It is imperative throughout the bill-writing process that you are willing to negotiate, compromise, and acquiesce. As with all bills that go through the legislative process, the single best way to get your bill defeated is to be inflexible. On the other hand, the single best way to get your bill passed is to be willing to give and take a little.

**Getting the Public Relations Machine Rolling**

Many structural engineers tend to avoid publicity and take a back row seat behind the owner, contractor and architect when a project on which they have worked is in the limelight. That type of passive behavior is unproductive when you are trying to get a bill for structural licensing and practice acts passed. Because many structural engineers are seldom seen in the spotlight, it is likely that some of your legislators and the general public may not fully understand the important role that structural engineers play in protecting their health, safety and welfare.

It is imperative that structural engineers raise awareness about the structural engineering profession and the potential problems and hazards that the public faces because of unqualified individuals attempting to perform structural design.

Populate Boards and Committees

There are a variety of boards, organizations, or committees to which the media and your legislators turn for advice and recommendations. It would be beneficial if members of the local SEA and/or SEI Chapter populated those groups to offer advice and provide a voice from the structural engineer's perspective.

Does a representative from your SEA/SEI regularly attend your state's licensing board meetings? Is there a structural engineer on the licensing board? Does your state have other appointed advisory boards to which they turn for advice? A structural engineer should volunteer to sit on every board that may be consulted by the legislature while debating the issue of structural licensing and practice acts to provide input and clarify the motivation and reasons behind the bill.

There are a variety of local engineering-related associations such as ASCE and ACEC that have boards and committees that may support changes to the current laws. Members of the SEA should volunteer to be involved in those organizations to keep them abreast of developments and progress, and to be a conduit for information and input back to the SEA/SEI.

Increase Awareness of What Structural Engineers Do for the Public

Journalists from local television stations, magazines and newspapers are always looking for interviews and articles of local interest and concern. Publishing an opinion piece or appearing on television is a great opportunity to increase the public's awareness about structural engineering. If it is appropriate, emphasize what structural engineers do and what sets them apart from other branches of engineering.

Remember that the media are looking for local interest stories that will grab the public's attention and provide useful information that they can use and from which

they can benefit. When you discuss or write on a topic for the media, keep this question in mind: "What is in it for their viewers, listeners, or readers?" That is the question they are asking themselves, and it will ultimately be a deciding factor in whether you are published or interviewed.

To be of use to the general public, any interview that is given or article that is written should use non-technical language, such that it is void of jargon, and should emphasize why the public should be concerned about the topic.

A sample of article titles that may be of interest to the public and media include:

- Why Did My Neighbor's House Fall Down? (after a hurricane, earthquake, or snow storm)
- Is My House Safe Against Earthquakes?
- Things to Consider When Building in Earthquake Country.
- What to Look for Before You Buy a House in Hurricane Country.
- How Much Snow is Too Much Snow on My House?
- The Hurricane is Gone, but the Damage Remains – What You Can Do to Prevent This from Happening Next Time

The White Paper and the One-Pager

Writing a white paper is a good starting point to help the SEA/SEI Structural Licensing Committee members collect their thoughts and firm up their positions regarding structural licensing and practice acts. A white paper is generally three to five pages in length and emphasizes the reasons for structural licensing and practice acts.

A white paper is good, but a one-pager is even better. A one-pager is, as the name suggests, one side of one sheet of paper. The one-pager is a concise summary of the contents of the white paper. The one-pager should be easy to read and have bullet points to emphasize important aspects of structural licensing and practice acts. The one-pager is a great way to introduce the public, legislators, and media to the topic of Structural Licensing and Practice Acts.

The value of a well crafted one-pager is that it is likely to be read, while the lengthier white paper will generally *not* be read in its entirety. A sample one-pager is included at the end of this paper.

Making the Case for Structural Licensing and Practice Acts

From the national arena there has been a variety of investigations and studies that have highlighted the problem of member failure, building collapse, and–in some cases–death as a result of an engineer practicing outside the area of his or her competence. As informative as those cases are, it is more beneficial to document similar problems within your state. Making the problem more of a local concern and issue carries more weight and impact with the legislature and media than to highlight the problems with poor-quality structural design nationally.

