Structural Licensure

issues related to the regulation of structural engineering practice

Chicago skyline at sunrise. Courtesy of Daniel Schwen.

100 Years of Structural Engineering Licensure

Looking Back, Looking Forward

By Gregg E. Brandow, Ph.D., P.E., S.E.

*Gregg E. Brandow, Ph.D., P.E., S.E. (**brandow@usc.edu**), is Professor of Engineering Practice at the University of Southern California in Los Angeles. He is also a Principal at Brandow & Nastar, Inc. Structural Engineers.*

Growing up with a father who was a structural engineer, I learned at an early age about the impressive buildings in Los Angeles that he was responsible for engineering, but never put much thought into his professional title, "S.E." Following in his footsteps, I quickly learned the academic requirements, and soon after completed the examination and experience that it took to put "S.E." after my own name. The phrase, "protecting the public," and the challenges of designing structures to withstand "nature's fury," especially earthquakes in California, put the responsibility that goes with holding the title of "Structural Engineer" into perspective.

My structural engineering practice began as a kid when I would lay a wooden plank over the wash to serve as a bridge. Fortunately, the public did not use my bridges, because sometimes they would fail. Nobody said that I had to be licensed to engineer my bridge. The same problem occurred in Wyoming back in 1907, when water and irrigation required engineering, and anybody could provide such services. From this unruly situation came the first state law to regulate the practice of engineering. Today, every state has statutes that "protect the public" by regulating the practice of engineering in the built environment and the use of the title of "Professional Engineer" (P.E.).

As I look back and look forward, I realize that I am part of a profession that is well established in some states, in desperate need of recognition in other states, and embraces licensure that varies significantly from state to state.

Looking Back

The history of structural engineering dates back to at least the time of the Egyptian pyramids, where structural form and stable construction were planned and achieved. For the next 4,000 years, engineers built large and impressive structures without beam theory, Euler's equation or the computer software that we have today. The 20th-century structural engineer became equipped with new tools, such as moment distribution, and began to refine more elegant and taller buildings and longer bridges.

Illinois Structural Engineers' Act of 1915

The first efforts to regulate the practice of structural engineers started in 1908 when the Western Society of Engineers began negotiations with the Illinois branch of the American Institute of Architects and the Illinois Society of Architects to support and establish a state building code and provide a licensing law for structural engineers. The architects had been successful in creating the 1897 Architectural Act in Illinois, which gave them the exclusive right to design and supervise building construction. However, in 1913, efforts to establish a state building code failed to gain enough support. Architects' support for engineering laws waned, and it took another two years of bitter debate before passage of the new Structural Engineers' Act in 1915.

The motivation to regulate the practice of structural engineering in Illinois was the rapid growth of downtown Chicago, which resulted in the construction of "skyscrapers" like the world had never seen before. These taller, more complex and higher-occupancy buildings drew the attention of the state legislature, which saw a need to regulate the profession responsible for designing them. As the late Gene Corley related to me, the legislature was compelled to keep "the fools and rascals from building unsafe structures." As we begin 2015, we celebrate 100 years of structural engineering licensure that began with the first Structural Engineers Act in Illinois. The skyline of Chicago is a testament to the accomplishment of structural engineers over that century.

California Title Authority of 1931

In California, the cities of San Francisco and Los Angeles were growing and developing their own skylines, and the structural engineering profession was faced with the additional challenges of building on ground that was susceptible to violent shaking. The great 1906 San Francisco Earthquake and the 1925 Santa Barbara Earthquake were very destructive. Civil engineers managed to get a Civil Engineering Registration Law passed in the California legislature in 1929, but structural engineers were unsuccessful in achieving a separate practice act.

They tried to gain the support of architects, but in 1931 amended the Civil Engineering Registration Law to include regulation of the title of "Structural Engineer" or "S.E." without restricting any class of buildings to the exclusive purview of those authorized to use it.

The 1933 Long Beach Earthquake caused widespread damage to, and the collapse of, many masonry school buildings throughout Southern California. If this earthquake had occurred during school hours, it could have resulted in an unimaginable loss of life. The legislature passed the Riley Act, which required seismic design, and the Field Act, which required that school buildings be engineered by licensed Structural Engineers. Years later, hospitals were added. Even without the legislative requirement, the vast majority of California's significant structures are designed today by a licensed Structural Engineer.

