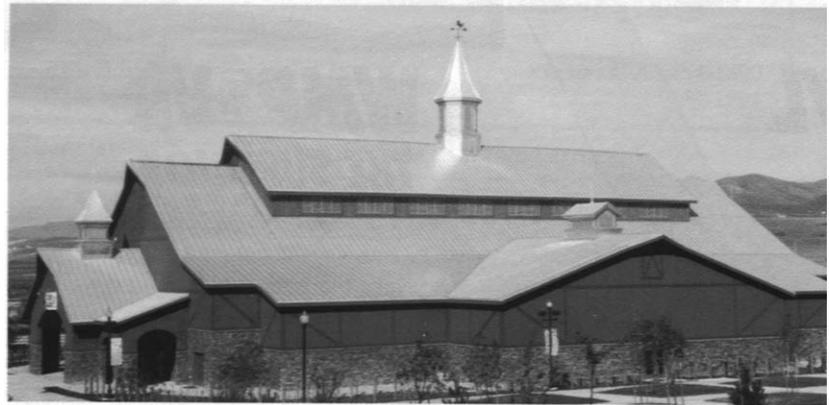
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*The Barn at Thanksgiving Point, Lehi, Utah  
by Mountain View Engineering, Inc.*

## IN THIS ISSUE

Message From The Board ..... p 1

Member Forum..... p 2

Bulletin Board ..... p 4

## FEBRUARY EVENT

### *Retrofit of Structures Using Fiber-Reinforced Polymer Composites*

▼  
**Presented by:**

Dr. Chris Pantelides

Dr. Larry Cercone

▼  
**Program Date:**

Thursday, February 20, 2003

5:30 p.m. Social Hour

6:00 p.m. Program

▼  
**Location:**

University of Utah

EMCB Room 103  
▼

## MESSAGE FROM THE BOARD

### **SEISMIC UPGRADE TRIGGERS**



By Jeff Miller,  
SEAU Secretary/Historian

**R**ecently most, if not all SEAU members received an e-mail from Roger Evans, the Salt Lake City Building Official. The e-mail asked a question regarding whether a seismic upgrade would be required on a hypothetical building based on a change in occupancy. Different occupancies were planned for

different floors of the building. When I received the e-mail, I was initially a bit curious as to the reason for the e-mail. I figured as a structural engineer the question relative to the occupancy load for the building wasn't something I really needed to worry about. A few days later, I had a little more time to study some of the tables in the IBC regarding occupant load for various types of occupancies. It was a good exercise to review these tables. Tables that I figured usually only apply to the work of the Architects. I'm not sure that I calculated the occupant load for the building correctly, but at least it served as an introduction to the occupant load tables.

Once I had the occupant load calculated, the question that needed to be answered was whether or not the occupancy change would trigger a seismic

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:*

*Bidwell Inc.*

**B**idwell Inc. was first conceived in 1981 by Joan Jones as a parking lot resurfacing company. Since then, Bidwell has evolved into a structural concrete rehabilitation firm working with many of Utah's structural engineering firms. Fraser MacPhee of Bidwell, Inc. has been a member of SEAU since 1997.

Structural engineering principles and practices are integral to many of our projects, as well as cement and concrete chemistry, and the understanding of thermal, static, dynamic and chemical/environmental loads. The opportunity for continuing education afforded through membership in SEAU has assisted us in understanding Root Cause Failure Analysis - the results of which determine rehabilitation methods and materials.

Bidwell has completed a diversified number of projects involving many forms of structural concrete rehabilitation in commercial, parking, heavy highway, industrial and mining markets. Types of projects include restoring structural members to original capacity, increasing capacity of structural components due to use changes, mitigation of corrosion in concrete, as well as protective coatings and linings.

Bidwell, Inc. has recently preformed following structural concrete repairs:



*Hilton Hotel Parking Structure, Salt Lake City*

This underground parking structure located on West Temple Street, suffered extensive corrosion damage due to water and chloride infiltration.

The structure was shored to grade using single post 25 kip capacity shores. All deteriorated concrete was removed and detailed. The entire area was

sandblasted to remove loose, and/or micro-fractured concrete, as well as any corrosion on the reinforcing. Additional steel was added where more than 15% section loss had occurred, and the member restored to its original dimension. The area above the deterioration was sealed from further water and chloride intrusion using a polyurethane sealant and a vehicular traffic deck system.



*Bridger Coal Company, Point of Rocks, WY*

Conventional un-reinforced slabs on grade were deteriorating under the force of tracked vehicles weighing over 200,000 lbs. The high point/impact loads were pulverizing the cement paste and aggregate. To counter the loads, Bidwell, worked with on site engineers to design and construct slabs capable of withstanding the given loads, as well as installing a crane rail embedded in the slab to offer a malleable impact point for the tracked vehicles. The rails were anchored using Nelson Studs grouted with epoxy, and malleable metallic aggregate grout in the rail block-out.



