Structural Licensing:

The Current State of US Practice

By Susan M. Frey, P.E., S.E., LEED® AP

Most engineers and clients realize that each and every state and protectorate of the United States has a specific licensing requirement for each category of engineer: mechanical, electrical, civil, and so forth. While mechanical and electrical engineers perform similar services regardless of the type of project, civil engineering houses many diverse types of practice. These civil engineering specialists include professionals who design intersections, parking lots, and roadways (general civil engineers); those who provide the design criteria for earth structures, such as dams and dykes, and foundations for vertical structures (geotechnical engineers); those who clean up the environment (environmental and hydraulic engineers); those who furnish traffic controls and design roadway intersections (traffic engineers); and of course, those who design buildings, tanks, and bridges (structural engineers).

To be able to practice in any given jurisdiction, an engineer typically must have taken and passed an exam, which may be a national exam, a state exam, or a combination of both. Each jurisdiction dictates the qualifications for an engineer practicing within his/her area of responsibility. When engineers desire to practice in any additional jurisdiction, they may apply for reciprocity (or comity) to have the other state or territory accept their current qualifications, or they may have to undergo additional testing. Of all these disciplines, the one that is most directly related to the life safety of the general public is structural engineering.

In many states, an engineer who has a civil engineering license may design any structure, even though the licensing exam may not have included any questions on detailed code requirements for buildings' or bridges' wind or seismic design. The civil engineering PE exam is very generic in nature. Many states have recognized the distinction between general civil and structural engineering and have enacted either structural engineering title restrictions or practice restrictions, to ensure that the designs of public and private facilities are performed by those who understand life-safety codes to a higher level of competency. The structural engineer must be knowledgeable in multiple materials and their corresponding standards (concrete, wood, aluminum, steel, masonry), as well as the forces that these materials must be able to withstand (gravity, wind, vibration, seismic, hydraulic, snow, earth pressure, ice, flood).

Structural Engineering Exams Past, Present, and Future

The content and type of structural engineering (SE) exams have varied over the years. The first state legislated structural engineering licensure as a separate area of practice was Illinois in 1919. Many of the original western state exams began with the 16 hour Western States Structural Engineering Exam. Originating in California many decades ago, followed immediately by Oregon and Washington, nearly a dozen western states authored and graded a 16-hour SE exam. This test was given for many years and is still accepted as a basis of reciprocity in almost all states.

More recently and valid through 2010, the National Council of Examiners in Engineering and Surveying (NCEES), the national licensing exam organization for all engineering disciplines, had offered two companion SE exams, SE I and SE II, each 8 hours in length. Some states had adopted the SE I exam, which is the more basic exam and is similar to the national civil engineering exam, to be an equivalent 8-hour civil engineering test. Oregon, Washington, and California (either in the past or moving forward for reciprocity in 2011) use the SE II paired with an additional state 8-hour SE III exam which will be given for the final time in the fall of 2011. The SE III has two annual versions through October of 2011. The first is written by Washington and graded by Oregon and Washington and is used in those two states, as well as in British Columbia. Similarly, California continues to write an annual SE III exam which is utilized only in California. The three states accept either version of the SE III for reciprocity of licensure.

Refer to the April 2010 STRUCTURE® magazine article *"The New Structural Exam, NCEES Raises the Bar"* by Peter Vaccaro, P.E. for information on the 2011, new 16 hour SE exam to replace the current SE I and II (and in 2012, the SE III) test formats. Although this exam will improve consistency among those jurisdictions that currently have SE licensure, it still is not a universal requirement for licensure for all those engineers who are designing bridges and buildings, as many do so under a civil PE license.

Alaska requires civil engineers designing structures to pass an additional 4-hour exam on cold regions design requirements, in addition to passing the 8-hour Civil PE exam. A few states also require a civil PE license prior to an SE license. Others require an ethics exam, or a local legal knowledge test, in addition to any type of professional engineering testing, including structural exams.

Part two of this discussion will delve into the various jurisdiction-based title and practice restrictions for structural engineers, how they vary between states and territories, and how the differences impact comity and reciprocity.