Progress in enacting legislation recognizing and regulating structural engineers in other states has been slow. Only a handful have structural engineering practice restrictions within the P.E. practice acts, while a few have separate structural engineering practice acts, and a few more have structural engineering title restrictions.

NCEES Model Law Structural Engineer

In 2001, the National Council for Examiners for Engineering and Surveying (NCEES, **www.ncees.org**), which is the organization of state licensing boards for engineers and land surveyors, established the Structural Engineering Examination/Recognition Task Force (SEERTF) to address issues regarding structural engineering licensure. The NCEES President, Ted Fairfield from California, saw this national effort as a way to enhance public recognition of structural engineering and to standardize the requirements for professional practice.

The national structural engineering organizations – SEI, NCSEA, and CASE – and NCEES have all recognized that structural engineering lacks national recognition, uniformity of requirements, and a means to facilitate comity and mobility. In addition, the NCEES national two-day competency exam for structural engineers was not used uniformly – for example, some states used only the first day – and the states of California, Oregon and Washington used different additional examinations.

I served as chair for the SEERTF, and we recognized that no uniformity existed in the states that recognized structural engineers. In response, the SEERTF created the Model Law Structural Engineer (MLSE), a standard for experience, education and examination requirements. To facilitate comity and mobility, NCEES established a Records Program for MLSEs. Structural engineers can now establish MLSE records with NCEES, and this information can be used to apply for comity in states that recognize structural engineers.

NCEES 16-Hour Structural Engineering Exam

The SEERTF recognized the need for a single national exam with the adoption of the International Building Code (IBC) in all states. The SEERTF convinced NCEES to develop a new exam based on the new IBC, which replaced the three previous national building codes that had been adopted in various states. A subsequent NCEES task force developed a test plan and exam format, and created and implemented a new NCEES 16-hour exam that all states agreed would be the standard for minimum competency for structural engineering licensure. All states that recognize structural engineers adopted this new exam, and most of the other states allow engineers to take this exam.

SELC Unites Structural Engineers

The Structural Engineering Licensure Coalition (SELC, **www.selicensure.org**) was created in 2012 to be a single voice for structural engineers to advocate the advancement of structural engineering licensure. According to its position statement, its goal is protection of the public through the implementation of minimum standards for the practice of structural engineering in every jurisdiction by enacting the national minimum standards (MLSE) and using the minimal competency 16-hour NCEES SE exam with a consistent licensure format in each state.

The SELC is a coalition of SEI, NCSEA, the Structural Engineering Certification Board (SECB) and CASE. The SELC recognizes that the missing piece of the puzzle is to establish a structural engineering licensure format – practice restriction, title restriction or partial practice restriction – that can be adopted by NCEES as a standard and a guide for states to use.

Looking Forward

If the structural engineering profession wants to be recognized nationally and have consistent licensure requirements across the states, we need to build support both inside our profession and among those who have historically been opposed to our efforts. The next 100 years of structural engineering licensure will depend upon our efforts. Recent successes occurred in two states, Utah and Washington, where legislation was passed for partial structural engineering practice acts with the restriction that "significant structures" can only be designed by licensed Structural Engineers. In both of these states, provisions for transitioning Professional Engineers currently practicing structural design into the new S.E. license without having to take another exam was an important aspect of gaining wide support. Other states are currently undertaking similar efforts.

With 100 years of history and a lot of passion, the structural engineering profession needs to recognize that we are part of a larger community of Professional Engineers in many disciplines, all as dedicated as we are to the protection of the public. We must keep this in mind as we work with NCEES to develop a consistent structural engineering licensure format, especially when interacting with organizations like the National Society for Professional Engineers (NSPE), which for many years was opposed to our efforts because of their concern about fracturing the wider engineering profession. We need to convince them and others that we all have the same goals of protecting the public, and that establishing a uniform S.E. licensure program across the country will enhance the public's recognition of all engineers, whether they call themselves Structural Engineers or Professional Engineers.

I can now design a bridge across a wash or a high-rise building, and the public, seeing a "S.E." after my name, will be confident that I meet the minimum qualifications to be a Structural Engineer. Let us continue as a profession to promote structural engineering licensure for our second 100 years.▪