*Donner Place Condominiums*

A suspended 225 foot-long, post tensioned concrete slab required repair at a random crack joint that had formed in the deck. As the original design did not call for an expansion joint, the "random joint" was difficult to keep watertight, and hence the conventional steel free from corrosion.

The approach taken was to structurally repair the "random joint" and to create another joint. A new joint was formed into the repair area along a predictable plane perpendicular to the banded tendon direction. The existing random joint was stitched with reinforcing steel and the crack underneath the slab injected with epoxy. Approximately one week later, a new crack appeared directly underneath the formed joint, indicating success.

**MESSAGE FROM THE BOARD** (continued from page 1)

upgrade. My previous experience had been that a discussion with the building official having jurisdiction was needed to determine whether or not a seismic upgrade would be required. It had also been my experience that different jurisdictions had somewhat variable standards as to what would trigger a seismic upgrade. The more common standard being that if the occupancy of a building was changed such that it was classified as a higher seismic hazard classification, a seismic upgrade was required. Other factors such as the percentage of the remodel cost relative to the total cost of the building were also considered in some cases.

While looking through various documents regarding seismic upgrade triggers, I remembered that I had read something about seismic upgrade triggers in the Utah Uniform Building Standard Act Rules. I had seen this when I used the snow load calculation procedures in this document, but didn't pay much attention to it at that time. A review of the Rules made things a whole lot clearer. The following is an excerpt from the Rules:

(48) Section 1614.2 is deleted and replace with the following:  
1614.2 Change in Occupancy. When a change of occupancy results in a structure being reclassified to a higher Seismic Use Group, or when such change of occupancy results in a design occupant load increase of 100% or more, the structure shall conform to the seismic requirements for a new structure.

Exceptions:

1. This is not required if the design occupant load increase is less than 25

persons and the Seismic Use Group does not change.

2. Specific detailing provisions required for a new structure are not required to be met where it can be shown an equivalent level of performance and seismic safety contemplated for a new structure is obtained. Such analysis shall consider the regularity, overstrength, redundancy and ductility of the structure within the context of the specific detailing provided. Alternatively, the building official may allow the structure to be upgraded in accordance with the latest edition of the "Guidelines for the Seismic Rehabilitation of Existing Buildings" or another nationally recognized standard for retrofit of existing buildings.

The Rules are adopted as statewide amendments to the IBC, and this made it clearer in my mind that there is a consistent statewide trigger for seismic upgrade of buildings when the occupancy is changed as outlined above. A few days later I had a telephone conversation with Roger Evans about the seismic upgrade of a small city-owned building. During that conversation he asked me if I had received the e-mail and tried to work an answer for the question. I said I had, but wasn't sure I had come up with the correct answer due to my uncertainty with some of the occupant loads in the building. Roger said his main objective in sending the e-mail was not so much to have people get the correct answer, but to understand that the Utah Uniform Building Standard Act

Rules contain an adopted statewide trigger mechanism for seismic upgrade of buildings. He said in his experience, both Architects and Engineers are largely unaware of what is contained in the Rules, and he wanted to use this exercise as a means to make people more aware of the Rules, and what they contain.

For us as structural engineers, there are amendments related to the calculation of snow load and the percentage of snow load to be included in the seismic weight of buildings. These provisions are patterned after the present SEAU snow load study. Other amendments relate to empirical design of concrete foundation walls, mostly for residential construction, and to maximum aspect ratios for wood shear walls. As I read through the Rules in more detail, I found other amendments that apply to structural engineering. The majority of the amendments contained in the Rules do not apply to structural engineering, but there is a significant amount of information there that we all need to know about. I mention this knowing that for a number of you, all this is nothing new. However it does appear, based on Roger's experience he related to me, that there is a need for design professionals to become more familiar with the code amendments contained in the Rules. I know the exercise was educational for me.

If you don't have one already, you can download a copy of the Rules at: [http://www.dopl.utah.gov/licensing/statutes\\_and\\_rules/R156-56.pdf](http://www.dopl.utah.gov/licensing/statutes_and_rules/R156-56.pdf)

The SEAU Board has asked the Codes Committee to highlight different sections of the Rules in newsletter articles

over the next few months. This article is intended to be the first of these articles. These articles will help us all become more familiar with what is contained in the Rules, and how they relate to our practice.

By the way, I came up with two different answers for Roger's exercise. In my answer, the trigger for the

seismic upgrade depended on the type of seating in the club portion of the building. If the club had movable seating I figured a seismic upgrade would be required due to the higher occupant load causing the building to be classified as a Seismic Use Group II building. If the seating was fixed, I figured no seismic

upgrade would be required because there was no change in the Seismic Use Group. I know this answer sounds a bit non-committal, but it's my best shot. If anyone has the correct answer, I would be interested to know what it is.

