



# **Fourth Structural Engineering Licensing Summit**

**July 18, 2008**

***Summary Report***

## ACKNOWLEDGMENTS

This Structural Engineering Licensing Summit was organized by the Professional Activities Committee (PAC) of SEI. The Committee's members included:

Sam A. Rihani, PE, F.ASCE – Chairperson  
Gregg E. Brandow, PhD, SE  
W. Gene Corley, PhD, PE, SE, Hon. ASCE  
Alicia E. Diaz de Leon, RA  
Howard C. Dutzi, PE  
Ed Huston, PE, SE  
Susan A. Jorgensen, PE, LEED AP  
Carl H. Josephson, SE  
David I. Ruby, PE, SE, F.ASCE  
John G. Shipp, SE, F.ASCE

The following individuals attended the Summit:

Gregg Brandow, California	Chris Jackson, North Carolina
Mary Goodson, California	Peter Vaccaro, Nebraska
Carl Josephson, California	Jeff Stevens, Nebraska
John Shipp, California	M. Ali Khan, New Jersey
Howard Dutzi, Colorado	Gretchen Bryc, Ohio
Susan Jorgensen, Colorado	Mahmoud (Mike) Khoncarly, Ohio
Thomas Grogan, Florida	Dustin Cole, Oklahoma
Ronald Milmed, Florida	Doug Meltzer, Oregon
Adam Ray, Georgia	Charles Walczak, South Carolina
W. Gene Corley, Illinois	Barry Arnold, Utah
John Crutti, Louisiana	Suzanne Fisher, Virginia
William Brittle, Maryland	Stephen Jones, Virginia
W. Eric Rathgeber, Maryland	Sam Rihani, Virginia
William Kussro, Michigan	Jim Rossberg, Virginia
David Ruby, Michigan	John Swecker, Virginia
Cheri Leigh, Missouri	Ed Huston, Washington
Richard Meloy, Missouri	

On July 18, 2008, twenty states were represented at the fourth summit on Structural Engineering Licensing held at ASCE headquarters in Reston, VA. Three previous summits were held in 2000, 2002, and 2004, and each achieved a milestone in reaching certain goals facilitating the path toward structural licensure. At the time of this publication, seven states have enacted full or partial structural engineering practice acts thus requiring a licensed Structural Engineer (SE) to design "significant" or certain types of structures. The last three states embracing a practice act were Oregon (1997), Washington (2007), and Utah (2008). The other four states with full or partial practice acts for structural engineering are Illinois, Hawaii, Nevada, and California.

In addition to these seven states, four more have enacted a title act for structural engineers. These states are Arizona, Idaho, Nebraska, and New Mexico. With a title act, a structural engineer can be licensed as a SE however, there is no distinction on the type of structure a PE or a SE may design. At this time 11 states, representing approximately 30% of all structural engineers in the United States, recognize structural engineering as a distinct practice within the engineering profession.

The purpose of this summit was to bring together leaders from local structural engineering groups from around the country to discuss strategies which local groups may use, and collectively develop materials to support local efforts for separate SE licensing in their state. Reports and materials from the previous summits were made available to all attendees, as well as the most recently passed legislation in Washington and Utah. The morning session of the summit was comprised of several presentations by leaders in the structural engineering community. These presentations were intended to lay the groundwork for the group discussions to be held later in the summit, and included topics such as (a) an overview of SE Licensing in the U.S., (b) case studies from 3 states (UT, WA, OR), (c) working with state licensing boards, (d) why an SE License is needed, (e) the differences between title acts and practice acts, and (f) an overview of existing state laws and the new NCEES unified structural exam. These presentations are available at SEI's website, <http://content.seinstitute.org/inside/SELicensure.html>. The group discussions addressed four topics with a focus on developing suggestions and recommendations for use by local groups who will be seeking a SE licensing act in their state. These topics were (a) developing a fair and practical grandfathering/transition clause, (b) developing a threshold for structures that are required to be designed by a licensed SE, (c) elaborating further on why a SE license is needed, and (d) addressing potential objections and concerns by other local groups. The outcome of these four discussions is summarized in the following pages.

## **I. Grandfathering/Transition Clause**

(Moderated by Gregg E. Brandow, PhD, SE)

The consensus of the Summit was that an appropriate “grandfathering clause” is necessary to successfully implement a structural engineering practice act. It was discussed that “grandfathering” is not the proper term due to implied age discrimination, and “transition clause” more closely described the intent. A definition was agreed upon:

Ability of civil/professional engineers to continue to practice structural engineering without conforming to the new examination, education, and experience requirements of the structural engineering practice act laws and rules.

