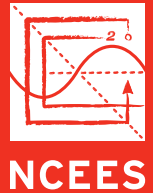


Licensure EXCHANGE

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PATTY MAMOLA, P.E.

NEVADA BOARD OF PROFESSIONAL
ENGINEERS AND SURVEYORS
EXECUTIVE DIRECTOR AND
NCEES PAST PRESIDENT



MOVING THE MOBILITY CONVERSATION FROM "WHY WE CAN'T" TO "HOW CAN WE"

THE ABILITY TO WORK ACROSS STATE BORDERS—mobility—is the reason that U.S. licensing boards created NCEES in 1920. We still don't have complete mobility for engineers and surveyors, nearly 100 years later. Some states recognize the NCEES Model Law Engineer or Surveyor as the gold standard for licensing and, therefore, expedite licensure for MLEs and MLSs—but many do not.

At various NCEES meetings over the past 10 years, I have heard from member board administrators and members, "We can't do that," or "Our law won't allow us to do that." For nine of those years, I was a Nevada board member. This past year, I became the board's executive director. In this new role, I've had many more opportunities to read, in detail, Nevada laws and rules and gain an intimate knowledge of Nevada's administrative processes.

Nevada has two separate laws—one says that if a person is licensed in another jurisdiction, state, or country and the board determines that the other jurisdiction's licensing

process is equivalent to Nevada's, Nevada can license that person. The other law is prescriptive. It says that to be licensed in Nevada, you must be qualified—that is, you must meet a, b, c, and d requirements. Clearly, the legislature had two separate processes in mind: one for initial licensure (prescriptive) and the other for comity licensure (if you are licensed by a similar process, Nevada can license you).

Nevada has used the law concerning P.E.s licensed in other jurisdictions for comity licensure with Canada, which I'll discuss later, and with other states. But what I realized since becoming the Nevada MBA is that Nevada uses the same application process for comity licensure as it does for initial licensure—requiring comity applicants to meet the same requirements as initial licensure applicants, without any consideration for equivalent licensing systems. And if the processes for comity and initial licensure are identical, then in reality, there is no comity.

This revelation prompted me to look at laws, rules, and processes of other states. I wanted to understand the perspective of states that say, "We can't do that." I found that most states are similar to Nevada. They have two laws: comity (if you are licensed in another jurisdiction with similar requirements, we can license you) and initial (if you meet our specific requirements, we can license you). Yet, in most cases, the application process is the same for initial and comity licensure. Nowhere do the laws or rules dictate the application process. Therefore, can we not consider changing our administrative processes to facilitate comity? Is it not just a matter of changing the focus from "why we can't" to "how can we?"

I had a discussion recently with an MBA of a sister state. Like Nevada, this state has the two laws, covering comity and initial licensure. The state also has a law that if you fail the

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RIC MOORE, P.L.S.

CALIFORNIA BOARD EXECUTIVE OFFICER

NANCY EISSLER

CALIFORNIA BOARD ASSISTANT
EXECUTIVE OFFICER



New renewal requirement assesses knowledge of California engineering and surveying practice laws and regulations

CALIFORNIA IS ONE OF THOSE FEW STATES THAT HAVE NOT imposed any form of continuing education requirement on licensed engineers and surveyors—that is, until very recently.

During outreach engagements, representatives of the California Board for Professional Engineers, Land Surveyors, and Geologists are regularly asked, Why doesn't the board require continuing education, or When will the board start to require continuing education? And the response has always been, when someone can show that the public can benefit from this requirement.

Historically speaking, previous attempts at implementing a new requirement of continuing education for licensees in California have been met with a great deal of resistance, usually ending with a proposed bill dying in legislation or being vetoed by the governor.

During preparations for the board's 2014 Sunset Report to the legislature, it became apparent that many licensees fail to adequately and independently stay up to date with critical legal and regulatory changes that directly affect the manner in which they provide services to and for the general public. Over a three-year period, approximately 45 percent of cases against licensees with violations that did not warrant formal disciplinary action involved these types of infractions. Examples include failing to include all required elements in a written contract, failing to execute a written contract, failing to sign and seal professional documents in the manner required by law, failing to submit reports of civil judgments or settlements, and failing to file required business association forms. Moreover, the board frequently receives complaints alleging that a written contract was not executed or was not appropriately written by one of its licensees—even though the requirement for licensees to execute written contracts was enacted 17 years ago. The response from many licensees during the board's investigations of these complaints was that they were unaware of the "new" law, even though the board had publicized it multiple times in its newsletter,

on its website, and through in-person outreach opportunities—and despite the fact that the law is almost two decades old.