**BULLETIN BOARD**

**SEAU MEMBERSHIP APPLICANTS**

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

1. William Komlos - Student
2. Robert Clark Conder - Associate
3. Pat Heun - Associate
4. Blake Hoskisson - Associate
5. James David Knight - Associate
6. Paul W. Mc Mullin - Associate
7. Jason Rapich - Associate
8. Nicole Marriott - upgrade Associate to Professional
9. Larry Christiansen - Professional

**STATE OF UTAH SUPPORTS SEAU**

In October and again in January, SEAU sponsored events where SEAU members enjoyed a substantial discount on enrollment fees. Although a small amount of that subsidy came from SEAU funds, most came from funding that was provided by the Division of Occupational & Professional Licensing from the 1% Surcharge Funds on all building permits.

The SEAU Board of Directors gratefully acknowledges the assistance the State of Utah gives us in bringing these outstanding programs to you. For those in attendance at the seminars, this announcement was made at the start of each seminar. For those not in attendance, we just wanted you to know about the great support and financial commitment the State of Utah makes on behalf of SEAU and you.

***THANK YOU DOPL!***

**THIS SPACE FOR RENT**

The newsletter is an excellent forum to target a very select group of professionals for advertising. To find out more, contact:

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## BULLETIN BOARD

## BULLETIN BOARD EDUCATOR FEATURE

Each month for the next several months, SEAU NEWS will highlight a Structural Engineering educator from one of Utah's engineering schools. This month's feature is on:



**J. DERLE THORPE**

J. Derle Thorpe has been a member of the Utah State University faculty for 34 years. He also received his undergraduate and his graduate degrees from Utah State. Many Utah State alumni who are now members of SEAU remember him as a very effective professor of basic engineering principles such as statics and strengths of materials. In addition, alumni remember Professor Thorpe as very approachable and willing to give assistance and advice regarding their academic endeavors.

Professor Thorpe's general experience includes being an expert witness, working as a licensed general contractor, and quality control engineer for the Materials Division of the Utah Department of Highways. He also worked as a research engineer for the Materials Division, Utah State Department of Highways. His consulting work for city governments, county governments, the State Highway Department, Corps of Engineers, U.S. Air Force, contractors and construction material suppliers has resulted in many patents to his credit.

Professor Thorpe has authored many publications that can be considered of primary interest to structural engineers. One of his primary areas of research involves the durability of concrete. Some of his publications include:

- Durability Testing of High Strength Concrete Containing High-Range Water-Reducing Admixture. Project No. 10-32A. The National Cooperative Highway Research

Program, Transportation Research Board, National Research Council.

- The Performance of Shrinkage-Compensating Cement Concrete on Bridge Decks. With others. Utah Department of Transportation.
- The Use of Free-Free Resonance Testing to Evaluate the Effects of Freezing and Thawing Cycles on Concrete Samples.

Professor Thorpe is actively involved in many scientific and research organizations and committees including: American Society for Engineering Education, American Society of Civil Engineers, Society of Sigma Tau, Tau Beta Pi, ACI Committee on the Durability of Concrete, ACI Committee Chairman for the Evaluation of Results of Tests Used to Determine the Strength of Concrete, and ACI Committee for Cold Weather Concrete.

Professor Thorpe has received honors and awards too numerous to list, most of which reflect his outstanding abilities and performance as an instructor. Courses he has taught include Statics, Strengths of Materials, Surveying and Concrete Lab.

Perhaps more than his effectiveness as a teacher, alumni of Utah State remember Professor Thorpe as one who shows genuine concern for his students. Many remember him as the professor who extended an open invitation to Thanksgiving dinner for those who had nowhere to go.

SEAU News is proud to feature Professor Thorpe in this month's newsletter and offers its sincerest gratitude for his efforts in preparing the future structural engineers of Utah.

If you had an engineering professor at BYU, the U of U, or USU that you believe should be recognized in SEAU NEWS, please contact the SEAU Newsletter committee or send an email to [jjohnson@reaveley.com](mailto:jjohnson@reaveley.com).

***SEAU Presents:***

# RETROFIT OF STRUCTURES USING FIBER-REINFORCED POLYMER COMPOSITES

**Thursday, February 20, 2003**

**Social Hour: 5:30 p.m.**

**Program: 6:00 p.m.**

**Presented by:**

Chris Pantelides, PhD, P.E.

Larry Cercone, PhD, Senior Scientist, Air Logistics

**Location:**

University of Utah

Engineering & Mines Classroom Bldg.

Room 103

## ***STRUCTURAL ENGINEERS ASSOCIATION OF UTAH***

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[www.seau.org](http://www.seau.org)



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