SEAU *NEWS*

The Newsletter of the Structural Engineers Association of Utah

Volume XI- Issue VI March 2007

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 may be submitted to:
Richard Seelos, Editor
(801) 486-3883 rseelos@reaveley.com
Advertisements may be submitted to:
Jerod Johnson, Advertising
(801) 486-3883
jjohnson@reaveley.com

Ogden High School
see page 2.

IN THIS ISSUE

MARCH EVENT

Joe Maffei, SE, Ph.D,

Seismic Performance and Design Requirements for High-rise Buildings

March 15, 2007
5:30 PM
EMCB, U of U

See page 8

MESSAGE FROM THE BOARD

Successes of SEAU

By Julie Ott,
SEAU Past President

Congratulations Barry Arnold!

SEAU's own Barry Arnold was awarded the Utah Engineers Council's (UEC) coveted Utah Engineer of the Year title at the UEC annual banquet held during Engineers Week.

Barry Arnold was SEAU's nominee for UEC Engineer of the Year. Barry's contribution to SEAU and the engineering community is exemplified by his recent 5 year term on the SEAU Board of Directors as the Sectary, Treasurer, Vice-President, President, and Past President. Barry then coordinated SEAU's hosting of last falls annual convention of the National Council of Structural Engineers Association (NCSEA) here in Salt Lake City.

Currently Barry is SEAU's NCSEA delegate and is Co-Chair of the Professional Licensing Committee. All of this is in addition to Barry's duties at ARW Engineers. We

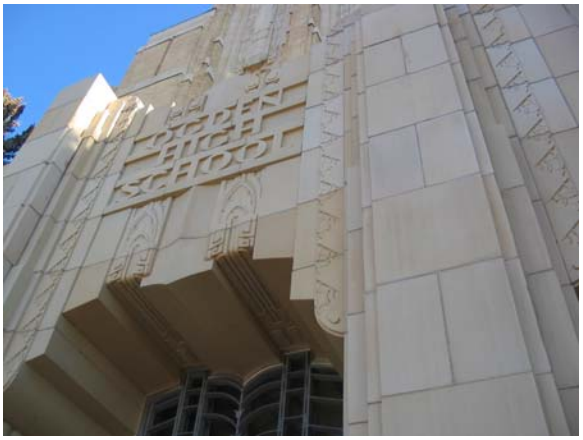
CONTINUED ON PAGE 3

FOCUS

SEAU NEWS intends to highlight some of our most interesting and important buildings in Utah. We also wish to provide biographies of famous structural engineers.

If you have a particular interest in a building or person you would like to see highlighted in this space, please contact newsletter committee member Cameron Empey at (801) 486-3883 or cempey@reaveley.com.

This month the focus is on:



OGDEN HIGH SCHOOL

The design of Ogden High was conceived by the architectural firm of Hodgson and McClenehan. Ogden High School is regarded as the culmination of almost four decades of Leslie S. Hodgson's work.

Construction of Ogden High began on October 29, 1937 at 2828 S. Harrison Blvd in Ogden. The Ogden High School project was funded through the Federal Public Works Administration (WPA) and represented a monumental undertaking in the context of a depressed economy during the 1930's. The most distinguishing aspect of Ogden High School is the ornamental Art Deco style. The total cost of Ogden High was approximately $1.2 million and was aptly named the "million dollar" high school, being the first high school to cost more than a million dollars in Utah. Many taxpayers in the community were opposed to such an extravagant high school project when some were trying to survive on $50 or less per month.[1]

The school consists of classroom areas four stories high, a gymnasium and an auditorium in the main building and a smaller shop/mechanical building to the east of the main building. The school was constructed of unreinforced clay masonry brick exterior bearing walls and reinforced concrete one-way pan joist floor structure. The roof consists of steel open web joists and concrete beams or steel girder trusses supporting metal roof deck. Clay masonry veneer and glazed terra cotta caps & ornamentation give the exterior the distinctive Art Deco style. Numerous roof setbacks required the designers to incorporate reinforced concrete transfer girder systems to carry the terraced roofs and exterior masonry walls.