While licensees pay attention to changes to building codes or map filing requirements, they seem to forget about the other laws that regulate their profession. Outreach experiences and disciplinary statistics continue to show that few licensees take the time to familiarize themselves with the laws regulating their respective practices, and annual changes thereof, even though by simply being licensed—initially and through every renewal—each licensee states that he or she has read those laws and will abide by them at all times.

Fortunately, the legislature and the governor's office recognized the reasoning behind the statistics and the concerns in the board's Sunset Report, resulting in the following new section being added to the Professional Engineers Act (with similar sections for the Professional Land Surveyors' Act and the Geologist and Geophysicist Act):

Business and Professions Code Section 6795.2

- (a) At the time of renewal specified in Section 6795 or 6796, the board shall administer an assessment of the certificate holder to reinforce the certificate holder's knowledge of state laws and the board's rules and regulations. Failure to complete this assessment within 60 days after the date of expiration of the certificate may result in disciplinary action under Section 6775, but shall not affect the renewal of the certificate.
- (b) The crime in subdivision (j) of Section 6787 shall not apply to this section.
- (c) The board shall not charge the certificate holder a fee for the administration or development of the assessment.
- (d) For the purposes of this section, "assessment" means an online program that contains educational reading material

COMMITTEE FOCUS



MICHELLE RAMBO-RODDENBERRY, PH.D., P.E.
COMMITTEE ON EDUCATION CHAIR

Education Committee addresses practice-oriented pathway for PS 35

NCEES DELEGATES ADOPTED POSITION STATEMENT (PS) 35, Future Education Requirements for Engineering Licensure, at the 2015 annual meeting. It outlines four academic-based pathways for meeting future education requirements. The four pathways require a bachelor's degree in engineering plus additional [university] education. This has also been referred to as "B.S. plus 30" and "master's or equivalent." After determining that there is no equivalent to a master's degree, the committee now prefers the term "alternate pathways."

At the 2017 annual meeting, the Committee on Education will present Motion 1 to amend PS 35 to include a fifth, practice-oriented pathway (Option E). This article explains the rationale for the motion and the history of NCEES' engineering education initiative that began in 2000. Motion 1 addresses President Daniel Turner's charge: "Research a new practice-oriented pathway to satisfy PS 35. Collaborate with the technical engineering societies in establishing criteria for education in their respective engineering disciplines. Recommend potential pathways for Council consideration."

What is PS 35?

PS 35 contains essentially the same language as the former Model Law Engineer (MLE) 2020, which was adopted by the Council at the 2007 annual meeting. MLE 2020 was the result of many years of work by advocates of additional engineering education beyond the bachelor's degree. It was removed from the *Model Law* in 2014. The most common reason for supporting the removal was the inability of boards to actually implement it. MLE 2020 supporters were understandably disappointed in the vote, while those with anxiety about the fast-approaching 2020 deadline were relieved that changes to the education prescribed for engineering licensure were no longer imminent. Several boards argued that they had too little time left to implement MLE by 2020, and most, if not all, boards had not yet taken steps towards adopting

MLE 2020 into their laws and rules. Most agree, though, that additional education is a good idea, as evidenced by the Council's willingness to keep the requirements in the form of a position statement.

Why a practice-oriented pathway?

In 2013–14, the committee invited five technical societies (American Institute of Chemical Engineers; American Society of Civil Engineers; American Society of Heating, Refrigerating, and Air-Conditioning Engineers; American Society of Mechanical Engineers; and National Society of Professional Engineers) to provide input on the equivalency requirement. After hearing their presentations, the committee concluded that societies have high-quality, relevant, and practice-oriented educational programs. These programs often fill the gap that traditional university degrees leave—especially for highly specialized disciplines. An example of this is for HVAC engineers: the knowledge and skills needed are not often taught in universities, even at the graduate level, but ASHRAE offers courses that are targeted to this discipline.

Option E will give applicants a pathway to licensure that does not rely solely on academic institutions. A practice-based option is also in line with NSPE Professional Policy 168, Engineering Education Requirements, which is related to NSPE Position Statement 1737, Licensure and Qualifications to Practice.

Formulation of Option E

The committee reviewed the 2011 report by the NCEES Alternate Licensure Pathway Task Force, which developed recommendations for a possible alternate pathway to meet future education requirements for engineering licensure. The task force recommended a required number of assessed learning days (ALDs) as well as a mentoring component. Committee

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FROM THE PRESIDENT



DANIEL TURNER, PH.D., P.E., P.L.S.
NCEES PRESIDENT

NCEES leadership continues member board visits

THE NCEES PRESIDENT, PRESIDENT-ELECT AND CEO meet with several peer organizations during the year. It is an effective way to discuss emerging trends, swap success stories, collaborate, and look into the future. At one of these meetings, a colleague discussed the positive results of his organization's initiative for officers and staff to visit the regional offices. CEO Jerry Carter saw potential benefits for such a program at NCEES and suggested that the 2016–17 board of directors investigate developing one. After a very positive discussion at its next meeting, the board voted to initiate such a program.

