SEAU *NEWS*

The Newsletter of the Structural Engineers Association of Utah

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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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Primary Children's Medical Center
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JANUARY EVENT

SEAU MEETING

Seismic Design Of Bridges

January 19, 2006 5:30PM
EMCB

Presented by

Gerald Godzwon P.E.
with HDR in Dallas, TX

MESSAGE FROM THE BOARD

Should SEAU Self-Police?

By Jake Watson,
UEC Delagate

SEAU's *Code of Ethics* begins "Engineers shall hold paramount the safety of the public in the performance of their professional duties." It is my opinion that SEAU should be a leader in protecting the public from structural engineering which may put the public at risk. I have heard several arguments to the contrary: "It's the building official's job to check engineering" or "people get what they pay for", or "SEAU should support its members, not investigate them". Let me dispel these one at a time.

How many building officials could pass the P.E. licensing exam let alone the Structural II exam? There is a reason many municipalities retain outside consultants to review structural designs. Building officials can be great at deciding big picture items such as when to upgrade an existing building or when to allow a change of use. They can also be great arbiters of code provisions when language may be unclear. However, it's unreasonable to expect them to know everything about what we do and also be experts in every other discipline in the building code. SEAU can and should offer

CONTINUED ON PAGE 3

MEMBER FORUM

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 a 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:

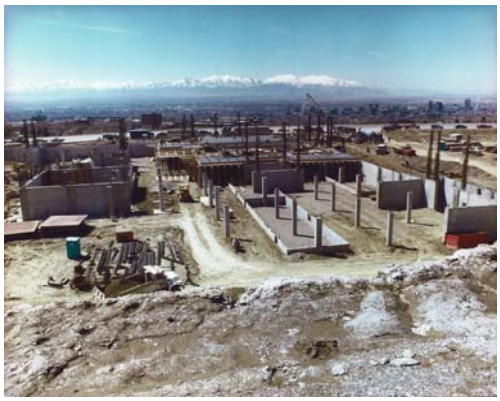
Primary Children's Medical Center

Article by Cameron Empey

Primary Children's Medical Center was designed using cutting edge technology in the area of children's health care. The construction of this modern looking facility was completed in 1990. The building contains 560,000 square feet and resides on a 2-1/2 acre site. Total project cost was $70 million dollars. It consists of 4 stories with an adjacent parking structure and equipment rooms below grade. After the 3-year construction period, the medical center opened with 178 beds and had shell space to expand to 266 beds. Some of the architectural features of the building include exterior limestone wall panels, an interior limestone curtain wall, and exterior glass wall staircases.

The structural systems utilized for the building helped pave the way for some of the construction practices used in the industry today. The parking structure was constructed of a concrete beam and pan joist system supported by conventional concrete columns and foundation walls. The hospital was constructed using composite steel framing with lightweight concrete topping and concrete shear walls. 50 ksi steel was used versus 36 ksi used typically at the time. This design reduced the weight of the building sufficiently to reduce the seismic demand on the building by 1/3 from conventional methods which lead to significant cost savings. Due to its size, the building was separated structurally, by expansion joints, into 5 independent buildings each with its own gravity and lateral system.

This project was met with several design challenges in order to meet the owner's needs. The primary challenge was the design schedule. The project was designed using the fast track schedule with 3 months being allocated to the structural design. Due to the scheduled completion date requirements, the structural design needed to be complete far ahead of the other disciplines. This provided many positive outcomes during construction. One of these was that while the structural steel was detailed and fabricated, the contractor was able to construct and build the adjacent concrete parking areas below grade saving the contractor valuable construction time. The structural design team



FOCUS (cont.)

had to be in close contact with the other members of the design team in order to accommodate and provide flexibility for the other systems of the building. This presented many challenges due to the fact that the other designs were still in schematic or design development phases.

This building was designed and constructed using a unique structural system combining both concrete and steel to gain economy and efficiency. In an area where concrete has been the dominating material in virtually every building less than 15 stories, this design helped show that a combination of concrete and steel could be used to achieve cost effectiveness and efficiency. As a result, many of the buildings being designed today take advantage of this approach.