### **Reasons for a Transition Clause**

The concern is to not exclude civil/professional engineers currently engaged in structural design from continuing their practice within the state. Since under current laws there is no restriction on the scope of their practice, implementing new laws cannot take away their practice. The Summit created a list of reasons to create a transition clause:

1. Not to take away someone’s livelihood
2. Allow continuation of successful practice
3. Welcome the experienced professionals to the higher standard
4. Recognition of achievement of professional practice
5. Reduction of opposition
6. Tradition of “transition clauses” in licensing
7. Elimination of perception of restraint of trade

### **Requirements for a Transition Clause**

To implement a “transition clause”, a set of requirements will be needed to bring those engineers who are qualified and motivated to be included in the new practice act. The Summit presented a list of requirements to be considered for the transition which would be included in an application process:

1. Active PE/CE license
- ② Currently licensed in the state to practice in field of structural engineering
3. Professional experience. Could include submitting “past work” that demonstrates experience in scope of restricted structural engineering practice
4. Professional References

5. License free of disciplinary actions
6. Current with state's continuing education policy

The Summit participants agreed that the transition requirements needed enough flexibility to not exclude anyone deemed qualified. A reasonable transition time of one to three years was also thought to be important. Other considerations were presented but not recommended for the transition process:

1. "Track record" in passing the national structural exam.
2. BS + 30 in the structural engineering requirements
3. "Take Home" exam to cover state requirements

### Comity

Obtaining a structural engineering license by the "transition process" will not qualify an engineer for comity in another state. All current state laws require that an engineer meets all the state's requirements such as education, exams and experience. To become a Model Law Structural Engineer in the NCEES Records Program also requires that an engineer meets the education, exam and experience requirements.

### Utah Experience

Utah has recently passed a structural engineering practice act which includes a transition clause. This clause was significant in their efforts to get their legislation passed. Their law states that an engineer must meet the requirements for structural engineering, "except that prior to January 1, 2009, an applicant for licensure may submit a signed affidavit in a form prescribed by the division stating that the applicant is currently engaged in the practice of structural engineering."

The discussion at the Summit demonstrated the desire to "protect the public" by assuring that only those qualified become Structural Engineers. There is also the desire to transition all those engineers currently practicing in the field of structural engineering, and to have a liberal enough transition procedure to minimize the opposition.

## **II. For which structures should an SE license be required?**

(Moderated by Sam A. Rihani, PE, F.ASCE, SECB)

As a preface to this discussion, the Summit participants were presented with a detailed overview of the current state practice acts as they relate to the identification of “Significant Structures” (as some states refer to them) which are required by law to be designed by a licensed Structural Engineer. Consequently, those structures that are not considered “significant” may be designed by a licensed Professional Engineer. This threshold in the seven states with a current structural engineering practice act may be summarized as follows:

1. States that require practically all structures (with the exception of only a few one- or two-story structures, or residences) to be designed by a licensed Structural Engineer. Illinois and Hawaii adopt this practice.
2. States that require “Significant Structures” (other similar terms are used) to be designed by a licensed Structural Engineer. Oregon, Washington, Utah, and Nevada adopt this practice.
3. States that identify only a few select structures that must be designed by a licensed Structural Engineer. California adopts this practice, as all public schools and hospitals in California must be designed by a SE.

The term “Significant Structures” is used by the states of Oregon, Washington, and Utah. Although Nevada does not use this same terminology, it follows a similar practice but with fewer structures identified. The following is a general breakdown of the various categories identified under “Significant Structures”, not all of which are used by each of the three states:

1. Essential Facilities (such as healthcare, fire, rescue, police, power generation, control towers, emergency preparedness and emergency shelters, national defense, etc.)
2. Special Occupancy Structures (large occupancy buildings)
3. Hazardous Facilities (buildings containing explosive substances)
4. Buildings Customarily Occupied by Human Beings (4-5 story buildings and above)
5. Structures with Irregular Features
6. Structure Requiring Special Expertise/Consideration (radio towers, tall signs, large buildings)
7. Tall Structures (more than 100 feet)
8. Bridges (only Washington includes this requirement – long span, and large piers)

The Summit participants suggested that although it is desirable to have all structures covered in a structural engineering practice act, it is important to realize that this may not be often feasible.

For various reasons, including facilitating passage of a proposed SE practice act, states may want to consider excluding structures such as single family dwellings, small agricultural buildings, and other less significant structures from the list of facilities that must be designed by a licensed Structural Engineer.