The member board visits are designed to 1) improve communication, 2) enhance two-way understanding of activities, programs, and initiatives, 3) let the member board know how NCEES can best help it and let NCEES leadership find out what the member board most needs from us, 4) streamline and minimize any negative impacts of new programs, 5) answer pressing questions, and 6) address complaints, rumors, and misconceptions.

Why do we need it?

Membership of both state boards and the NCEES board of directors rotates. For NCEES, two vice presidents and the immediate past president leave after the annual meeting, and the treasurer leaves every third year. This means that 38–50 percent of the board leaves every year. These senior members carry away a lot of institutional memory. They are replaced by good new leaders. But those leaders have a steep learning curve and a lot of new material to master, and it may be difficult initially to explain some NCEES board issues to their zone. (How long would it take you to absorb the *Model Law*, *Model Rules*, and various policies?)

The state boards have vastly different membership patterns, as well as term lengths and appointment processes. Plus, they must deal with the unpredictable governor appointment process. In addition, at one time or another practically every member board has dealt with limited funding, travel restrictions, unfilled staff positions, and regulations that hinder its ability to operate within NCEES.

These are just a sample of the reasons that, at times, communication between NCEES and member boards is difficult to understand or misses the target.

Reception of program

In approving this program, NCEES officers and senior staff members committed to visit all state boards that requested a meeting. Board members optimistically anticipated that a third of existing boards might request visits in the first year. In the first six months since launching this, NCEES received requests for visits from 26 member boards, which is 37 percent.

At this time, almost all those visits have been completed. For virtually all visits, both sides enjoyed them and thought the visit was beneficial. The board of directors reported that they now have a wider vision of the organization and its programs and have learned a great deal about the member boards that they visited.

A typical visit

The visit takes shape with phone calls and emails between the member board and the NCEES visitor to iron out details. Sometimes board members eat dinner with the visitor the night before the meeting. A good dinner and a friendly discussion go a long way in accomplishing the goals of this initiative.

The NCEES visitor typically adapts his or her presentation to the time available and the desires of the host board. A sheet of talking points can be distributed at or before the meeting, or PowerPoint slides can be used. The visitor is trying to show the big picture of NCEES and its operation to help new members and administrators understand it and to refresh the memories of others. This includes an overview of the structure of NCEES, communications, meetings (including the annual meeting, zone meetings, and Board Presidents' Assembly), and services that NCEES provides (exam development, credentials evaluations, and Records). We also discuss the standing committees and how to get involved. This sounds like a lot to throw at a new member at one time, and it is. But these visits are a great opportunity to

describe a process or program and explain the purpose behind it. That really helps everyone better understand how it all works.

And we NCEES visitors always get to answer lots of questions (my favorite part of a visit). It seems that at each state board visit I have made, a senior member says something like, “I’ve been here X years and didn’t know that.” The more we get to know each other, the easier our jobs become, and the more we both enjoy them.

Would your board like to take part?

The process begins when a member board contacts CEO Carter to express interest in a visit. It helps if the request includes multiple dates of upcoming state board meetings. This makes it more likely to find a compatible date for the

It seems that at each state board visit I have made, a senior member says something like, “I’ve been here X years and didn’t know that.”

NCEES representative who will attend your meeting. CEO Carter periodically distributes state board requests so that NCEES board of directors members can volunteer for them. The president assigns volunteers to specific member boards, and NCEES staff helps with organizing the visit. If you are considering a visit, my suggestion is to call or email CEO Carter as soon as you can to make sure that you get the date and time that works best for you.

CONTINUING EDUCATION

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and questions. The material shall be based on state law and the board’s rules and regulations relating to the practice of professional engineers. The scope of the assessment shall be limited to the board’s top five types of violations related to the administrative and procedural aspects of the practice of professional engineers and any changes or additions to existing law related to such administrative and procedural aspects.

From an operational perspective, the board is in the midst of designing an assessment that can be primarily delivered online in an interactive format. It will consist of the laws and regulations related to the practices and any new changes to the laws, with an emphasis on the laws most commonly violated by licensees. Each licensee will be required to complete this assessment on a biennial basis within 60 days of his or her normal renewal date.

While this requirement will not prohibit the license from being renewed or immediately impact the status of the license, the law does give the board the authority to pursue disciplinary action against a licensee who fails or refuses to complete the assessment.

While licensees pay attention to changes to building codes or map filing requirements, they seem to forget about the other laws that regulate their profession.

Our goal is for this to be a learning opportunity for our licensees so that they can ensure they are in compliance with the laws and better serve their clients and the public.

