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Licensure Issues of Strategic Importance to the Civil Engineering Profession - and ASCE

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Licensure Issues of Strategic Importance to the Civil Engineering Profession – and ASCE

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Introduction

Civil Engineering is a profession that is charged to protect and enhance the health, safety and welfare of the public. As such, engineering licensure is critically important to civil engineers. Unlike some other engineering disciplines, most practicing civil engineers are required to maintain a license as a professional engineer due to the unique aspect of their practice in the built environment and in dealing directly with the public. This paper describes pre-licensure engineering experience guidelines recently adopted by ASCE, and four changes that are currently in process or being considered in engineering licensure in the US that will impact the licensure of civil engineers in the future: discipline-specific licensure; separate licensure requirements for structural engineers; master's or equivalent as a requirement for licensure in the future and consideration of alternate pathways to licensure; and licensure comity among jurisdictions with respect to continuing professional development requirements. Since the Civil Engineering Program Criteria of the EAC/ABET's *Criteria for Accrediting Engineering Programs* [(1)] requires that the "curriculum must prepare graduates . . . to explain the importance of professional licensure," it is important that civil engineering students and their faculty keep abreast of current licensure issues. Each of these issues is discussed in this paper.

Engineering Experience Guidelines for Engineer Interns

The qualifications for engineering licensure are often described as the "three legged stool" of education, examinations and experience. Combined qualifications in each of these three separate areas provide assurance to the public that engineers who are in responsible charge of engineering activities have demonstrated a minimum of level of competency to protect and enhance the public health, safety and welfare. Of these three qualifications, experience is often characterized as the weakest leg of the stool, primarily because of the necessarily broad definition of what type of experience is required.

Currently, the experience requirements in most licensing jurisdictions necessitate that the applicant demonstrate that they have the requisite number of years of engineering experience, typically under the supervision of a licensed professional engineer (commonly 4 years for a baccalaureate degree, 3 years for master's degree, and 2 years for a doctoral degree in engineering). The experience must also be both "engineering" in nature, as opposed to at a technologist or technician level, and "progressive," meaning that the applicant shows increasing responsibility over time. In other words, all that is required to demonstrate the required experience is typically a certain number of years of progressive engineering experience. From a licensing board perspective, the experience requirements need to be very broad because engineers from all backgrounds, i.e., design, construction, industry, management, regulatory, product development, technical sales, i.e. from all "walks of life" should be able to become

licensed. Therefore, the nature of engineering experience required is universal only in a very broad sense.

In the past year, the American Society of Civil Engineers (ASCE) has acted to further define the early career engineering experience that is ideal for a civil engineer to become ready to practice at the professional level [(2)]. This new policy was formulated on the basis of the experiential components outlined in the 2nd Edition of the Civil Engineering Body of Knowledge [(3)], which outlines the knowledge, skills and attitudes necessary to enter the professional practice of civil engineering. Civil engineers need experience both in the engineering and technology aspects of their chosen sub-discipline(s) as well as in common professional practice areas. Many of the capabilities in these areas are attained primarily through engineering experience. The ASCE policy statement is presented below. The full policy, with a description of the issue and rationale, may be viewed at: http://www.asce.org/issues-and-advocacy/public-policy/policy-statement-547-engineering-experience-for-professional-licensure/

ASCE Policy Statement 547
ENGINEERING EXPERIENCE FOR PROFESSIONAL LICENSURE

Adopted by the Board of Direction on October 10, 2015

Policy

The American Society of Civil Engineering (ASCE) believes that prior to licensure as a Professional Engineer, an engineering graduate should have progressive experience in technical breadth and depth in their chosen sub-discipline(s) of civil engineering, and in the following professional practice components pertinent to their practice area:

- Assessment of risk and impacts of engineering activities
- Communication skills
- Professional ethics
- Project management processes
- Business and governmental processes

Employers, mentors, and supervisors of Engineer Interns have a professional obligation to assist Engineer Interns under their supervision in acquiring experience and capability in these professional practice areas, in addition to appropriate technical capabilities.

ASCE believes that, as a prerequisite for licensure and consistent with the National Council of Examiners for Engineers and Surveyors (NCEES) Model Law, four years of such progressive experience should be required for those possessing a baccalaureate degree from an EAC/ABET program, three years for those having a master's in engineering from an institution offering EAC/ABET programs, and two years for those with an earned doctorate in engineering from an institution offering EAC/ABET programs.