The Summit recommended that, in addition to the “Significant Structures” discussed above, the following be included in the list of structures/facilities that must be designed by a licensed SE under a newly enacted practice act:

1. Power generation facilities, including nuclear power plants
2. Coastal structures within 1500 feet (or some limit) of the shoreline
3. Water and wastewater treatment facilities
4. Dams
5. Tunnels
6. Buildings with long clear span roofs
7. Bridges beyond a certain span (provided the political realities of the state in question prohibit this inclusion)

Other suggestions were presented but not recommended by the Summit. These include:

1. Structural components
2. Pre-engineered buildings
3. Mobile homes (as these may be governed by federal rather than state laws)

As stated earlier, the most desirable goal is to include all structures. Knowing that several variables typically impact such an outcome and make it unattainable, it became natural that the focus of this discussion revolved around the selection of those structures that could have the most impact, directly or indirectly, on the lives, safety, and welfare of the public.

### **III. Why is an SE license needed in my state?**

(Moderated by Ed Huston, PE, SE)

As a preface to this discussion, the Summit participants discussed the requirements in states which have SE Practice Acts.

The primary reason for having a SE Practice Act is *life safety*. Under this premise, there are several reasons for practice acts. They include:

- 1) Increased complexity of codes
  - a) Level of seismicity – IBC requires seismic design in every state
  - b) Structural portion of Civil exam does not address seismicity
  - c) High wind areas – increased complexity of design
  - d) High snow loads and drifts
  - e) Extreme loadings (blast, terrorism related)
  - f) Man-made extreme environmental loadings
- 2) Overall increased complexity of design
- 3) Increased complexity of structures
  - a) Reduced weight of structures
  - b) Optimization of structures
- 4) Greater expectation of performance
- 5) Increasingly complex software
- 6) Condition of the infrastructure

Beyond life safety, there are some business and personal reasons to promote a SE Practice Act:

- 1) Mobility between jurisdictions
- 2) Demonstrate structural competence
- 3) Anecdotal increase in claims due to structures
- 4) Increase requirements by owners in change in occupancy
- 5) Increased responsibility for special inspections

Boards of Registration also have some reasons to want to promote a SE Practice Act.:

- 1) Decreased disciplinary action
- 2) Case studies being documented (by SEI)

#### **IV. Concerns/Opposition that will be voiced – Developing appropriate responses**

(Moderated by W. Gene Corley, PhD, PE, SE, Hon. ASCE)

The consensus of this summit and previous summits is that we need to raise the bar for structural engineering. Although it cannot be guaranteed that a person with a structural license will not make mistakes, it is true that the structural license improves the quality of engineering by having those who have studied, practiced, and passed the exam for structural engineering do a better job. The first Structural Act was put in place in 1915. In fact, it could be argued that it was the first professional engineering act to address concerns other than water or levees.

The Structural Engineering Act was enacted in the State of Illinois and has been in place and working successfully for almost 100 years. The experience in Illinois is that there are very few discipline cases for people who are actually licensed structural engineers. Rather, the discipline cases involve mostly those who have no licenses whatsoever.

In states that do not have a separate license for structural engineers, experience shows that a large quantity of their total disciplinary cases deal with structural issues. This is an indication that the structural licensing does provide better experience and better results than generic licensing.

#### **Why Fix What Isn't Broken?**

Case studies show that in fact structural engineering is broken in many states that do not have a separate structural license. There are many structural failures that occur in the US each year. You only need to read *Engineering News Record* to discover how many failures there are. Fortunately, most of them are small and don't cause loss of life.

Case studies show that lack of a structural license often leads to major disasters. For example, the Cocoa Beach, Florida collapse was attributed to engineers who did not know that they needed to check a slab for shear strength. Although they were properly licensed as PE's, the engineers came from the Aerospace Industry and did not understand how to design a civil structure. As a result, a building collapsed under construction and caused the loss of life of several construction workers.

In states with no Structural Engineering Act, it is more likely that errors will lead either to collapse or to extremely expensive repairs to buildings. In several states that did not have licensing for structural engineers, the discipline cases for engineers doing structural work

account for as much as 80% of those discipline cases each year. In states that do have structural licensing acts, there are very few cases against licensed structural engineers. Rather, the cases generally are against those who have no license.