Eissler is a member of the Committee on Law Enforcement, and Moore is a member of the Committee on Member Board Administrators for 2016–17. This article is a joint contribution for the regular columns of these committees, Enforcement Beat and Member Board Brief.

professional practice exam three times, you must take remedial coursework. The state has chosen to apply the three-strike law to comity licensure applicants. Nothing in the law requires it to do so, yet it is interpreting the law in that manner and choosing to apply it as a requirement for comity licensure. In reality, it could choose to change its process—it could differentiate between comity and initial licensure requirements (allowing the board to accept similar licensing processes) or it could choose to apply the three-strike law only for initial licensure. Either change would fit with the current laws and facilitate comity licensure.

NCEES' 100th anniversary—in 2020—is quickly approaching. I challenge you to really look at your laws, rules, and processes. Just because that's the way we've always done it doesn't make it the right thing to do. I believe that each of us can make a change—even if it's a small change—toward improving mobility. It could be as simple as shifting focus—rather than focusing on the hurdles on the path to reaching the goal, instead, choosing to focus on the goal and looking for ways to reach it.

Canada/Nevada comity licensure

Similar to the U.S. states creating NCEES, a number of countries created the International Engineering Alliance in 2007. IEA is focused on facilitating international mobility for professional engineers through registering qualified engineers on international registers. Acceptance to the International Professional Engineers Agreement (IPEA) register and the Asia-Pacific Economic Cooperation (APEC) Agreement register demonstrates that registrants have met the standard of registration and are prepared to practice engineering internationally. Successful engineers have the right to use the International Professional Engineer (IntPE) or APEC Engineer designations, showing potential clients and employers that they are experienced and well qualified. NCEES is a member of IEA and maintains the U.S. section of the IPEA and APEC Engineer registers. (The NCEES website, ncees.org/international, describes the NCEES International Registry and eligibility requirements.)

On January 12, 2017, Nevada signed a memorandum of understanding with Engineers Canada to streamline the licensure

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process for Canadian and Nevada engineers who are listed on their respective country's international register.

Nevada recognizes that Canadian engineers on the Engineers Canada Mobility Register have demonstrated that they will practice with competence and integrity and thus will be exempt from passing the Fundamentals of Engineering (FE) and Principles and Practice of Engineering (PE) exams that are required for initial applicants. Likewise, Engineers Canada recognizes that Nevada professional engineers on the NCEES International Registry have demonstrated that they will practice with competence and integrity and thus are exempt from Canada's initial licensure requirements.

Previously, Nevada had a memorandum of understanding with the Association of Professional Engineers and Geoscientists of Alberta (APEGA). This new agreement is with Engineers Canada—the national organization of the provincial and territorial associations that regulate the practice of engineering in Canada—and raises the bar for comity licensure. Rather than just requiring mutual recognition, it also requires meeting the relevant international registry standard.

As NCEES continues to improve mobility between the states, we should also consider international mobility. If we can be forward thinking with international mobility, maybe we can avoid the challenges that we continue to face with national mobility.

Mamola represents NCEES at United Nations



Patty Mamola, P.E., (center) is joined by other panelists speaking on STEM education for girls. Mamola represented NCEES at the Women's Empowerment in the Engineering World event at the United Nations headquarters in New York on March 13.

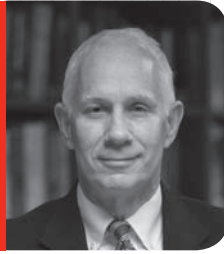
PAST PRESIDENT PATTY MAMOLA, P.E., REPRESENTED NCEES at Women's Empowerment in the Engineering World on March 13. The event was held at the United Nations headquarters in New York on the opening day of the 61st Commission on the Status of Women Conference, one of the largest intergovernmental forums on women's rights and gender equality.

The event was sponsored by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) and women in engineering nonprofit WomEng. Mamola joined representatives from academia, industry, government, and nongovernmental organizations for a roundtable discussion of the importance of supporting and encouraging women in engineering careers and the boost to productivity and creativity that diversity brings to teams and to society at large. The discussion included remarks from the director general of UNESCO; the executive director of UN Women; and representatives from IEEE, DiscoverE, and the World Federation of Engineering Organizations.

Mamola, who is the executive director of the Nevada board and a past president of NCEES, said, "It was thrilling to have so many women packed into one room wanting to make a difference in empowering women in engineering in the world."

The meeting officially launched the One Million Girls in STEM campaign by UNESCO and WomEng, a volunteer organization that aims to attract, develop, and nurture the next generation of women engineering leaders. The campaign focuses on encouraging more young women to consider careers in STEM fields, especially engineering, and on removing preconceptions about such careers. With this campaign, UNESCO and WomEng have committed to reach 1 million girls through STEM education and awareness initiatives in at least 10 regions in the next 10 years.