MESSAGE FROM THE BOARD (continued from page 1)

guidance to building officials and help them recognize potential problems outside their expertise.

The free market is a wonderful tool and is very effective. However, clients of engineering services can easily be misled and that is one reason all states require some form of engineering licensing. Engineers must not only prove their technical competence but they must also agree to follow ethical guidelines. Ethics codes and most (all?) licensing laws contain language similar to our Code of Ethics. Engineers may take a job for any fee he or she feels is appropriate. No matter what fee an engineer accepts, that engineer must perform a minimum service which protects the public. SEAU and its members are the most qualified people to determine when an engineer is putting the public at risk. Should engineers simply preach ethical standards or should there be accountability for those who abuse them? In order for our license to have meaning, the licensing laws must be enforced.

SEAU supports its members in many ways: education, promotion, and by encouraging quality practice. A new way we hope to support or members is by encouraging self-policing. SEAU's enforcement model offers our members the best of both worlds. Our new partnership with the state enables us to weed out any frivolous complaints that may occur; meanwhile we can offer insight & recommend appropriate action for any complaints which may have merit. Most importantly, our Ethics Committee answers to our members. Building officials and even the Engineer's Board at the state are not directly accountable to us. If you don't like the way our committee (or our board) is proceeding, contact a board member and voice your concern. Or better yet, volunteer to be part of the committee. If that doesn't work, vote a new board into office and then select a new ethics committee.

Self-policing offers us the opportunity to better our profession. Medical doctors have a similar relationship with the state. Attorneys retain a great deal of professional strength through the Bar Association. SEAU can best advocate for improved professional stature by improving the conduct of our members. Better enforcement of our licensing laws can also help us move closer to a Structural Engineering practice act. SEAU will be in a much better position to advocate for a practice act if we can point toward positive self governance and stricter enforcement of laws already on the books.

Next time you see a member of the Ethics Committee, please thank them. They have volunteered for an unappreciated job. It's a job very few of us want, but needs to be done. These engineers are using their time, experience, and reputation to improve engineering practices for the benefit of us all.

SPECTRAL ACCELERATION MAPS AND ASCE 7-05 by JEROD JOHNSON

The adoption of the IBC 2000 code several years back marked perhaps the most significant change in seismic design codes in recent history. At that time, we as designers witnessed the 'death' of seismic zones as we know them and the birth of the spectral acceleration contour maps to which we have all grown accustomed.

The seismic provisions of IBC 2000 were replete with new criteria and categorizations corresponding to various levels of seismic hazards and structural configurations. Many of these issues have even been addressed in previous SEAU Newsletter technical articles. Some of the more restrictive criteria have caused considerable angst among designers. More specifically, IBC 2000 contained provisions that prohibited certain structural irregularities for certain levels of seismic hazard. For instance, IBC expressly prohibits plan irregularity type 1b (Extreme Torsional Irregularity) and vertical irregularity types 1b and 5 (extreme soft story and weak story) for structures assigned to Seismic Design Category E or F. To put it simply, when a structure is in Seismic Design Category E or F, these irregularities cannot exist. The designer must configure the lateral system to ensure that such irregularities are not present in the system.

So, you may ask; how did these provisions affect my designs under these codes since nearly every building I did in Utah did not surpass a Seismic Design Category D? IBC 2000, and the new ASCE 7-05 contain provisions similar to Table 1616.3 of the current IBC 2003, all of which state that where long period spectral accelerations (S_1) are greater than or equal to 0.75g, the structure must be assigned to Seismic Design Category E or F (depending on risk & occupancy). Hence, one could reasonably conclude that very large portion of projects should fall within one of these higher seismic design categories. See Figure 1 for the 0.75g boundary within which structures would be affected by these provisions. Therefore, the aforementioned irregularities would be prohibited.

