

Civil Source **ASCE**

Civil Engineers Make the Difference – They Build on the Quality of Life

American Society of Civil Engineers

*ASCE Utah Section Newsletter
January 2008*

President's Message

By Brent Packer, PE



In the President's Message last month, I stated that the Structural Engineers Association of Utah (SEAU) is preparing a bill to go before the State Senate to clarify the structural licensing scope of practice. An invitation was extended to ASCE Utah Section members to participate in a committee formed by the Section Board to review the bill and be more involved as the bill proceeds through legislation.

Over thirty Section members responded to the invitation showing interest and concerns regarding the bill. Cable Murray, committee chairman, has compiled questions and comments from those members. Cable and I met with Barry Welliver, President of SEAU, and Barry Arnold, Co-Chair SEAU Licensing committee, to obtain a better understanding of the bill and to discuss some of the questions and concerns from the ASCE, Utah Section.

The SEAU has handed their work to Senator Fred Fife as of December 19, 2007. The actual bill is currently being written and should be available online (www.le.state.ut.us) the first part of this month before the 2008 General Session begins, January 21, 2008.

I have attached copies of the SEAU Licensing Committee January Newsletter Article and A Structural Practice Act for the State of Utah from the SEAU that provides more information and background regarding the bill and the need to revise some of the current language in the Professional Engineers and Land Surveyors Licensing Act.

The ASCE Utah Section is scheduling a meeting with the SEAU Licensing Committee within the next two weeks to discuss the bill further and to answer individual questions from the ASCE Utah Section special committee members. An e-mail will be sent out soon to the Section members identifying the place and time. If you are interested in attending, plan on notifying Cable Murray (cmurray@jacobsenconstruction.com, 801-502-3032) after the e-mail has been sent.

Brent Packer, P.E.
ASCE, Utah Section President



A Structural Practice Act for the State of Utah

IN A NUTSHELL

- ❑ Need for greater public safety in the structural design of significant buildings and structures
- ❑ Those presently qualified and competent to practice structural engineering as defined will remain qualified to do so
- ❑ Six month window for transitioning professionals to apply for S.E. licensing
- ❑ Administration changes for DOPL are minimal

PROPOSED STRUCTURAL LICENSE ACT FOR UTAH

The current Utah law concerning the practice of structural engineering does not define which structures or buildings require structural design other than to suggest that they are complex.

A proposal by the Structural Engineers Association of Utah (SEAU) would better define the practice of structural design by explicitly stating which buildings and structures would be considered not only complex, but also of sufficient importance to warrant the added expertise of structural engineers.

The International Building Code (IBC) classifies structures according to their occupancy with the intent of requiring increased care in the design of certain buildings. Hospitals, schools, and structures housing large numbers of occupants are deemed important and the code requirements for their structural design are consequently elevated.

These structures are among those defined in the proposed structural practice act for Utah.

Why Is A Structural Practice Act Necessary?

With the adoption of the 2006 International Building Code, Utah is leading the way in public safety. There is an increasing complexity requiring higher levels of competence and experience for structural design of significant structures

Reasons for improving structural practice:

- *Education Requirements:* Bachelor of Science degree requirements have steadily decreased from 140 to 150 semester hours to as little as 124 hours.
- *Complex Codes:* Structural engineering design and building code requirements have become increasingly complex
- *Computerization:* Use of advanced software by less competent engineers to design structures
- *Hidden Problems in Existing Buildings:* Many potential problems will only be evident when an earthquake or design snow load is applied
- *Plan Checking:* Many jurisdictions do not have the resources to perform sufficient structural plan reviews. Reliance on the "engineers stamp" does not always assure quality performance
- *Insurance Costs:* Poor design and construction can affect many different insurance policies
- *Cost Effective Design:* A structure can be designed which may be safe and meets the building code, yet is not the most cost effective structural solution

How Will the Current Practice of Structural Engineering Change?

Those presently qualified and competent in the areas defined by the act will continue to be able to practice structural engineering. If not presently licensed as an SE in Utah, they will submit application to DOPL for review together with an affidavit attesting to their competence and experience.