In 2016, the ASCE Committee on Licensure has drafted a short brochure to provide guidance, consistent with the experience policy, to Engineer Interns and their mentors and supervisors on

what these important capabilities are and how they may be obtained during their experience as an Engineer Intern. While not finalized as of the date of this paper, this experience brochure is scheduled to be made available in hardcopy and electronic formats at the Civil Engineering Department Heads meeting in June, 2016, with a request that the guidelines be provided to all graduating seniors along with encouragement that they provide these guidelines to their mentors and/or supervisors as they begin their careers.

The reader is cautioned that these experience guidelines are intended to provide guidance to Engineer Interns and their supervisors and mentors and are NOT currently required to obtain a license as a professional engineer.

Discipline Specific Licensure

Licensing engineers in a specific engineering discipline (e.g., civil, mechanical, electrical, etc.) is an increasing trend. Eleven jurisdictions have either title acts or practice acts that limit the engineer's title or practice to the specific discipline in which he or she is licensed. Numerous other jurisdictions, which do not have title or practice acts, have been considering transitioning to such provisions by requiring that a board approved discipline be indicated on the PE stamp, or on the state's on-line roster [(4)]. This is a somewhat controversial topic in engineering licensure as many PE boards have long advocated licensing engineers only as professional engineers (so-called "generic" licensure), with the understanding and expectation that engineers will practice only within their area of competence. ASCE currently has no policy on either discouraging or encouraging discipline-specific licensure.

Many professional engineers in the past have ardently opposed discipline-specific licensure initiatives with the argument that engineering practice does not adhere well to boundaries between disciplines (for example, structural, geotechnical and civil engineers are involved in geotechnical evaluations at different levels; and many water and wastewater engineers design machinery more in the realm of mechanical engineering), and that the individual engineer is the best judge of his or her areas of competence.

State licensing boards have a different role than practitioners, predominantly assuring that all professional engineers practice in a manner that protects the public health, safety and welfare. In instances where there is incompetence or misconduct (not common in civil engineering, but it occurs), the investigation and enforcement of rules is different in generic versus discipline-specific states [(4)]. Let's say that a civil engineer stamps a plan with electrical engineering components, without the stamp of an electrical engineer (also not common, but it happens). In a generic licensure state, the investigator might ask the PE, "you are educated as a civil engineer, you took the licensing exam in a civil sub-discipline, how are you qualified to design components that require electrical engineering expertise?" In a discipline-specific state, the investigator might contend, "you are educated as a civil engineer, you took the licensing exam in a civil sub-discipline, you aren't licensed as an electrical engineer, and you are practicing electrical engineering unlawfully." In the generic licensure state, what follows in a disciplinary hearing might be a discussion of what physics course the engineer took in school, and how the engineer has addressed wiring on lots of projects. In a discipline-specific state, at a disciplinary

hearing and upon appeal, this is pretty much an open and shut case. The question becomes whether or not what is on the drawing constituted electrical engineering. It is for this enforcement reason that more and more jurisdictions are thinking about discipline-specific licensure, in a variety of ways. Engineering education has changed over the years. Many curricula do not include courses from other disciplines. For instance, civil engineering students often do not take electrical circuits or thermodynamics at the same level of detail than was required in years past. The FE exam no longer examines candidates in areas outside of their specific discipline, for the most part. State Board members may ponder if they are protecting the public health, safety and welfare by allowing licensees to practice in areas where they might not have received formal education and in which they were not examined.

Over the years, Massachusetts, Vermont, Rhode Island, Nevada, Utah and Washington State have enacted discipline-specific licensure through practice acts, limiting the practice of engineering to certain disciplines within which the engineer is licensed either through a separate license or, in some recent cases, through a discipline designation within a PE license. In addition, a growing number of states including Delaware, Florida, Maine, Minnesota, New Hampshire, Texas and Wyoming have chosen to maintain on-line rosters indicating the board approved discipline of each licensee. Some of these states may in the future consider practice limitations based on roster discipline designations. In 1965, there were four jurisdictions that had discipline-specific licensure provisions in one form or the other. In 2016, there are 23 jurisdictions that have practice acts, title acts, or roster discipline designations. This practice among licensing jurisdictions is growing.

The ASCE Committee on Licensure is in the process of reviewing what impact this increasing trend is having on civil engineers practicing in those jurisdictions. This is especially relevant given the major debate going on in the profession over separate licensing requirements for structural engineers.