In 2003, NEHRP introduced a new set of spectral acceleration maps that accompanied the draft versions of the new NEHRP seismic provisions (provisions which would eventually appear in ASCE 7-05 and IBC 2006). These maps indicated a global reduction in spectral accelerations along the Wasatch Front (for both S_S and S_1). Along with the reduction in spectral accelerations came a reduction of the 0.75g trigger mentioned previously to 0.60g. Hence, the proposed NEHRP provision had the primary effect of shifting and re-shaping the Category D to E/F trigger boundary (see Figure 1). This change seemed reasonable and prudent and did not seem to represent a dramatic shift in code provisions (see article in November 2003 edition of SEAU News).

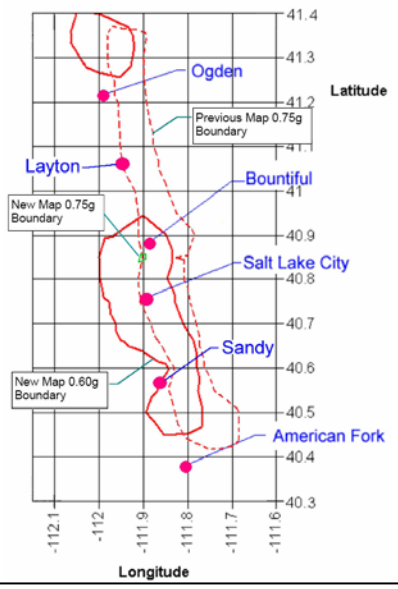


Figure 1 – Trigger Boundaries for Seismic Design Categorization from D to E/F

With regard to this issue, ASCE 7-05 has been met with a great deal of surprise by many designers. This comes from the change in spectral accelerations described above, accompanied by a lack of change in the Category D to E/F trigger boundary. Whereas the draft version of the NEHRP lowered the trigger boundary from 0.75g to 0.60g in addition to lowering the spectral accelerations, the trigger boundary in the recently released ASCE 7-05 remained at 0.75g. So, what does this mean? As shown in Figure 1, the boundary representing spectral accelerations greater than 0.75g (Category D to E/F trigger boundary) has been reduced *significantly*. Whereas the previous boundary extended from North Ogden to approximately American Fork, the new boundary (based on the same trigger value but lower spectral accelerations) encompasses a small patch of earth somewhere between Ensign Peak and the southern foothills of Bountiful.

This change is good news for owners, in that it may constitute a significant reduction in construction expenses. Nonetheless, such drastic changes within one code cycle are difficult to embrace and are naturally met with significant apprehension from us as designers.

Commentary:
The author of this article is currently awaiting feedback from USGS officials regarding this particular code issue. Specifically, information is sought to verify that such significant changes in code provisions are consistent with the intent of code officials and authors. Follow-up information will be provided in future newsletter articles.

PRESIDENTS MESSAGE – GUIDELINES FOR STRUCTURAL ENGINEER OF RECORD by JULIE OTT

JR Richardson presented the final version of the Guidelines for the Structural Engineer of Record document (Guidelines) to the SEAU Board of Directors at the December board meeting. All SEAU members can expect to receive a final copy the end of February/first of March.

The Professional Practices and Ethics Committee has put a tremendous amount of effort in the preparation of this document; presenting at an SEAU meeting, taking feedback revising the document, then presenting again to the membership, taking feedback and revising again. Remember as you read the Guidelines that EVERY SEAU member has received the two iterations of the Guidelines document and EVERYONE has had time to make any comments/suggestions.

If any of us has issues with what is stated in the Guidelines now is not the time to make derogatory remarks or complaints. Now IS the time to upgrade your standards to ensure that all of us are providing a uniform standard of services.

The Guidelines is a critical step in setting a standardized minimum scope of services for structural engineering services in Utah. These Guidelines are intended to ensure all of us are providing the same standards of services and is another step in the process of self-regulation of a profession that lays the path for the implementation of a Practice Act in the State of Utah for Structural Engineers.

At the last SEAU meeting where the Guideline document was presented JR Richardson personally took a tremendous amount uncalled abuse from all of us, myself included. We all need to thank JR and his committee for their dedication and follow thru in completing this document.