HEADQUARTERS UPDATE



JERRY CARTER
NCEES CHIEF EXECUTIVE OFFICER

What is “equivalent” in “ABET or equivalent?”

FOR MANY YEARS, THE STANDARD FOR A CANDIDATE applying for licensure has been a degree from a program accredited by ABET. Many licensing boards also include a pathway for degrees from non-ABET accredited programs, accepting degrees that are “substantially equivalent” to those from ABET-accredited programs. This is useful for programs such as those that are recently developed or offered by foreign schools. However, evaluating these degrees is not as straightforward as matching them to the ABET standard.

Prior to 1997, ABET based accreditation on programs that offered a specified number of courses in basic science and math, general education, engineering science and/or engineering design, and related courses. This was often referred to as the bean-counting method of accreditation.

In 1997, ABET adopted new standards: Engineering Criteria 2000 (EC2000). EC2000 focuses on outcomes (what is learned) rather than input (what is taught). This system requires institutions to establish objectives and assessment processes to ensure that each program provides graduates with the technical and professional skills required in the work force. While EC2000 is less prescriptive than its predecessor in the specific courses in the curriculum or in the number of hours for each program, each program must include one year of a combination of college-level mathematics and appropriate basic sciences, one-and-a-half years of engineering topics (engineering sciences and engineering design), and a general education component consistent with the program objectives. Each program is required to establish goals and objectives that are evaluated regularly and used to enhance the quality of the education provided to students. With EC2000, ABET placed greater importance on the success of students in achieving the objectives of each program than on the process itself.

Since the adoption of ABET’s outcomes-based system, it is impossible to analyze a transcript and declare that a degree is equivalent to a degree from an ABET-accredited program. The

Since the adoption of ABET’s outcomes-based system, it is impossible to analyze a transcript and declare that a degree is equivalent to a degree from an ABET-accredited program.

accreditation process now provides greater flexibility to each program to structure a curriculum that not only accounts for core engineering and science courses but also allows student achievement to be compiled and analyzed over the course of their career at an institution.

Because NCEES member boards need to be able to evaluate the quality of the education for candidates with non-ABET degrees, NCEES developed the NCEES Engineering Education Standard in 2011 and followed with the NCEES Surveying Education Standard in 2012. These standards include specific curriculum measurements that mimic the input-focused standards previously employed by ABET. The NCEES Engineering Education Standard requires 32 college semester credit hours of higher mathematics and basic sciences, 16 college semester credit hours in general education that complements the technical content of the curriculum, and 48 college semester credit hours of engineering science and/or engineering design courses. For applicants whose educational record meets the NCEES standard, NCEES reports that they possess the education required to be considered by a member board for entry into the professional practice of engineering or surveying. For applicants whose education history indicates deficiencies relative to the standard, NCEES notes the areas the deficiency. The evaluation serves as a reference for member boards, which make any decisions on applicants’ eligibility to become licensed.

Evaluations of non-ABET degrees are offered through the NCEES Credentials Evaluations department, along with other third-party evaluators. Only the NCEES Credentials Evaluations department uses the NCEES Engineering and Surveying Education standards to determine if a candidate has satisfied the minimum requirements as approved by NCEES.

It is my understanding that many member boards still include the “or the equivalent” language in their statutes or administrative rules as a qualifier for a satisfactory education for licensure purposes. Some boards have expressed concern that the evaluations issued by the NCEES Credentials Evaluations service are not acceptable since the report issued only compares a transcript to the applicable NCEES standard and makes no mention of equivalency to an ABET degree. The NCEES Credentials Evaluations do not compare to the outcomes-focused ABET criteria because it is not possible to conclude equivalency from reviewing a transcript. NCEES developed its standards, instead, to meet the unique needs of member boards. The Committee on Education is charged to maintain the standards and ensure that they continue to meet boards’ needs.

ABET remains the gold standard for NCEES member boards in evaluating the educational qualifications of candidates pursuing licensure. For other pathways to meet the educational requirements, make sure they are serving your board and the public well.

If “or the equivalent” language still exists in the governing language of your board, I suggest changing it to “or as approved by the board.” I strongly advocate that each member board consider how it evaluates non-ABET degrees when attempting to qualify a candidate for licensure as a professional engineer or surveyor. I also recommend member boards contact ABET for any needed clarification about the accreditation process. Finally, please review the report of the NCEES Committee on Education in the 2017 *Action Items and Conference Reports*. The report gives an overview of a recent audit of the NCEES Credentials Evaluations process completed by members of five NCEES member boards. The committee will share the full findings of the audit at its annual meeting workshop on Wednesday, August 23. I encourage you to attend, but if your schedule will not allow, the committee’s presentation (along with the other annual meeting presentations) will be posted on the Member Resources section of ncees.org after the meeting.