How Will It Be Implemented?

Beginning July 1, 2008, those professional engineers not holding a valid S.E. license in Utah and desiring to be transitioned will have six months to make application to the Division of Occupational and Professional Licensing (DOPL).

After January 1, 2009 licensing as a S.E. in Utah will follow the requirements presently established by the state and administered by the DOPL.

Benefits

- Increased public safety for the structural design of significant buildings and structures
- Clearly defines the responsibilities for the practice of structural engineering
- Maintains and improves upon the standards established by the state of Utah for the practice of structural engineering and the qualifications of license holders.



www.seau.org

Contact info: Barry Arnold, Co-Chair SEAU Licensing committee: (801) 782-6008; barrya@arwengineers.com;
Kelly Calder, Co-Chair SEAU Licensing committee: (801) 466-1699; Kelly@creng.com
Barry Welliver, President, Structural Engineers Assoc. of Utah: 801-553-0162; barrywelliver2@earthlink.net

RESOLUTION RECOGNIZING THE UNREINFORCED MASONRY

BUILDING HAZARD IN UTAH

SPONSOR: UTAH LEGISLATURE

January 1, 2008

Whereas the State of Utah is susceptible to powerful, damaging earthquakes;

Whereas the Federal Emergency Management Agency (FEMA) has ranked Utah sixth in projected annualized earthquake loss in the United States;

Whereas much of the existing building stock within the state was constructed under codes and standards that did not recognize this hazard;

Whereas more than eighty percent of the state's population is located in areas subject to large earthquakes;

Whereas a major seismic event could result in catastrophic loss of life, property, and business in the state;

Whereas one of the state's primary responsibilities is to safeguard the safety and welfare of its citizens;

Whereas unreinforced masonry buildings (URM's) are among the most dangerous structures in a strong earthquake;

Whereas there is a large, but unquantified, inventory of such URM buildings in seismically active areas; and

Whereas recognizing and anticipating future catastrophic events, and preparing for recovery from such events is in the best interest of the citizens and the state,

Now therefore, be it resolved that the Utah Seismic Safety Commission undertake to compile an inventory of URM's to quantify the extent of the problem in the state.

Be it further resolved that the Utah Seismic Safety Commission recommend priorities to address the problem in a manner that will most effectively protect the lives, property, and the economy of the state of Utah.

Be it further resolved that the Utah Seismic Safety Commission make recommendations for ameliorating the URM problem in the state.

Be it further resolved that copies of this resolution be sent to the Governor, the President of the Structural Engineers Association of Utah, and the President of the Utah Chapter of the American Institute of Architects.

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31

**UTAH SCHOOL SEISMIC HAZARD
INVENTORY
2008 GENERAL SESSION
STATE OF UTAH**

LONG TITLE

General Description:

This bill establishes requirements related to public school seismic safety.

Highlighted Provisions:

This bill:

- ▶ requires a seismic evaluation of all public schools, using specified standards;
- ▶ creates a public school seismic safety committee;
- ▶ requires the public school seismic safety committee to determine a threshold score on the seismic evaluation; and
- ▶ requires the State Board of Education to adopt administrative rules.

Monies Appropriated in this Bill:

This bill appropriates:

- ▶ \$500,000 from the Uniform School Fund for fiscal year 2008-09 only to the State Board of Education and makes the appropriation non-lapsing.

Other Special Clauses:

This bill takes effect on July 1, 2008.

Utah Code Sections Affected:

AMENDS:

63-55b-153, as last amended by Laws of Utah 2007, Chapter 216

ENACTS:

53A-13-1201, Utah Code Annotated 1953

53A-13-1202, Utah Code Annotated 1953

Be it enacted by the Legislature of the state of Utah:

Section 1. Section **53A-13-1201** is enacted to read:

Part 12. School Seismic Safety

32 53A-13-1201. Public School Seismic Safety Committee.

33 (1) There is created the Public School Seismic Safety Committee, consisting of seven
34 members.