BULLETIN BOARD

SEAU – CODES COMMITTEE by MARK HARRIS

NEW YEAR – NEW CODES

As we begin a new year we begin a new code cycle. The IBC 2006 will be adopted by the State of Utah in a year. One of the main documents influencing our area of practice is ASCE 7 Minimum Design Loads for Buildings and Other Structures. The 2005 edition of this standard has recently been issued, and contains a number of significant changes that we should begin to familiarize ourselves with.

In a recent web based seminar S.K. Gosh presented a number of the highlights of the changes to this document. Here are a few of those highlights:

- Added new wind provisions for free-standing walls and solid signs
- Added new wind provisions for canopies and free roofs
- Clarified exposure categories for main wind-force-resisting system and components and cladding
- Major revisions have been made in the values as well as the distribution of the unbalanced snow load on hip and gable roofs
- Rain-on Snow Surcharge Load. For locations where p_g is 20 psf or less, but not zero, all roofs with a slope less than ½"/ft. shall have a 5 psf rain-on snow surcharge
- Seismic Provisions have been completely reformatted and reorganized through a major effort funded by FEMA through BSSC and ASCE
- Seismic technical changes reflect revisions from 2000 to 2003 NEHRP
- Spectral acceleration maps are based on the latest USGS hazard maps. These new maps have resulted in significant modifications in some areas of the Wasatch Front.
- The Design Response Spectrum has been modified such that the constant velocity branch of the curve terminates at a new long-period transition period, T_L, where a new branch proportional to $1/T^2$, starts. This is the constant displacement part of the design spectrum that governs the seismic response of structures with periods beyond T_L. The period T_L is given on new contour maps for all 50 states.
- New Redundancy provisions have been adopted for Seismic Design Categories D-F. $\rho = 1.0$ or 1.3, depending on whether or not an individual element can be removed from the lateral-force-resisting-system without causing the remaining structure to suffer a reduction of story strength of more than 33% or creating an extreme torsional irregularity. $\rho = 1.0$ if the structure is regular in plan and there are at least 2 bays of seismic force-resisting perimeter framing on each side of the structure in each orthogonal direction at each story resisting more than 35% of the base shear.

There are many more changes in this important document. As you can see from the highlights above, some of the changes are significant. A careful and thorough review of these provisions will be required to prepare us for their implementation in 07.

SEAU – REPORT OF 2005 NCSEA 13th ANNUAL CONFERENCE by CRAIG CARTWRIGHT SECB

2005 NCSEA 13th Annual Conference
October 27-29 at Kansas City, Missouri

Every year I have the unique opportunity to attend the national annual conference of the NCSEA. As the delegate for the SEAU, I represent our member organization along with about 40 other delegates as we meet to discuss issues, solutions, actions, and goals that are relevant to the structural engineering community. This "community" gets most of its professional needs addressed through the NCSEA and partnering organizations such as SEI and CASE. Within the NCSEA is a group of 11 committees that handle the bulk of work necessary to achieve all the successes we enjoy. Such successes include the results of very active and powerful Code Advisory, Licensing, Education, Advocacy, and Publication committees.

The Code Advisory committee, in cooperation with the Building Seismic Safety Council, sponsored a series of code change proposals, removed technical provisions relating to structural design from the body of the IBC and replaced these technical provisions with references to national consensus standards. The NCSEA also established itself in the role of coordinator of the standards development process to assist them in resolving cross-referencing, conflicting requirements and scheduling issues. This action will reduce the ambiguity and get the standards and code bodies on the same publishing cycle.

The NCSEA established the Diamond Review program, providing engineers the opportunity to earn continuing education credit for vendor-hosted, in-office seminars. In the future STRUCTURE magazine will also be a venue to earn continuing education credit through a series of technical articles and quizzes.

On my tag line you notice I have used the SECB credential. I mention this to celebrate the success of the Structural Engineering Certification Board, spawned by the NCSEA, but now operating as an independent organization. To date the SECB has received more than 900 applications and issued its first 500 certifications.