The Art Deco style so prominently epitomized in Ogden High School consists of three variations all of which are exhibited in the brick details of the exterior. The first was termed Zigzag Moderne and was realized primarily in skyscrapers such as the Empire State Building. This Deco subtype can be especially visualized in the verticality and succession of setbacks found on the main entrance tower on the west. The second was termed Streamlined Moderne and was typically used in gas stations and roadside diners where corners were curved and parallel lines in buildings echoed the streamlined effect of modern industrial technologies. The streamlining is most apparent in the stainless steel materials of the doors and windows which echo the modern industrialism. The third was the Classical Moderne – an adaptation of Greco-Roman style with Deco elements and is most prominent in the general details.[1] Many consider the auditorium architectural finishes including art deco cast plaster to be among the finest of any high school auditorium in Utah.

Since its construction Ogden High has been an educational, cultural and architectural cornerstone of Ogden throughout its 70 year history. The recent adoption of small learning communities as the district's preferred framework for curriculum delivery along with the rising need to address the declining architectural integrity and functionality of Ogden High's historic structures precipitated a Master Plan for the school which was completed in 2006.

1. Adw 1 Tc:270U(A)t(d)-2h H(A)4(e)2(tag2(e)]TJ-022231 Tc 0.1853 T13.837678 0 TdF

MESSAGE FROM THE BOARD (CONTINUED FROM PAGE 1)

would like to thank Barry for all his contributions and wish him a heartfelt congratulation!

This year, with Jeff Miller leading, SEAU has continued to make good progress at our long and short term goals. Several committees have been combined to streamline our efforts, as well has many of SEAU's tasks are being worked on by two and three committees to focus on meeting SEAU's goals.

This year with Jeff Miller and Larry Reaveley the monthly program attendance has dramatically increased. January's lunch meeting was very well attended and last month's regular evening meeting almost packed the EMCB 104 room.

Rick Seelos and his crew on the SEAU Newsletter committee, and Jake Watson with the e-mail blasts continue to do an outstanding job of getting information out to everyone.

Personally it has been very educational and rewarding past few years being on the SEAU Board of Directors. Working with the other Board members, committee chairs, and members from many different firms, backgrounds, and locations has been very interesting. Based on SEAU's longevity, current activity, and continued growth there is something for everyone, and we continue to encourage all members and non-members to get involved – it is mutually beneficial.

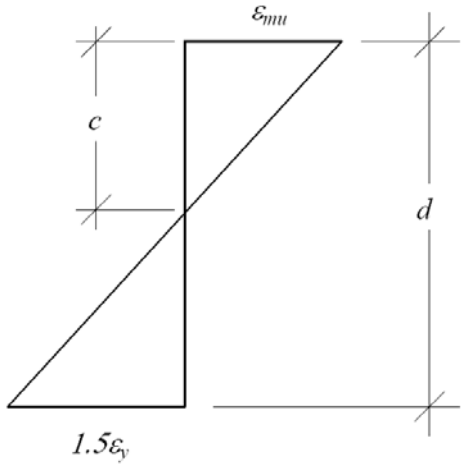
TECHNICAL ARTICLE

Flexural Masonry – Stress Design Works, Strength Design Fails?

Recent decades have seen major changes in methods of design and analysis for various commonplace structural materials. Decades ago the nuances of strength design for concrete were introduced and are now the norm for the design of concrete elements in the modern world. In more recent history, strength design methodologies have been developed and adopted for other common materials such as steel, masonry, and even wood. Though many engineers have initially resisted the idea, the 'new' provisions and methods of ultimate strength design have been generally accepted if not embraced.

Those familiar with both schools of design tend to agree that strength design follows a more accurate prediction of element behavior and in general a less conservative outcome. It stands to reason then that members designed using the 'strength' methodology should generally have a higher design capacity than those using the traditional 'stress' methodology. However, there are subtle nuances in strength design that cannot be overlooked which may come as a surprise.