35 (2) (a) The governor shall appoint three members who are licensed structural engineers,
36 including one member appointed from each of the following:

37 (i) the Utah Seismic Safety Commission;

38 (ii) the Utah Division of Facilities Construction and Management; and

39 (iii) the private sector, after considering recommendations from professional
40 associations representing structural engineers.

41 (b) The state superintendent of public instruction shall appoint four members,
42 including:

43 (i) one member representing a small school district;

44 (ii) one member representing a medium-sized school district;

45 (iii) one member representing a large school district; and

46 (iv) one member from the state superintendent's staff.

47 (3) (a) Except as required by Subsection (3)(b), each member is appointed to a
48 four-year term.

49 (b) Notwithstanding the requirement of Subsection (3)(a), the governor and state
50 superintendent shall, at the time of appointment, adjust the length of terms to ensure that the
51 terms of committee members are staggered so that approximately half of the committee is
52 appointed every two years.

53 (c) When a vacancy occurs in the membership for any reason, the replacement shall be
54 appointed for the unexpired term in the same manner as the vacated member was chosen.

55 (4) (a) A member who is not a government employee may not receive compensation or
56 benefits for the member's service, but may receive per diem and expenses incurred in the
57 performance of the member's official duties at the rates established by the Division of Finance
58 under Sections 63A-3-106 and 63A-3-107.

59 (b) A state or school district employee member who does not receive salary, per diem,
60 or expenses from the entity the member represents for the member's service may receive per
61 diem and expenses incurred in the performance of the member's official duties at the rates
62 established by the Division of Finance under Sections 63A-3-106 and 63A-3-107.

- 63 (c) A member may decline to receive per diem and expenses for the member's service.
- 64 (5) (a) The committee shall elect one of the members to serve as chair.
- 65 (b) A majority of the members of the committee constitutes a quorum of the
- 66 committee.
- 67 (c) The action of a majority of a quorum constitutes the action of the committee.
- 68 (6) The state superintendent's staff shall provide staff support to the committee.
- 69 (7) The committee shall advise and make recommendations to the Legislature,
- 70 governor, state superintendent, and State Board of Education on seismic safety issues in public
- 71 schools.

Section 2. Section **53A-13-1202** is enacted to read:

53A-13-1202. Definitions -- Seismic safety evaluation.

(1) As used in this section:

(a) "Evaluation score worksheet" means the appropriate scoring worksheet for the location and type of building, as contained within federal guidelines.

(b) "Federal guidelines" means guidelines and procedures specified in "Rapid Visual Screening of Buildings for Potential Seismic Hazards: A Handbook" published by the United States Federal Emergency Management Agency.

(c) "Threshold score" means a score on the evaluation score worksheet below which a building warrants a more detailed structural evaluation for its intended use.

(2) On or before June 30, 2010, each school district and charter school shall:

(a) conduct a seismic safety rapid visual screening of each facility utilized by the school district or charter school, in accordance with federal guidelines;

(b) complete the appropriate evaluation score worksheet; and

(c) report its findings to the State Board of Education, including for each building:

(i) the screening score worksheet;

(ii) the current number of building occupants; and

(iii) the square footage.

(3) The rapid visual screening and completion of the evaluation score worksheet under Subsection (2) shall be supervised or performed by a licensed professional structural engineer or a licensed professional civil engineer with experience in seismic evaluations.

(4) In accordance with Title 63A, Chapter 46a, Utah Administrative Rulemaking Act,

94 the Board of Education, after consultation with the Public School Seismic Safety Committee,
95 shall make rules to establish standardized forms and procedures for conducting and reporting
96 the results of the rapid visual screening.

97 (5) (a) The State Board of Education shall allocate funds appropriated for this purpose
98 to reimburse school districts and charter schools for costs of complying with this section and to
99 cover expenses of the Public School Seismic Safety Committee.

100 (b) If reimbursement requests from school districts and charter schools exceed
101 available funds, the State Board of Education shall proportionately reduce the allocation for
102 each reimbursement request to match the level of available funds.

103 (c) (i) If reimbursement requests from school districts and charter schools are less than
104 available funds, the State Board of Education, after consultation with the Public School
105 Seismic Safety Committee, shall allocate any remaining funds for additional evaluations of
106 buildings below the threshold score.