Responding to an NCSEA-sponsored initiative to encourage the adoption of structural engineering practice acts in all 55 U.S. jurisdictions, engineers in several states (Utah is one) began the political process of having their states adopt separate structural engineering license legislation.

As we now begin another new year, let me remind you that the NCSEA has selected Salt Lake City to be the host city for their 14th Annual Conference. This event in September will give our members the opportunity to attend the conference at a reduced registration fee, meet your peers from around the nation, discuss common interests, and witness the power of the NCSEA at work. Obviously, being the host city is not only an honor but an awesome responsibility. Barry Arnold has assembled a committee that has been working since last year to make sure Utah and the SEAU are well prepared and represented. Every month Barry's committee meets to plan the event and they have accomplished a significant amount of work but there is a lot more that must be done. When you receive a letter from the Conference committee asking for help, participation, and donations (yes, it takes money too!), please respond generously with your time, talent and money for the good of structural engineering, the SEAU, and the people we serve.

NOTICE FROM AISC

Changes in the depth and internal depth of the W36×16 Series (ranging from W36X230 to W36X800) of wide-flange sections will take effect January 1, 2006.

Engineers should be able to use either section interchangeably in most cases, but they should immediately begin to specify the new sections for projects in which steel will be procured after the first of the year.

The new section information will be included in the 13th Edition Manual of Steel Construction (the first unified specification manual), available now on the www.aisc.org website.

Table 1. Properties of Existing W36 Series

Shape	Area A	Depth d	Flange		Web Thickness t_w
			Width b_f	Thickness t_f	
	in.²	in.	in.	in.	in.
W36×798	234.6	41.97	17.990	4.290	2.380
×650	191.0	40.47	17.575	3.540	1.970
×527	154.7	39.21	17.220	2.910	1.610
×439	129.0	38.26	16.965	2.440	1.360
×393	115.6	37.80	16.830	2.200	1.220
×359	105.4	37.40	16.730	2.010	1.120
×328	96.4	37.09	16.630	1.850	1.020
×300	88.3	36.74	16.655	1.680	0.945
×280	82.4	36.52	16.595	1.570	0.885
×260	76.5	36.26	16.550	1.440	0.840
×245	72.1	36.08	16.510	1.350	0.800
×230	67.6	35.90	16.470	1.260	0.760

Table 2. Properties of Modified W36 Series

Shape	Area A	Depth d	Web Thickness t_w	Flange		k	k_1	Elastic Properties						Plastic Modulus	
				Width b_f	Thickness t_f			X-X Axis			Y-Y Axis				
								I_x	S_x	r_x	I_y	S_y	r_y	Z_x	Z_y
	in.²	in.	in.	in.	in.	in.	in.	in.⁴	in.³	in.	in.⁴	in.³	in.	in.³	in.³
W36×800	236	42.55	2.380	17.990	4.290	5.240	5.560	64 700	3 040	16.6	4 200	467	4.22	3 650	743
×652	192	41.05	1.970	17.575	3.540	4.490	4.810	50 600	2 460	16.2	3 230	367	4.10	2 910	581
×529	156	39.79	1.610	17.220	2.910	3.860	4.180	39 600	1 990	16.0	2 490	289	4.00	2 330	454
×487	143	39.33	1.500	17.105	2.680	3.630	4.000	36 000	1 830	15.8	2 250	263	3.96	2 130	412
×441	130	38.85	1.360	16.965	2.440	3.390	1.750	32 100	1 650	15.7	1 990	235	3.92	1 910	368
×395	116	38.41	1.220	16.830	2.200	3.150	3.430	28 500	1 490	15.7	1 750	208	3.88	1 710	325
×361	106	37.99	1.120	16.730	2.010	2.960	3.310	25 700	1 350	15.6	1 570	188	3.85	1 550	293
×330	97.0	37.67	1.020	16.630	1.850	2.800	3.120	23 300	1 240	15.5	1 420	171	3.83	1 410	265
×302	88.8	37.33	0.945	16.655	1.680	2.630	3.000	21 100	1 130	15.4	1 300	156	3.82	1 280	241
×282	82.9	37.11	0.885	16.595	1.570	2.520	2.870	19 600	1 050	15.4	1 200	144	3.80	1 190	223
×262	77.0	36.85	0.840	16.550	1.440	2.390	2.750	17 900	972	15.3	1 090	132	3.76	1 100	204
×247	72.5	36.67	0.800	16.510	1.350	2.300	2.620	16 700	913	15.2	1 010	123	3.74	1 030	190
×231	68.1	36.49	0.760	16.470	1.260	2.210	2.560	15 600	854	15.1	940	114	3.71	963	176