**Know Who May Resist SE Licensure**

As obvious as the need for structural licensing and practice acts are for many, there are those who are wholly unaware of the magnitude of the problem of licensed engineers practicing outside the areas of their competence and the potential life-threatening consequences that may result. States that require a plan check review before issuing a building permit have firsthand knowledge about the magnitude of the problem. Many contractors, owners, architects, insurance companies, and fabricators and manufacturers of products used on structures are also keenly aware of the magnitude of the problem and its consequences. Unfortunately, there are those in the legislature and within some engineering organizations who choose to turn a blind eye to the situation, preferring to wait and "count the bodies" before they are willing to do something about it.

Some of the groups that have had, in the past, some concern about structural licensing and practice acts include:

- The National Society of Professional Engineers (NSPE) and its state-level affiliates. They prefer to have engineers unrestricted and left to decide for themselves what work they are competent to perform. Unfortunately, some engineers who may not be competent to perform structural engineering genuinely believe that they are competent to do this work.
- Commercial Contractors. They are concerned about having to pay higher fees for structural engineering services and higher building costs. This is only speculation and is not the intent for a SE licensing act.
- Residential Contractors. They are concerned that if a residential building is designed correctly by a knowledgeable structural engineer that the cost of a home will go up and may cause a potential home buyer not to build. This is only speculation and is not the intent for a SE licensing act.
- Some Engineers. Some engineers are concerned about the low pass rate on the NCEES structural exam and a lack of adequate resources for preparing for it. There are several courses available to prepare engineers to pass the structural engineering exam requirement.

Common questions, accusations, and misconceptions that surround structural licensing and practice acts include:

- "Won't buildings cost more?" No, buildings should not cost more. The code establishes the minimum requirements for a safe building. This bill makes sure that certain structures comply with the code by requiring them to be designed by those who have the appropriate education and experience, and who have passed a structural exam.
- "PEs and SEs, aren't they all the same?" Experience, education and examination separate and differentiate SEs from PEs.
- "Are we currently having a problem?" Although, as noted above, the problem of engineers practicing outside the areas of their competence is a real danger and threat to the public, there are some who are unaware of it. It is important to emphasize that we would rather take action now than "count bodies" later.

- "Ethics shouldn't be legislated." We are not trying to legislate ethics; this is about protecting the public - like drivers' licenses, speed limits and seat belt laws.
- "Aren't all professional engineers intelligent and capable?" Sure, but this is about having engineers demonstrate their knowledge and understanding of structures by passing the requisite examination. History is full of people that were intelligent and capable but—knowingly or otherwise—did not work for the public good.

Some people, including engineers and legislators, may never understand the importance of structural licensing and practice acts as a means of protecting the health, safety, and welfare of the public. Ignorance and ego will be unfortunate obstacles, but they are not insurmountable. Patience and a desire to educate others are virtues that will be invaluable throughout the process.

**Generating Support**

There are a variety of organizations and individuals that support structural licensing and practice acts. They include:

- National Council of Structural Engineers Associations (NCSEA)
- American Society of Civil Engineers (ASCE)
- Structural Engineering Institute (SEI)
- Council of American Structural Engineers (CASE)
- Local chapters of ACEC
- Some local chapters of the American Institute of Architects (AIA)
- Building officials and those who perform structural plan reviews
- The state Division of Professional Licensing (or equivalent)

All of these organizations should be informed about the proposed changes to the licensing laws and be given the opportunity to offer input and advice.

All members of the SEA/SEI Chapters and the supporting organizations should be kept fully informed about the progress and changes that may be made to the proposed changes to the licensing laws. The SEA/SEI's membership will appreciate monthly newsletter articles or emails that keep them fully informed. Some of the groups listed above may find it more advantageous to receive frequent emails.

When the proposed changes to the licensing laws are being debated in the legislature, it is advantageous to have the legislators receive email from their constituents declaring support for the bill. Declaring support is not always as clear-cut as it seems. Legislators must receive email, or other forms of communication, clearly noting that the sender "supports the bill as it is currently written." Emails that state, "I support the proposed bill …….. but suggest the following changes….." or "I agree with structural licensing and practice acts in principle but would request the following changes…" are viewed as non-support of the bill and will be counterproductive.