Perhaps the largest benefit of the strength design methodology is the concept of ductility which might also be termed 'controlled failure'. The concept is simple; we do not design the members to fail, we design members so that if they do fail, they do so in a 'safe' and predictable manner. Consider the following scenario. A masonry wall may full well have the capacity to support required loads when designed using the more traditional stress based methods. However, following the methods of strength design, the wall might be over-reinforced. Section 3.3.3.5 of ACI 530-05 outlines the maximum area of flexural tensile reinforcement for masonry elements. In short, the provision describes an ultimate strain scenario which will ensure that tensile reinforcement yields prior to masonry crushing. Hence, a ductile, controlled, flexural failure mechanism is ensured. Though the code provision for this concept is presented in a different manner than its concrete counterpart, the idea is the same. In general terms, the amount of flexural reinforcement in a masonry member should be proportioned so that a minimum tensile strain of at least 1.5 times yield strain is achieved prior to the masonry crushing in the compressive zone. This concept is presented by the following strain diagram:



To meet the code provision (3.3.3.5), the area of steel must be proportioned so that the value of tensile strain is at least 1.5 times the yield strain of the reinforcement. Using relationships similar to those found in concrete design ($a = 0.80c$ and $0.80f'm$ for stress in masonry at crushing failure) in addition to those depicted by the linear relationship of Figure 1, the following relationship for maximum area of steel can be derived:

TECHNICAL ARTICLE (CONT.)

$$As_{\max} = \frac{0.80\left(\frac{\varepsilon_{mu} d}{1.5\varepsilon_y + \varepsilon_{mu}}\right) b(0.80 f'm) - P}{fy}$$

For this relationship ε_{mu} is the maximum allowable usable strain (0.0025 for CMU and 0.0035 for clay masonry), ε_y is the bar yield strain, and *b*, *d*, *f'm*, and *P* represent the dimensions, masonry strength and axial load respectively.

For practical application, this provision comes into play most frequently in slender elements such as the wall scenario mentioned previously and with lower specified masonry strengths (i.e. *f'm*=1,500 psi). Lower depths (*d*) translate into lower tensile strains. These are further reduced by the presence of axial load. This ultimately leads to shallow (slender/thin) elements carrying axial load being the most likely masonry elements that might be classified as 'over-reinforced' using current strength design methodologies. For this case, it would not be unusual for the #5 vertical bars typically used for columns in 8" masonry walls to violate the provisions of ACI 530 strength design whereas the same configuration may be acceptable using the stress design provisions.

BULLETIN BOARD

SEAU – CODES COMMITTEE by MARK HARRIS

To connect or not to connect…that is the question. There is a controversy in the world of tilt up concrete construction regarding the necessity of connecting the panels to the footings. The Tilt-Up Concrete Association (TCA) has weighed in on the don't connect side. TCA design guides show details that have no direct connection to the footing and transfer all in-plane and out-of-plane loads at the base of the panel into the slab on grade via rebar dowels.

An article featured in the June 2003 Structure magazine by Mark E. Remmetter, PE on behalf of the TCA, states that a direct connection to the foundation is not required and that all lateral loads can be transferred into the slab on grade.

A rebuttal to this article was published in the October 2003 Structure magazine asserting that code does indeed require a connection to the footing and questioning the rationale that the sliding resistance of the slab on grade is feasible. In addition, The SEOC Seismology ad-hoc Tilt-Up committee has issued a position statement on the issue. The position statement references a number of passages from the 1997 UBC in support of requiring the connection. The position statement summary is as follows:

"*It is in theory possible to provide an exclusive connection to the slab-on-grade based on the specific language of the 1997 UBC 1915.8.3.2, provided that a "rational load path" is established to transfer the in-plane and out-of-plane forces through the slab-on-grade and to the supporting soil. However, slab-sliding resistance is difficult to predict, especially where a moisture/vapor retarder such as Visqueen is provided. Also, un-reinforced or jointed floor slabs are unlikely to provide a rational load path. For these reasons, as well as the desirability of being able to mobilize the lateral sliding strength of foundations, the SEOC Seismology Committee strongly recommends that designs in seismically active areas always include either a direct or indirect connection to the foundation footings. An indirect connection might consist of the current rebar from the wall panel to the pour-strip, plus additional rebar to connect the pour strip to the footings.*"

The SEAU Codes committee would like to hear what our membership thinks about this issue. Please e-mail

SEAU – UEC DELEGATE by MIKE BUEHNER

The Utah Engineers Council held its annual awards banquet on Friday, February 23, at the 23rd floor of the Wells Fargo Building in downtown Salt Lake City. This is the event where recipients of Fresh Face in Engineering, Engineering Educator of the Year, and Engineer of the Year awards are named and scholarships are given to one engineering student at Utah State University, the University of Utah, and Brigham Young University.

SEAU nominated Dr. Marv Halling, professor of structural engineering at Utah State University, for Educator of the Year and Barry Arnold of ARW Engineers for Engineer of the Year. We are extremely pleased to announce that Barry Arnold won the Engineer of the Year!

Barry Arnold 2007 Engineer of the Year

Barry has given hundreds of hours to SEAU as a board member and President and heading up the organizational effort to host the national NCSEA convention here in Salt Lake City last fall. SEAU has benefited from Barry's efforts and we are happy that he has received such great recognition for all his hard work.

SEAU NEWSLETTER DEADLINE

April SEAU News deadline is **March 29th**.

We expect updates from the following committees:

- SEAU Junior Board Member
- Seismic Committee
- Residential Design Committee
- BSSC Representative
- Professional Practice and Ethics

UPCOMING EVENTS

April 20 - 21, 2007

2007 ASEE ROCKY MOUNTAIN SECTION CONFERENCE
American Society for Engineering Education will be holding their section conference at BYU this year. Further information may be found at

November 4-9, 2007

The Third Structural Engineering World Congress - 2007 (SEWC 2007) will be held in Bangalore, India. Please contact info@sewc2007.org for further info.

SEAU MEMBERSHIP APPLICANT

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

Joel Jorgensen Associate

ADVERTISEMENT

ASEE CALL FOR PAPERS

The American Society for Engineering Education (ASEE) Rocky Mountain section invites authors to submit abstracts for the 2007 ASEE Rocky Mountain annual conference. The conference will be hosted by Brigham Young University (BYU) and Utah Valley State College (UVSC) on the Brigham Young University campus in Provo, Utah, April 20-21, 2007.

The 2007 Rocky Mountain Section Conference seeks abstracts that include, but are not limited to, the following topics:

- Innovations and Leadership in the Global Environment
- Future Engineering and Technology Program Directions
- Innovative Teaching Methods for Engineering and Technology
- Innovations in Engineering and Technology Ethics Education
- Preparing Engineering and Technology Students for International Practice
- Diversity: Women and Minorities in Engineering and Technology Education around the Globe
- Preparing Engineering and Technology Students for Work in the 21st Century
- Recruitment and Retention of Engineering and Technology Students
- Infusing Engineering and Technology into K-12
- New and Current Topics of Interest to Engineering and Technology Educators

Abstracts are invited for presentation and conference proceedings. Authors should submit a 200-300 word abstract in electronic form. Abstract submission will open on December 22nd, 2006. Abstract submittal deadline is **February 16th, 2007**. Notification of abstract acceptance is March 16th. Submission of full paper is optional but encouraged. Camera ready papers must be submitted by March 30th, 2007. Papers will be published on CDs. For the format of the abstract and papers please refer to the conference website (http://asee.et.byu.edu/). There will be an award for the best presentation.

Proposals for workshops are invited. Deadline for early registration is March 30th, 2007.