NCEES introduces online outreach fulfillment system

NCEES HAS LAUNCHED A NEW SYSTEM FOR ORDERING outreach and educational materials in an effort to make it easier and faster for member boards to receive materials that promote the engineering and surveying professions and licensure. The online system launched in April.

“The system will make it easier for boards to know what outreach materials we have available and make it more convenient to order them,” said Nina Norris, director of public affairs at NCEES. “Most of all, we hope that it will encourage boards and our Speakers Link volunteers to plan outreach activities and put these resources to use.”

While NCEES has set up accounts for all member board administrators, members and emeritus members will need to create an account at app.marcomcore.com to order materials.

Once logged in, users can choose from NCEES brochures, licensure kits, publications and other materials. Most orders will be received within 10 business days.

New engineering and surveying licensure kits have been created specifically for Speakers Link events, which promote licensure and educate audiences on the process. The engineering kit includes brochures on licensure, the Engineering Education Award, and practice exams; promotional screen cleaners; and mechanical pencils; the surveying kit includes similar materials. These items are packaged in individual folders to allow for easy distribution.

NCEES will add new kits in the coming months. These kits will be for high school events, K-6 events, and working engineers and surveyors.

For more information on the new outreach fulfillment system, email outreach@ncees.org.

COMMITTEE FOCUS

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members who were involved in Council meetings at that time recalled that the mentoring aspect received much discussion and some opposition, but it seemed that Council members were open to the concept of requiring ALDs.

As proposed, Option E requires 80 ALDs in areas germane to professional practice. At least 40 ALDs would have to be earned through technical engineering coursework. ALDs could be earned from one or more of the following types of courses:

- University courses
- Industrial in-house specialty courses
- Short courses and certification courses offered by professional and technical societies
- Other courses meeting standards to be developed by NCEES

Why 80 ALDs?

A typical master's degree requires 30 semester credit hours, where a credit hour is 15 to 16 hours of contact time with the professor. This equates to 450 to 480 contact hours. Dividing this by 8 hours per day results in 60 days (or 60 ALDs). For each semester credit hour in a college course, a student would be expected to study an additional 30 to 45 hours (approximately 4 to 5 days) outside the classroom. This level of study would not likely be required for practice-oriented education offered by industry or a society. The Committee on Education elected to increase the minimum number to recognize the fact that many of the courses taken under this pathway—even though they must be assessed in some manner—would not be as rigorous

$$\begin{array}{r} 30 \text{ credits for a Master's degree} \\ \times 16 \text{ contact hours/credit} \\ \hline 480 \text{ contact hours} \\ \div 8 \text{ hours/day} \\ \hline 60 \text{ days (Assessed Learning Days)} \\ \times 1.33 \text{ multiplier*} \\ \hline 80 \text{ ALDs} \end{array}$$

*Multiplier adjusts for rigor and study required for a college degree that would likely not be required in practice-oriented education.

as a college-level course and would not require as much study beyond the assessed learning days.

The committee envisions that NCEES will need to develop a clearinghouse to set standards for ALDs and assessment methods, approve ALD providers, approve coursework, and provide a list of approved public ALD providers to applicants. However, the clearinghouse would not be developed by NCEES until multiple licensure jurisdictions have adopted a form of PS 35 into their licensing laws.

At the 2017 annual meeting in August, the committee will present Motion 1 to amend PS 35 to include a new Option E:

- E. A bachelor's degree in engineering from a program accredited by EAC/ABET; and 80 assessed learning days (ALDs) in areas germane to professional practice and that support and enhance the applicant's capability in their technical area of practice
 1. ALDs can be earned through credit or noncredit courses. The applicant shall be required to demonstrate successful completion and that the content of the coursework was of sufficient content and rigor.
 2. Coursework may include university courses, industrial in-house specialty courses, short courses and certification courses offered by professional and technical societies, and other courses meeting standards to be developed by NCEES.
 3. At least 40 ALDs shall be from technical engineering coursework. Non-technical ALDs include professional practice topics such as business, communications, contract law, management, ethics, public policy, and quality control.
 4. For non-university-provided coursework, a course that earns ALD credit must have a syllabus, learning objectives, and outcomes assessment.
 5. For non-university-provided coursework, one ALD unit shall be defined as eight hours of contact time.
 6. For university-provided coursework, a three-semester credit hour course shall equal six ALDs.
 7. Any single course must consist of at least one ALD.

The committee's full report will be published in the *Action Items and Conference Reports*, which will be available in the Member Resources section of ncees.org by July 1.