### Splintering of Profession

Many people are concerned that separate licensure for structural engineers will result in what is referred to as splintering. In fact, the very first license for anything other than water resources or levees was the Illinois Structural Engineer in the year 1915. That license recognized the extreme life safety issues that are presented by structural engineers who must design buildings that sometimes house thousands of people.

Over the last ten to fifteen years, universities have changed curriculum so that they are less general than they used to be. Because of budgetary limitations, engineers are no longer taught what they were previously. Rather, they start specializing much earlier in their careers. The fact is that the universities are teaching specialists not generalists.

Engineering exams for professional licensure have become more specialized in the last ten years. Now, you may take an exam that gives the breadth of a profession in one half of a day then go into depth in some area of that profession in the other half of that day. Also, there are separate exams for electrical engineering, mechanical engineering, civil engineering and others.

The separate licensing of structural engineers would not cause splintering. In fact, separate exams and separate curriculum are already in effect. The only problem is that the public has no way of knowing whether they are hiring someone with the credentials that are necessary for their particular job. Having a separate license for structural engineers will assist the public and provide more protection by identifying people with appropriate credentials.

At the same time that schools have become more specialized in their instruction and have reduced the number of courses required to get an engineering degree, there has been an exponential explosion in knowledge in the various fields. Our expanded knowledge of earthquake effects, wind, and other extreme loadings has greatly increased what a structural engineer must know. Building codes have increased in size by hundreds, in some cases thousands, of pages.

Because of the increase in the amount of knowledge required to design structures, it is not possible for engineers to have complete general knowledge and also be able to safely protect the

public in a particular area such as structural engineering. Separate licensure is one of the tools available to provide this protection to the public.

In addition to increasing the size of building codes, the amount of software available has increased exponentially. This is another area where the structural engineer has to be competent to be able to safely do the job.

One indication of the need for separate licensure is the increase in insurance losses. Professional liability insurance has experienced more and more losses as time passes. Separate licensure to reduce the number of people who are not competent to practice structural engineering will, over a period of time, help to reduce insurance losses.

#### Where is the Groundswell of Support for this Movement?

The groundswell of support comes partly from qualified structural engineers and partly from the public. What hockey mom or soccer mom wants their child to be learning in a school that is not properly designed for earthquake and wind loads? Also, who wants to live or work in a high rise building that may be designed by someone who is not qualified to design structures? When the public is aware of the risks that may occur with unqualified people doing design, they choose to have properly qualified designers.

Building officials also are behind the efforts to have qualified people doing design. In their job to protect the public, building officials see the quality of work that is done on a daily basis. Virtually all cities with qualified building officials have many case histories where unqualified people have developed unsafe designs.

Changing laws that are designed to protect the public from incompetent or unscrupulous people is a slow process. However, it is gaining momentum. Each year more states are adding further recognition of structural engineering qualifications. This recognition ranges from simply a list of those who are qualified, to requirements that only licensed structural engineers do structural work. Support for the changes in laws is growing.

#### All Structural Engineering Involves Life Safety

If even a billboard that requires structural engineering should happen to fall down, there is a risk that someone would be injured or killed. In the case of tall buildings, collapse endangers the

lives of thousands of people, not just one or two as in the case of most other professions. No other civilian service has as great an effect on life safety as do structural engineers.

If only those people who meet the minimum requirements for designing structures are allowed to practice structural engineering, fewer accidents and mistakes will occur. Over a period of time, this will reduce the costs of structural engineering by reducing insurance costs, now a major portion of structural fees. As this occurs, the public will be better protected.

#### Rural Communities Cannot Afford Structural Engineers

Essential facilities exist everywhere. In rural areas, school children deserve safe school structures just as much as in urban areas. Also, assembly areas need to be as safe in non-urban areas as in cities.

Patients in hospitals and residents of nursing homes are not able to be evacuated easily. Also, inmates in jails cannot be quickly evacuated. All of these people deserve safe structures to protect them as they go about their daily routines.

Separate licensing of structural engineers is not an effort to limit competition. Rather, it is something that is needed to protect the public.

The members of the Professional Activities Committee of SEI want to thank the participants of this Summit for their contributions and support for a Structural Engineering licensure act. SEI-PAC and the Licensing Committee of NCSEA (National Council of Structural Engineers Associations) have long worked together for this common goal and will continue to offer assistance to states desiring to pursue the enactment of a Structural Engineering license. The chairpersons of these two committees may be contacted at their respective association, as follows:

SEI – PAC: <http://content.seinstitute.org/committees/business.html>

NCSEA Licensing Committee: <http://www.ncsea.com/directory.aspx?GroupID=11>