107 (ii) If additional evaluations are funded pursuant to Subsection (5)(c)(i), the State
108 Board of Education, after consultation with the Public School Seismic Safety Committee, shall
109 required that the additional evaluations be performed using a nationally recognized standard.

110 (iii) The State Board of Education may require matching funds as a condition of
111 funding any additional evaluations.

112 (6) The state superintendent shall report to the Education Interim Committee of the
113 Legislature the findings of the statewide seismic evaluation, including any additional
114 evaluations, on or before November 30, 2010, including:

115 (a) by district or charter school, the total number of screened buildings and the score
116 for each building;

117 (b) the total estimated number of building occupants and the total estimated number of
118 building occupants in structures below the threshold score;

119 (c) the total facility square footage statewide and the total facility square footage
120 statewide in structures below the threshold score; and

121 (d) the number of districts and facilities for which no report was submitted.

122 (7) The Public School Seismic Safety Committee shall:

123 (a) provide technical assistance to the State Board of Education, state superintendent,
124 school districts, and charter schools in conducting and overseeing the evaluations conducted

125 pursuant to Subsection (2); and

126 (b) after completion of the evaluations required by Subsection (2), establish the
127 threshold score.

128 Section 3. Section **63-55b-153** is amended to read:

129 **63-55b-153. Repeal dates -- Titles 53, 53A, and 53B.**

130 (1) Section 53-3-210 is repealed February 1, 2007.

131 (2) Section 53A-1-403.5 is repealed July 1, 2012.

132 (3) Subsection 53A-1a-511(7)(c) is repealed July 1, 2007.

133 (4) Section 53A-3-702 is repealed July 1, 2008.

134 (5) Section 53A-6-112 is repealed July 1, 2009.

135 (6) Section 53A-13-1202 is repealed July 1, 2011.

136 [~~6~~] (7) Section 53A-17a-152 is repealed July 1, 2010.

137 Section 4. **Appropriation.**

138 (1) There is appropriated \$500,000 from the Uniform School Fund for fiscal year
139 2008-09 only, to the State Board of Education for:

140 (a) reimbursement of school district and charter school seismic safety evaluation costs
141 incurred pursuant to Section 53A-13-1202; and

142 (b) expenses of the Public School Seismic Safety Committee created under Section
143 53A-13-1201.

144 (2) The funds appropriated in Subsection (1) are non-lapsing.

145 Section 5. **Effective date.**

146 This bill takes effect on July 1, 2008.

Linking ShakeMap and Emergency Managers in the Utah Region

Kris Pankow, Doug Bausch, and Bob Carey

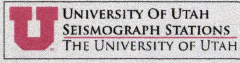
University of Utah Seismograph Stations, Salt Lake City, UT 84112

FEMA

Utah Division of Homeland Security

In 2001, the University of Utah Seismograph Stations (UUSS) locally customized and began producing automatic ShakeMaps in Utah's Wasatch Front urban corridor as part of a new real-time earthquake information system developed under the Advanced National Seismic System. In 2005, motivated by requests from Utah's Division of Homeland Security and FEMA, ShakeMap capabilities were expanded to cover the entire Utah region. Now in 2007, ShakeMap capabilities throughout the region will again be enhanced by increased station coverage. The increased station coverage comes both from permanent stations funded by a state initiative and from the temporary deployment of EarthScope USArray stations. The state initiative will add ~22 strong-motion instruments and ~10 broadband instruments to the UUSS network. The majority of these stations will be located in southwestern Utah—one of the fastest growing regions in the U.S. EarthScope will evenly distribute 70 broadband stations in the region during 2007 that will be removed after 18 to 24 months.

In addition to the enhanced station coverage for producing ShakeMaps in the Utah region, the transfer of information to the emergency response community is also being enhanced. First, tools are being developed that will link ShakeMap data with HAZUS loss-estimation software in near-real-time for rapid impact assessment. Second, ShakeMap scenarios are being used in conjunction with HAZUS loss-estimation software to produce customized maps for planning and preparedness exercises and also for developing templates that can be used following a significant regional earthquake. With the improvements to ShakeMap and the improved dialogue with the emergency managers, a suite of maps and information products were developed based on scenario earthquakes for training and exercise purposes. These products will be available in a timely fashion following a significant earthquake in the Utah region.