Questions regarding the abstract submission can be directed to Technical Sessions Coordinators:

Afsaneh Minaie Tel: (801) 863-6391
Reza Sanati Tel: (801) 863-6393
Utah Valley State College
800 West University Parkway
Orem, UT 84058

SEAU SEER COMMITTEE PROVIDES COST EFFECTIVE EMERGENCY RESPONSE KITS TO MEMBERS

Customized S.E.E.R. Team Response Kit

Be ready to respond at any time to community, state or national needs following a natural disaster or catastrophic event. Fully upgraded kit includes 111 items that include personal protection against bacteria, viruses, and chemicals. Also includes first aid supplies and other emergency items to last 72 hours. Kit is compiled from the ATC-20 Guide and SEERP guidelines. If purchased separately, these items would retail for approximately **$506** (not including tax & shipping). Kit comes fully assembled and ready for use. Beehive Preparedness is offering this kit to SEAU members starting at **$258.95** plus tax. Contact Debbie Everett at 435-720-2018 or www.beehivepreparedness.com for further information and ordering. Special pricing good only through 4/15/07

See the SEAU website seau.org for further information and a breakdown of what is included in each of the kits

SEER Team Response Kit Order Form

Questions call Debbie Everett at 435-720-2018 or
Email: beehivepreparedness@hotmail.com
Send personal or company checks along with complete order form to:
Beehive Preparedness
771 West 2820 South
Perry, UT 84302-5002

Name_____

Home Address _____

City/Zip_____

Employer _____

Address_____

City/Zip_____

Work Phone _____

Contact email _____

	Price*	# Needed	Total
1. Basic SEER Kit	**$258.95***	____	**$**_____
92 items based on ATC-20 guidelines and SEERP report (see flyer). Save time, money and running round! **Approximate suggested retail $352.00**			
2. Package "A" Upgrade	**$52.95***	____	**$**_____
See flyer for detail. Includes red hard hat with "structural engineer" sticker, clipboard/calculator, binoculars, compass, claw hammer & waterproof pouches for ease & convenience! **Approximate suggested retail $73.00**			
4. Package "B" Upgrade	**$55.95***	____	**$**_____
See flyer for detail. Includes Slumberjack sleeping bag (3.8lbs) & 2 velcro StrapIts to attatch bag to backpack. **Approximate suggested retail $81.00**			

Sub Total of items $_____

Utah State Sales Tax 6.25% $_____

Total cost including tax **$**_____

*Prices listed is for SEAU members for orders placed prior to **4-15-07**.

Office Use Only: cash_____ check_____ PO_____

Amount Collected $_____

SEAU Presents:

Seismic Performance and Design Requirements for High-rise Buildings

March 15, 2007 at 5:30 PM
Engineering and Mines Building (EMCB)
University of Utah Campus

Joe Maffei, SE, Ph.D,

In recent years there has been a resurgence of high-rise construction in the Western U.S., encompassing several major cities with high levels of seismic hazard. Unlike previous high-rise booms, most of the new and proposed tall buildings are for residential or mixed use rather than just containing offices. Concrete construction is often favored, and many of the new high-rises use concrete core-wall construction that does not use moment frames in the seismic-force-resisting system. For buildings over 240 feet tall, such systems are approved by the building authority using Seismic Peer Review, under the provisions of the building code that permit alternative systems, materials, or methods. In this review process the engineer of record is required to demonstrate that the building provides at least equivalent seismic performance to that implied or resulting from the prescriptive requirements of the building code.

What are the crucial structural design issues that affect the seismic performance of high-rise buildings? What requirements and analysis and design methods are recommended? Joe Maffei will discuss the key technical issues for the seismic design of high-rise buildings, particularly related to concrete core-wall structures.

Dr. Joe Maffei is a registered structural engineer and principal at Rutherford & Chekene in San Francisco, CA.

STRUCTURAL ENGINEERS ASSOCIATION OF UTAH
P.O. Box 581292
Salt Lake City, Utah 84158-1292
www.seau.org