Some within ASCE believe that the Raise the Bar Initiative, requiring a master's or equivalent (MOE) for licensure and professional practice, should be pursued by ASCE for civil engineers only. They believe that it is not ASCE's role to dictate these requirements to the other engineering disciplines who may not believe that MOE is a necessity. Adopting qualification requirements only applicable to civil engineers would require either roster designations or discipline-specific practice acts. ASCE needs to evaluate what is in the interest of practicing civil engineers with respect to discipline-specific licensure or designations while ensuring protection of public health, safety and welfare.

Licensure of Structural Engineers

Structural engineers have been lobbying state PE boards and legislatures in recent years to license structural engineers separate from PEs in order to further assure that engineers who design critical structures have passed the 16 hour NCEES structural engineering examination, and thus have demonstrated advanced knowledge in structural design [(5)]. This is also somewhat controversial among state licensing boards, most of which have a long-standing tradition of licensing engineers only as professional engineers.

Two states currently require an engineer to possess a separate license as a structural engineer in order to design any structure – Illinois (starting in 1915) and Hawaii. California, Oregon, Washington, Nevada and Utah require a separate structural license to design certain structures above a threshold that varies in each of those jurisdictions. Vermont and Massachusetts require a board approved designation as a structural engineer, with "structural engineer" indicated on the individual's PE stamp, to design certain structures. In recent years, structural engineers representing ASCE's Structural Engineering Institute (SEI), the National Council of Structural Engineering Associations (NCSEA), and the Council of American Structural Engineers (CASE), the structural arm of the American Council of Engineering Companies, have worked both separately and together to establish separate licensure acts for structural engineers in other states. Recent legislative initiatives in Florida, Texas and Georgia have not been successful, while the discussion continues in those and many other states.

ASCE's policy on this matter is broad [(6)]. ASCE Policy 524 encourages engineers to pursue post-PE advanced qualifications such as specialty certification, licenses or license designations, but advocates that all such advanced qualifications be subsequent to first having acquired a license as a professional engineer. ASCE's Structural Engineering Institute (SEI) supplemented ASCE Policy 524 by adding more specificity. SEI Policy 101 "encourages jurisdictions to license Structural Engineers as a post-PE (Professional Engineer) credential . . ."Not all structural engineering organizations advocate the "PE-first" policy.

Many structural engineers present a compelling argument that public safety would be better protected if structural engineers designing structures above a significant threshold demonstrate their advanced qualifications and knowledge of designing structures to withstand both horizontal and vertical forces, by passing the 16 hour NCEES structural examination. Important questions to be answered are how can that be accomplished in generic licensure states (by a separate post-PE structural license, or by a structural roster designation with a practice limitation), and what is the appropriate threshold. The designation of the threshold is of significant interest to civil engineers. The threshold needs to be low enough to adequately protect public safety, but high enough to allow the design of other structures, perhaps 80% of all structures, by civil engineers who do not have the separate structural designation or license. Consensus on the threshold, either among civil engineers or licensing boards, has not yet developed.

At the 2015 NCEES Annual Meeting, there was a motion to establish Model Law and Rules provisions for states adopting such separate structural engineering licensure requirements, and to begin the complicated discussions on establishing a recommended national threshold. The motion failed by the narrowest of margins, and will likely be considered again in future years.

The authors believe that this licensure issue will continue to evolve, state by state, in the coming years and decades. ASCE's positions on this issue allow for a variety of outcomes.

Requiring Master's or Equivalent as a Prerequisite for Licensure in the Future (Raising the Bar)

NCEES has had an aspirational future requirement in the Model Law since its initial adoption in 2006 advocating that future qualifications for licensure will require an engineering master's

degree or equivalent. ASCE, working cooperatively with the National Society of Professional Engineers (NSPE), has been advocating for such a requirement for more than fifteen years. It is an understatement to assert that this has been controversial within the engineering profession. Some other disciplines, led by mechanical and chemical engineering, have contended that graduate education should not be, in their disciplines, a prerequisite for professional practice.