Linking ShakeMap and Emergency Managers in the Utah Region

¹Kris Pankow, ²Doug Bausch, and ³Bob Carey

¹University of Utah Seismograph Stations, ²FEMA, ³Utah Division of Homeland Security



What's New with ShakeMap in Utah?

Improved Station Coverage:

- New permanent stations funded by a state initiative: ~22 strong-motion instruments and ~10 broadband instruments to be deployed primarily in southwest Utah
- Temporary stations deployed as part of the EarthScope USArray: 70 broadband stations evenly deployed throughout the region

New Site Condition Map:

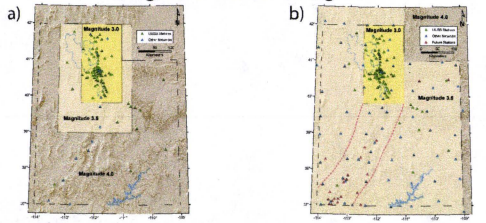
- Improved mapping of soil units particularly in Davis, Utah, and Weber counties

Enhanced Transfer of Information to the Emergency Response Community:

- Use of ShakeMap scenarios in conjunction with HAZUS to develop templates for planning and preparedness exercises
- Tools under development to generate the above templates for post-earthquake response

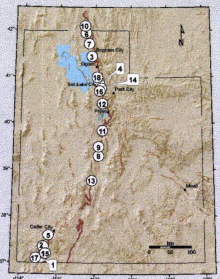
Real-Time ShakeMaps

Magnitude Threshold Regions



The minimum magnitude that ShakeMaps are generated in the Utah region is a function of station distribution. (a) Threshold values with UUSSS network (currently running on active machine) (b) Threshold values with the incorporation of the EarthScope USArray stations (currently running on the backup ShakeMap machine). The red stations are stations to be deployed as part of a state initiative and the red dotted lines show how the magnitude threshold will change after incorporating those stations. The TA stations will be added to the active machine in early 2008 and the stations from the state initiative by summer 2008.

ShakeMap Scenarios



#	Fault Name	Magnitude
1	Hurricane Fault, Anderson Junction Segment	6.7
2	Hurricane Fault, Ash Creek Segment	6.9
3	Wasatch Fault, Bingham City Segment	7
4	Wasatch Fault, Bountiful Segment	6.5
5	Hurricane Fault, Cedar City Segment	6.6
6	Wasatch Fault, Clark Segment	6.5
7	Wasatch Fault, Collinston Segment	6.8
8	Wasatch Fault, Fayette Segment	6.2
9	Wasatch Fault, Levan Segment	6.7
10	Wasatch Fault, Mallad City Segment	6.5
11	Wasatch Fault, Nephi Segment	6.9
12	Wasatch Fault, Provo Segment	7.2
13	Sevier Fault, Zone	6.5
14	Wasatch Fault, Salt Lake City Segment	7
15	Hurricane Fault, multi-segment	7.4
16	West Valley Fault, Zone	6
17	Washington Fault	6.5
18	Wasatch Fault, Weber Segment	7

ShakeMap scenarios are available for all segments of the Wasatch fault, the Sevier Valley, and southwestern Utah. The scenarios were generated using the Pankow and Rechmann (2004) ground motion relation combined with site amplifications generated using the Borcherdt (1994) equations and a soil map generated for the state (MacDonald and Ashland, in preparation).