HISTORY OF ENGINEERING EDUCATION INITIATIVE

For almost two decades, NCEES has debated the minimum engineering education required to become a professional engineer. The following timeline describes how the initiative has evolved. Additional historical information is provided at ncees.org/engineering/engineering-education-initiative.

2000-03

The **Engineering Licensure Qualifications Task Force** was commissioned to assess the current licensure system and develop recommendations for enhancement or change.

2003-05

The **Licensure Qualifications Oversight Group** was established to further explore the findings of the Engineering Licensure Qualifications Task Force from an NCEES perspective. NCEES began the process of changing language in the *Model Law*.

2005-07

The Council passed 2006 **Committee on Uniform Procedures and Legislative Guidelines (UPLG)** motions to add language to the *Model Law* and *Model Rules* requiring a master's degree or equivalent for initial licensure in 2015 (later changed in 2020). In 2007, it passed UPLG motions to revise the *Model Rules* definitions of Model Law Engineer and Model Law Structural Engineer to include the bachelor's plus 30 requirement.

2007-08

The **Bachelor's Plus 30 Task Force** was established to build on the work of the 2007 UPLG Committee. In 2008, NCEES delegates approved *Model Rules* definitions of acceptable coursework and approved course providers. They also passed a **Southern Zone** resolution to explore other alternatives to the additional education requirement.

2008-10

The **Engineering Education Task Force** was charged with developing a response to the 2009 Southern Zone resolution, developing a model for a clearinghouse, and writing a history of the initiative. In 2009, NCEES delegates passed a resolution for the task force to be charged with exploring alternatives. The Council voted in 2010 to approve the two resulting motions.

2010-11

The **Alternate Licensure Pathway Task Force** was created to investigate an alternate pathway to initial licensure that would allow a combination of assessed learning days and structured mentoring. The task force presented its findings as a motion for Council action at the 2011 annual meeting. The motion did not pass.

2012-14

In 2012, the **Committee on Education** (then a task force) addressed implementation issues, including a clearinghouse for course evaluation. In 2013, the committee continued to define the clearinghouse concept and the acceptable equivalent to a master's degree.

Council delegates voted in 2014 to remove language related to MLE 2020 and MLSE 2020 from the NCEES *Model Law* and *Model Rules* and, instead, develop a position statement on general reform in engineering education to ensure that graduating engineers are ready to enter professional practice.

2015

The Council adopted **PS 35** regarding additional education for initial engineering licensure.

2015-17

In 2015 and 2016, the **Committee on Education** was charged with researching a new practice-oriented pathway to satisfy PS 35. The committee's work resulted in a motion to add a new option to PS 35, which will be made at 2017 annual meeting.

CARL JOSEPHSON, P.E., S.E.

CALIFORNIA BOARD FOR PROFESSIONAL ENGINEERS, LAND SURVEYORS, AND GEOLOGISTS EMERITUS MEMBER



What is a significant structure?: A look at different S.E. licensing systems

FOR THE PAST TWO YEARS, NCEES MEMBER BOARDS have considered the position of structural engineering in the *Model Law*. Issues concerning separate licensing of structural engineers relate to a small number of member boards. But these boards have different approaches to this requirement. Considered debate and guidance from the Council could be useful to those boards as well as any other boards considering adding such a requirement.

Ten jurisdictions currently require that certain types of structures be designed by licensed structural engineers (S.E.s), albeit with varying requirements. Hawaii and Illinois require that all structures be designed by S.E.s. Alaska, Oregon, Utah, and Washington limit the types of buildings requiring S.E. design to significant structures. California, Guam, Nevada, and the Northern Mariana Islands limit it to structures that are specifically defined in law without using the term *significant structures*.

Where did the term come from?

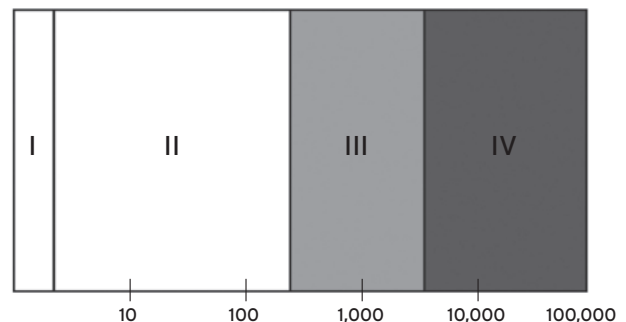
The expression *significant structures* first showed up in 1999 in Oregon law, when Oregon decided that certain classes of structures needed to be designed by S.E.s. From 1973 to 1997, the state saw more than a 300 percent increase in seismic design loading in some areas of the state due to better understanding of the region’s seismicity. Over the same time, the building codes expanded enormously and became much more complicated relative to design loads, materials, and methods of analysis, particularly for the design of tall and complex structures.