Emails and letters sent to legislators should be short, direct, and to the point to ensure that they are read. Lengthy correspondence is often not read by busy legislators. The first few paragraphs should be short, perhaps no more than two to five sentences in length, and should explicitly declare support for the bill. The correspondence should be cordial and avoid name-calling, fault-finding, and digging up past disagreements. A paragraph or two highlighting why you support the bill would be appropriate and acceptable.

It is important, but not critical, to have support emails from across the state, because most Legislators will not read or be swayed by any correspondence unless it is from their actual constituents. This does not mean that a person sending an email to every legislator is ineffective or useless, but it means that such a tactic is not as effective as every legislator receiving correspondence from their own constituents.

**Working with Your Legislatures**

Most states have a brief outline published or posted online that spells out the legislative process. Some states require a bill to go through an interim committee and/or legislative analyst review, receive a fiscal note, be reviewed by a Senate committee, be read and be voted on twice in the Senate, be reviewed by a House committee, and finally be read and voted on twice in the House. The process can be lengthy, catching the uninformed off-guard. It is a good idea to have a firm grasp on how the legislative process works in your state.

In addition, it is important to know something about the state leadership in the House and Senate. The leadership typically has the power to stall or throw out any bill that they deem of low importance or that they do not support.

It is also important to know something of the quality and character of the legislators with whom you are dealing. When asked by a legislator why the SEA of Utah was pursuing this course of action, I stated: “We’re proposing this bill on its own merits - because it’s the right thing to do.” To that, the legislator responded: “We don’t pass bills based on their merits or principle. Right has nothing to do with the decisions that are made.” Did he misspeak? Maybe. Was he right? Unfortunately, yes. A state’s legislature has many pressing and important problems to deal with and usually has a limited time frame within which to complete their work. What seems right and necessary to you may not be important to particular legislators based on the overall scope of the many issues that they face.

**Working with a Legislator**

Most states have information online about each legislator. Often the information includes a resume, the district that he or she represents, background information, committee assignments, contact information and past successful legislation. It is important to have as much information as you can about every legislator so that you can decide which one(s) to approach about sponsoring the bill.

Factors that influence the effectiveness of a legislator include, but are not necessarily limited to:

- Whether he/she belongs to the majority or minority party.
- His/her relationship with the Senate and House leadership.
- His/her longevity; senior legislators are generally more effective than freshmen.

Once you choose a legislator and that person accepts the responsibility of sponsoring the bill in either the Senate or House, he/she can assist you in choosing a legislator to co-sponsor the bill in the other legislative branch. It is important to review the credentials of all the legislators before asking one to sponsor the bill. Those who are eager to sponsor it may not be the best choice for getting it through the legislative process.

Legislators are good people who believe strongly in what they are doing and the notion that they are making a positive difference in the world. They also have to worry about getting re-elected. Because of that, no legislator wants to sponsor a bill that may fail because it could be bad for their campaign and image.

Important considerations that a legislator may entertain before agreeing to sponsor the bill may include:

- Will the bill result in a cost to the state? (The legislator will not want to increase taxes. Generally, the fiscal note for a bill on structural licensing and practice acts will be zero or very small.)
- Will the bill result in a cost to their constituents? (No.)
- Does the bill restrict or adversely affect existing businesses? (No. The transition clause ensures that the Bill will not affect existing businesses.)

Do not be afraid to interview your legislators to determine their level of commitment to the bill and assess their ability to assist you in seeing it successfully through the legislative process. This is probably the most important part of the whole effort – choose the sponsors carefully.

Once the sponsors have been selected, it is vital to educate them and help them fully to understand the reasons and purpose behind the bill. Your legislator must stand alone on the floor to speak in support of the bill and answer any questions that arise. It is important to make sure that they are well–prepared for this task.

When the Bill is being reviewed in committee or discussed on the floor, it is important to have the one-pager readily available and distribute it to every legislator so that they can read the main points of the Bill and perhaps gain a greater understanding of the importance of structural licensing and practice acts.

**Closure**

Licensing structural engineers separately and establishing a practice act will raise the bar for structural engineers above that of a Professional Engineer. However, we

should keep in mind that the purpose of structural licensing is not to create a group of elitist snobs. An open process and clear purpose will demonstrate our willingness to work with all interested parties and our desire to create a better future for our profession. The push toward structural licensing and practice acts in all states should be viewed for what it is: an expression of our desire to serve the public better and fulfill our ethical obligation to hold paramount the safety, health, and welfare of the public.