Susan M. Frey is a principal structural engineer serving as a designer, design manager, structural technical quality assurance reviewer, and multi-discipline team quality assurance manager on various types of projects during her 33 years with CH2M HILL. She is active in various code and standard committees including masonry and prestressed concrete tanks. She teaches a masonry and building forces class annually at Oregon State University.

On January 19, 2011, Susan Frey presented an NCSEA webinar titled Structural Engineering Forum: Exam, Exam Review, Licensing & Reciprocity. If you missed it and would be interested in obtaining a DVD of the recorded webinar, it can be purchased for $35, including shipping and handling, by calling the NCSEA office at 312-649-4600 ext. 200.

NCSEA Webinars

March 1 — Building Information Modeling in Structural Engineering Practice Today

This seminar will focus on practical issues of using Building Information Modeling (BIM) in a structural engineering office. Using real project examples, Mr. Odeh will discuss key issues including: how BIM changes the traditional structural design workflow; how teams can be organized effectively to manage the BIM; data exchange between BIM and analysis programs; appropriate levels of detail to be included in a model; and quality control/quality assurance.

David Odeh

David Odeh is a Principal at Odeh Engineers, Inc., a leading structural design and consulting firm in the New England region. He has over 15 years of experience in professional practice, including the design of high rise structures, academic and institutional buildings, forensic engineering and structural investigation, and the adaptive reuse and preservation of historic buildings. Since 2001, David has been on the adjunct faculty of the School of Engineering at Brown University in Providence. He also teaches at the Rhode Island School of Design and serves on the Board of Overseers of the Boston Architectural College.

David is an active member of ASCE's Structural Engineering Institute, and currently serves as co-chairman of the national committee on Building Information Modeling, and as a member of the Business and Professional Activities Division Executive Committee. He also serves on the Existing Building Code Subcommittee of the National Council of Structural Engineers Associations.

March 10 — Post-Tensioned Slabs on Ground Design

Post-tensioned slabs on ground are primarily used to resist the effects of expansive and compressible soils on residential foundations. These foundations have typically been used to support up to 4 levels of wood frame construction, but are also being used in industrial (tilt up and steel frame) and commercial structures. Since these foundations are considered slabs on grade, the requirements of the ACI 318 code do not apply to their design. A design methodology has been created and modified over the years by the Post-Tensioning Institute (PTI) and will be discussed. In addition the seminar will cover typical construction practices, design and use of rebar in post-tensioned slabs and drawing preparation.

Bryan Allred

Bryan Allred is a licensed Structural Engineer and Vice President of Seneca Structural Engineering Inc. in Laguna Hills California. He specializes in the design of reinforced concrete buildings using post-tensioned floor systems, post-tensioned slab on ground foundations for residential and commercial projects and using external post-tensioning to retrofit existing wood, steel and concrete structures. He has created and presented numerous instructional seminars for the Post-Tensioning Institute (PTI) across the United States and has published several articles relating to construction and engineering aspects of post-tensioned concrete. Bryan is a member of the Building Design, Slab on Ground and Education Committees of PTI.

Diamond Reviewed

The cost is $250 per internet connection. Several people may attend for one connection fee. This course will award 1.5 hours of continuing education, with a $5 fee for each continuing education certificate requested. The times will be 10:00 am Pacific, 11:00 am Mountain, 12:00 pm Central, and 1:00 pm Eastern. **Register at www.ncsea.com. Approved in all 50 states.**

Call for Entries

NCSEA 2011 Excellence in Structural Engineering Awards Program

NCSEA announces the 14th annual Excellence in Structural Engineering Awards Program. Up to three Excellence in Structural Engineering Awards will be presented in each of the following eight categories: New Buildings under $10M, New Buildings $10M to $30, New Buildings $30M to $100M, New Buildings over $100M, International Structures over $100M, New Bridge and Transportation Structures, Forensic/Renovation/Retrofit/Rehabilitation Structures, and Other Structural Design Projects. In each category, one of the three projects will be chosen as an Outstanding Project.

Entries are due July 22, and awards will be presented at the NCSEA Annual Conference Awards Banquet at the Renaissance Hotel in Oklahoma City on October 22, at the conclusion of the NCSEA Annual Conference. Winning projects will be featured in future issues of STRUCTURE magazine. For awards program rules and eligibility, as well as entry forms, see the Call for Entries on the NCSEA website:

www.ncsea.com