In 2014, NCEES voted to remove the master's or equivalent provisions from the Model Law, based on concerns that these future requirements were confusing to applicants as to current standards. The timing language in the Model Law raised many concerns as to the current applicability of what was in the Model Law. The 2014 vote advocated that these provisions be instead incorporated as an NCEES position statement. At the 2015 Annual Meeting, NCEES voted by a significant majority to adopt the same master's or equivalent language as Position Statement 35 [7]. Even though the future requirement for a master's degree or equivalent has moved from Model Law to a position statement, from ASCE's perspective, NCEES' position has remained precisely the same; master's or equivalent as a prerequisite for licensure is the aspirational future goal.

NCEES has also been working through its committees since 2008 on an alternate pathway to licensure to accompany the future master's or equivalent requirements. This consideration has been dormant for the past two years as the Model Law/Position Statement matter was being deliberated and decided, but is now being considered again by NCEES committee deliberations. Such an alternate pathway would entail a baccalaureate in engineering from a program accredited by the Engineering Accreditation Commission (EAC) of ABET, coupled with pre-licensure continuing professional development activities focused on both technical and professional topics related to the individual's area(s) of practice. Such activities likely would be required to include both rigor and some manner of learning assessment, but would be different than, and not necessarily "equivalent" to, graduate engineering education. NSPE is currently considering a policy change to support the development of such an alternate pathway. To date, ASCE is monitoring these activities to assess the effectiveness of such an alternate pathway on the adequacy of qualifications of civil engineers in the future.

ASCE continues to work with civil engineers in various licensing jurisdictions to advocate the adoption of master's or equivalent requirements for civil engineers to obtain a license as a professional engineer.

Continuing Professional Development Comity

More than forty licensure jurisdictions have adopted requirements for continuing professional development (CPD) for renewal of a PE license. This has created challenges for civil engineers who are licensed in multiple jurisdictions because the basic requirements, timing and application formats vary among jurisdictions.

Iowa was the first licensing jurisdiction to adopt CPD requirements for renewal of a license, in 1979. In the 37 years since, more than 40 jurisdictions have adopted CPD requirements. Despite the availability of well-conceived NCEES Model Law and Rules provisions which are intended to provide consistency among jurisdictions, a variety of inconsistent requirements have resulted,

as jurisdictions have deliberated and adopted their own unique requirements. Certain types of CPD activities and providers are acceptable in most jurisdictions, but not acceptable in all jurisdictions. Some jurisdictions require that at least a minimum number of hours need to be in certain topic areas. Each jurisdiction has its own renewal period, with the requisite number of CPD hours needed to be documented for that unique period of time, commonly different than in neighboring states. Each jurisdiction typically has its own format into which the CPD data must be inputted, requiring the applicant to provide the same information in a different format to each state. For civil engineers who are licensed in dozens of states, the current reporting system is dysfunctional for all of the above reasons.

NCEES is actively working on an effective resolution of these issues. Plans are being formulated to allow engineers who have a "Council Record" with NCEES to input and store CPD information on their Council Record. Providers would be approved by NCEES such that PE boards using the CPD data base for each individual would be able to rely on the acceptability of the CPD activity. The information would then be electronically available to the board staff in each individual jurisdiction. Once the NCEES Council Record software is modified, the next hurdle will be for board administrators in each jurisdiction to use this for PE renewal purposes. This can be made to work such that the problem disappears, if all states participate.

Since the Council Record Program of NCEES is closely related to the comity issue, the authors recommend that all students be introduced to this program prior to graduation. The Council Record Program provides a very significant benefit to engineers who practice in multiple jurisdictions in that, if the individual is deemed a "Model Law Engineer", expedited comity is provided in most, not all, jurisdictions. Council Records are available electronically to member boards, and a duly licensed and qualified engineer can receive a license to practice in a new jurisdiction in a short period of time – from a couple of days to two weeks. For engineers in the future who anticipate practicing in multiple jurisdictions, and that will likely become more and more prevalent, obtaining and maintaining a Council Record is very highly recommended.

Conclusions for Civil Engineering Programs

Licensure is critically important to all who practice as civil engineers. The issues presented above are strategically important to civil engineers and ASCE. Those who educate civil engineers are strongly encouraged to introduce engineering licensure concepts in a summary fashion early in the civil engineering curriculum and, in more detail, later in the curriculum prior to graduation. Civil engineering students should be apprised of the licensure process, including the benefits of the NCEES Council Record program. The authors believe that as a part of a capstone course, or otherwise in the senior level curriculum, all graduating civil engineering students should be informed about ASCE's pre-licensure engineering experience guidelines. Students should be encouraged to understand and use these guidelines and share them with their mentors and supervisors.

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