



An engineer's primary obligation is to hold paramount the safety, health, and welfare of the public. This is precisely what motivates advocates of separate licensure for structural engineers (SEs) – the conviction that such a step is *necessary* for the sake of the people who rely on structures to remain standing every day.

All fields of engineering have become increasingly complex and specialized over time – none more so than structural engineering. In fact, several states have had some form of structural licensure for many decades; Illinois introduced it in 1915, even before implementing professional engineering licensure. The trend in recent years has been the adoption of partial practice restrictions, with thresholds based on size and/or occupancy type beyond which design by a licensed SE is required. Rather than the typical 8-hour test, 16-hour structural examinations have been administered in all jurisdictions with separate SE licensure for at least 25 years. They have consistently included essay problems for evaluating a candidate's methodology, assumptions, and exercise of judgment, instead of just checking answers.

The National Council of Examiners for Engineering and Surveying (NCEES) has now adopted this higher standard nationwide. Its Model Rules include detailed education, experience, and examination requirements for a Model Law Structural Engineer. Beginning with the April 2011 administration, the separate 8-hour Structural I and Structural II exams – which were always intended to be taken as two parts of one test – have been replaced by a single 16-hour Structural exam with multiple-choice questions during the mornings and essay problems during the afternoons. Its specification (www.NCEES.org/Exams/SE_exam.php) reflects a comprehensive survey of SEs around the country and covers the full range of knowledge and skills required for competent practice.

As I have argued previously (“Incompetent and Unaware of It,” March 2011; “The Case for Discipline-Specific Licensure,” July 2011), licensed engineers should only work within the technical areas in which they have *demonstrated* minimal competence by means of an exam. Based on the test specification, someone who passes the new Structural exam has shown the ability to undertake just about any aspect of structural engineering. NCEES currently offers three other exams that include at least some structural content:

- 20% of the 4-hour breadth module of the Civil exam covers determinate analysis and design of concrete and steel beams, slabs, footings, and earth retaining structures subject to dead, live, and construction loads.
- The 4-hour Structural depth module of the Civil exam adds wind, earthquake (equivalent static), moving, snow, and impact loads; indeterminate analysis; prestressed concrete, timber, masonry, and composite construction; columns, trusses, braces, frames, connections, shear walls, diaphragms, and bearing walls; codes and standards; and various other topics.
- 25% of the 8-hour Architectural Engineering exam covers similar subjects as they pertain specifically to buildings.

At best, someone who passes one of these exams has only shown the ability to undertake those aspects of structural engineering that are included in the corresponding test specification. Obviously, someone who passes any of the 17 other NCEES exams has not shown the ability to practice structural engineering at all.

It is important to note that opponents of structural licensure do not claim that it will somehow have an adverse affect on the safety, health, and welfare of the public. Instead, they usually cite one or both of the following reasons for maintaining the status quo:

- Personal discretion – each individual engineer should have complete latitude to determine which assignments to accept and which to decline.
- Professional unity – special recognition of one discipline would further fragment engineering, which already lacks a unified voice in the social and political realms.

Neither of these considerations is integral to the most fundamental duty of all engineers. Modest constraints on those who are genuinely competent and ethical are a reasonable trade-off for protecting the unwary from those who are incompetent and/or unethical.

That is why those who are working toward structural licensure in all United States jurisdictions often come across as uncompromising. For example, the National Society of Professional Engineers (NSPE) has proposed roster designation as a potential middle ground. Several states now publish online lists of licensed engineers that indicate the particular discipline(s) in which each individual is qualified. However, there are still no practice or title restrictions, so it is clear that such a measure does not meaningfully raise the bar.

Physicians are sometimes suggested as a model that engineers should emulate; they are licensed generically in every state, while specialties are recognized by private certification boards, rather than government agencies. Despite the lack of legal constraints, no one would intentionally go to a family practitioner for a brain operation, rather than a neurosurgeon.

The analogy breaks down because doctors take a uniform test to become licensed, while every engineering licensure exam is discipline-specific. In addition, unfortunately it is all too common for clients to retain licensed professional engineers to provide specific services for which they are not adequately qualified, perhaps without realizing it. Unlike generic medical licensure, generic engineering licensure seems to create the false impression that anyone legally authorized to practice is inherently competent in any and every specialty.

One thing that physicians and SEs have in common is that they both save lives. However, doctors generally deal with problems that already exist, while SEs are expected to prevent problems from happening in the first place. Furthermore, physicians can inform their patients about the risks associated with the treatments that they prescribe, but everyone takes it for granted that structures will not fail under most circumstances. Finally, a single mistake by a doctor can cause one person's injury or death, while a single mistake by an SE can lead to an even greater tragedy.

This unique responsibility that SEs have for the safety, health, and welfare of the public – over and above that borne by all disciplines of engineering – is the single most significant component in the case for structural licensure. ■

Jon A. Schmidt, P.E., SECB (chair@STRUCTUREmag.org), is an associate structural engineer at Burns & McDonnell in Kansas City, Missouri, and chairs the STRUCTURE magazine Editorial Board.