# 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.

SEAU online
The Web Site of the Structural Engineers Association of Utah
www.seau.org

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# The New 16-Hour NCEES Structural Exam – How we got here

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## ABSTRACT

In April 2011, National Council 0f Examiners for Engineering and Surveying (NCEES) will begin offering a new 16-hour Structural Examination to replace the Structural I and Structural II examinations. This new exam will also replace the state specific seismic structural examinations currently offered by California, Oregon, and Washington.

The first half of this paper will focus on how and why the changes were made, including discussion of how different states use the current structural examinations, difficulties in mobility of structural licenses, the NCEES Structural Task Force, the NCEES Professional Activities and Knowledges Survey for the new 16-hour Structural Examination, and the new Test Specification.

The second half of this paper will discuss the format of the new 16-hour Structural Examination, the new 16-hour Structural Examination writing committee, and how the new 16-hour Structural Examination is graded.

## INTRODUCTION

The first administration of the new 16-hour Structural Examination which replaces the Structural I and Structural II examinations was April 8-9, 2011. This paper will discuss the history of structural examinations in the United States and its Territories, the reasons for the change from the Structural I and Structural II examinations to the new 16-hour Structural Examination, and the process of the change.

## HISTORY OF NATIONAL STRUCTURAL LICENSURE

The states of California, Illinois and Washington wrote state specific structural engineering examinations in the later half of the twentieth century. Illinois suggested that the National Council of Examiners for Engineering and Surveying (NCEES) write a national exam and that Illinois would use that exam rather than continue to write a state specific exam. In 1986 NCEES offered the first Structural I Examination (SE I) as the first day of a 2 day exam. In 1986 NCEES offered the first Structural II Examination (SE II) to complete sixteen hours of examination. In 1993, at Illinois request, NCEES added seismic content to the afternoon portion of the Structural II Examination.

In 1932 California passed a Structural Engineer title authority act. This was the year before the 1933 Long Beach Earthquake. After the 1933 Long Beach Earthquake the Field Act was passed to require a Structural Engineer for schools. Modifications to this act added a requirement that a Structural Engineer be engaged to design a hospital. California subsequently started writing state specific structural engineering examinations.

The structural engineering examination in Washington was first offered in 1950 following the 1949 Olympia Earthquake. This examination was initially an 8-hour exam. In 1963 it was changed to a 16-hour exam

In 1986 California, Hawaii, Oregon and Washington cooperated in writing the 16-hour Western States Examination. Idaho and Nevada subsequently joined this exam. In 1993 Hawaii, Oregon and Nevada left the Western States exam and went to the NCEES SE I and SE II exams because NCEES had added seismic content to the afternoon problems on the SE II Exam. Washington left the Western States Exam in 1998.

## STRUCTURAL EXAMINATION USEAGE AND MOBILITY

As shown in Table 1, after 1998 different U.S. states and territories have granted structural licenses using a variety of examinations.

Table 1. U.S. States and Territories Which Used 16-Hour Licensing Examinations

| STATE OR TERRITORY | EXAMINATIONS USED |
|---|---|
| Arizona | SE I + SE II |
| California | SE II + CA SE III |
| Guam | SE I + SE II |
| Hawaii | SE I + SE II or Civil/Structural + SE II |
| Idaho | SE I + SE II |
| Illinois | SE I + SE II |
| Louisiana | SE I + SE II |
| Nebraska | SE I + SE II |
| Nevada | SE I + SE II |
| Northern Mariana Islands | SE I + SE II |
| Oregon | SE II + WA/OR SE III |
| Utah | SE I + SE II |
| Washington | SE II + WA/OR SE III |

Forty-seven states and territories offered the NCEES SE I, but thirty-four of them did not require the SE II exam. The forty-seven states and territories include the 13 states and territories listed in Table 1. Some of these thirty-four states and territories which did not require the SE II exam offered the SE I so that engineers in their jurisdiction could apply for comity in other jurisdictions. Other jurisdictions offered the SE I in lieu of another PE exam, such as the civil exam with the structural module.