NOTICE FROM DOPL

Significant changes have recently been made to Title R156-1 General Rules of the Division of Occupational and Professional Licensing. Effective November 15, 2005 the license renewal deadlines have been amended for Professional Engineers, Professional Structural Engineers, Professional Geologists, and Professional Land Surveyors. The former expiration date of Dec. 31, of even years has been changed to Mar. 31, of odd years. All licensed professionals will receive a 90 day extension of current licenses. Any questions may be answered by calling DOPL at (801) 530-6628 or (866) 275-3675.

NOTICE FROM AISC

The AISC 2005 Seismic Provisions are finally out! Free download available off of the website.

SEAU MEMBERSHIP APPLICANTS

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

Shedly Clark Seaman - Professional

SEAU WORKSHOP

CONCRETE CAPACITY DESIGN METHOD FOR POST-INSTALLED ANCHORS

The Structural Engineering Association of Utah (SEAU), in conjunction with Hilti, Inc., will host a half-day workshop on design methods for post-installed anchors. Christian Fogstad, P.E., and William Gould, P.E., of Hilti, Inc., will be the lecturers. The workshop emphasis will be on practical design methods for post-installed anchors according to the latest ACI requirements. These design methods will also translate to the design of cast-in-place anchors as well. The following topics will be covered:

- Detailed analysis and explanation of the requirements of ACI 318-05, Appendix D – Anchoring to Concrete.
- Hands-on installation of post-installed anchoring systems. Different failure modes will be witnessed based on edge distance, spacing, etc.
- Introduction to Hilti PROFIS Anchor Design Software utilizing ACI 318-05, Appendix D.
- Worked-out design examples will also be presented that illustrate the design requirements. This workshop will provide 4.0 hours of continuing education units, and has received NCSEA Diamond Review.

The details for the workshop are as follows:

Date: Tuesday, January 31, 2006
Place: Renaissance Hotel
3801 Quebec Street
Denver Colorado, 80207
Time: 8:00 a.m. to 12:00 noon
Cost: $125 – Early registration is Jan. 3, 2006

Firms with 3 or more attendees receive 20% discount

Hilti will donate $25 to the SEAU chapter for each member of SEAU that attends the seminar

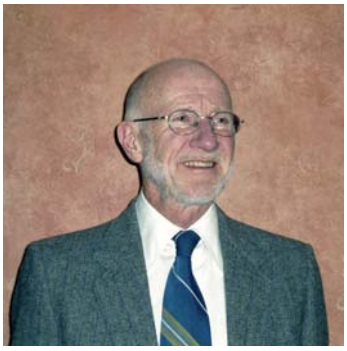
Reservations are required and may be made by visiting www.us.hilti.com/education or by calling Christine Zenthoefer at 800.879.6000, ext. 6660 or email Christine.Zenthoefer@hilti.com.

SEAU NOMINATIONS TO UEC

The following are the SEAU Nominations to the Utah Engineers Council

Chandra Clyde
Fresh Face

Bill Gordan
Engineer of the Year



Charles B. Elliott III
Educator of the Year

SEAU Presents:

Seismic Design of Bridges

January 19, 2005
5:30 PM
Engineers & Mines Classroom Building
EMCB
University of Utah Campus

Presented by Gerald Godzwon P.E.
with HDR in Dallas, TX

The presenter is a Professional Associate
and Bridge Section Manager for HDR.

He worked on the I-15 project here in Salt Lake.

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