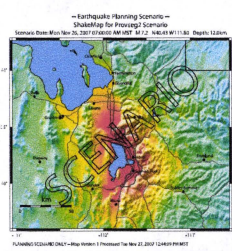
Example Post-Earthquake Information Products

Information products for an M 7.2 Wasatch Fault, Provo segment ShakeMap scenario:

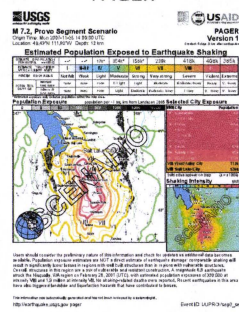
[The plan is to provide a series of maps like those shown below for all of the ShakeMap scenarios and to get these scenario maps into the hands of local responders so that they can (1) start to understand and plan for the scenario earthquake and (2) to get familiar with the type of products they will be given following a destructive earthquake.]

- **PAGER** (generated by the USGS, <http://earthquake.usgs.gov/eqcenter/pager/>), which provides estimates of the population exposure by city
- **HAZUS maps for loss-estimates** (generated by FEMA and Utah Division of Homeland Security). Map content includes:
 - a) **Building Inspection Needs:** The estimated extent of damage to buildings in the study area and the approximate number of building inspectors needed to inspect all of these buildings in 30 days.
 - b) **Communications Facilities Functionality:** The estimated percentage of functionality of communications facilities on day 1.
 - c) **Direct Economic Loss:** An estimate of the amount of direct building economic loss to expect in the event of an earthquake to the study area.
 - d) **Displaced Households and Public Shelter Needs:** The number of displaced households and short-term public shelter needs to anticipate.
 - e) **Estimated Damage to Transportation Infrastructure:** The estimated extent of damage to the transportation infrastructure. Determined by estimating damage to highway segments and major roadway bridges. Also, the number of bridges needing inspection, including the number of bridge engineers to inspect all of the bridges in 30 days.
 - f) **Hospital Functionality:** The chance that a given hospital will be functional on day 1. Also, the extent of damage to highways used to reach the hospitals and the number of hospital beds available per county.
 - g) **Potable Water Needs:** An analysis of the location of dams, water treatment plants, and water distribution pipes in proximity to areas of high liquefaction. Also, the number of households without potable water and the number of truckloads of fresh water needed by county per day.
 - h) **Electrical Infrastructure:** The proximity of power facilities and power lines to areas of high peak ground velocity.
 - i) **Debris:** The amount of brick, wood, concrete, and steel debris and the number of truckloads of debris removal needed by county.

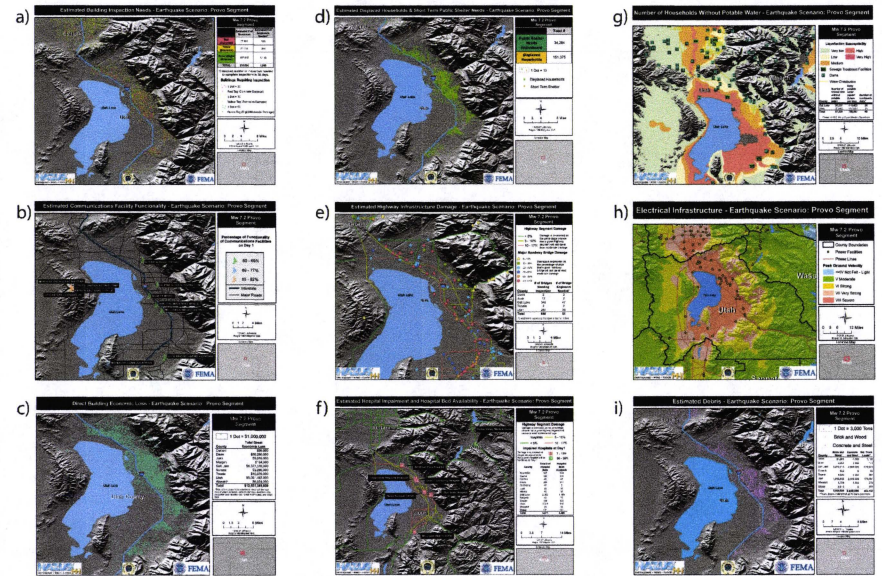
SHAKEMAP



PAGER



Hazus Loss-Estimates



Acknowledgments: We would like to thank Jesse Rozelle for assisting with the HAZUS runs, David Wald for providing PAGER results for the Provo and Weber scenarios, and Paul Roberson for graphics assistance.