The use of the term *significant structures* continued with Washington’s change of law in 2007, Utah in 2008, and Alaska in 2016. Other than Illinois and Hawaii, for whom the concept is moot, the four jurisdictions that do not use

the expression *significant structures* in their licensing laws all had their requirements for the types of structures to be designed by S.E.s in place prior to 1999. Legislation describing or expanding the types of buildings that would be required to be designed by S.E.s is currently under development in a number of other states, and in some cases the term *significant structures* is being considered. Florida, in keeping with their current language in law, is using the term *threshold building*. While there are differences in the meaning of significant structures, a common thread runs through the definitions adopted by all of these states.

What do these structures have in common?

Most of the structures defined as significant structures fall into several categories: 1) structures in Risk Categories III and IV, 2) structures over a specified height, or 3) structures over a specified size or complexity. Risk Categories III and IV are defined in *Minimum Design Loads for Buildings and Other Structures* (Standard ASCE 7) and in the International Building Code (IBC). Risk Category III structures are those whose failure could “pose a substantial risk to human life” or has the “potential to cause substantial economic impact and/or mass disruption of day-to-day civilian life.” Risk Category IV is primarily comprised of essential facilities, the failure of which could “pose a substantial hazard to the community.”



Approximate relationship between the number of lives placed at risk by a failure and risk category (from ASCE 7-10 Commentary, Figure C1-1)

Descriptions of structures in Risk Categories III and IV

Risk Category III

- Public assembly, occupant load greater than 300
- Elementary schools, secondary schools, and day cares with occupant load greater than 250
- Adult education, colleges, and universities with occupant load greater than 500
- Group I-2—Resident care greater than 50
- Group I-3—Jails, prisons, and correctional facilities
- Other occupancies with occupant load greater than 5,000
- Power-generating stations, water treatment, and public utilities not in Risk Category IV
- Buildings (not in Risk Category IV) that contain defined quantities of toxic or explosive materials

Risk Category IV

- Group I-2 with surgery or emergency treatment facilities
- Fire, rescue, ambulance, and police stations
- Designated earthquake and hurricane emergency shelters
- Emergency preparedness, emergency response, communications, and operations centers
- Power-generating stations and public utilities required as backup for Risk Category IV structures
- Structures containing defined quantities of toxic or explosive materials
- Aviation control towers and air traffic control centers
- Buildings having critical national defense functions
- Water storage and pump facilities required for fire suppression

ASCE 7-10, released in 2013, is more generalized in its definition than earlier versions because the writers considered the concept of acceptable risk to be one of public policy. With that said, more specific definitions of the risk categories are contained in the IBC, which are summarized in the table above. The exact wording of these definitions can be found in 2015 IBC, Table 1604.5. While there have been formatting changes over the years, the definitions or intentions of this portion of the code have seen little change. The jurisdictions that define significant structures in their laws have, for the most part, extracted these definitions as they are contained in ASCE 7 and the IBC, although some have slightly modified the language to meet local needs.

In addition to the types of buildings just mentioned, many jurisdictions also have height limitations, above which buildings that are normally occupied by humans (regardless of type or class) need to be designed by an S.E. Nevada, Guam, and the Northern Mariana Islands use height limitation as their sole defining criterion for the types of buildings

required to be designed by S.E.s. The height limitations of these buildings vary widely, as you can see in the table on the following page. Most of the states that define significant structures also require that any structure more than 100 ft. in height be designed by an S.E.

Washington and Alaska are unique in that both also require bridges with a total span of more than 200 feet and piers having an area of more than 10,000 square feet to be designed by licensed S.E.s. The 16-hour NCEES Structural Engineering exam allows the option for engineers who have been working in bridge design during their careers to take a bridge track as a path to S.E. licensure.

Several of the states specifically define structures that are not required to be designed by S.E.s. For example, Oregon law states that one- and two-family dwellings are not significant structures.

continued on next page

Height limitations by jurisdiction

Alaska: Four stories or 45 feet or more above average ground level

Guam: More than three stories

Northern Mariana Islands: More than three stories or 45 feet in height

Nevada: More than three stories or more than 45 feet above bottom of lowest footing

Oregon: Over six stories in height and over 60,000 square feet or over 10 stories

Utah: Five stories or more, or have an average roof height more than 60 feet above average ground level

Washington: Five stories or more

Structural Engineering Caucus

Josephson will facilitate a Structural Engineering Caucus at the 2017 NCEES annual meeting on Saturday, August 26. Attendees will drive the content, but topics will likely cover S.E. licensing, licensure by comity, title versus practice restrictions, and the PE Civil exam versus the 16-hour SE exam.

Hawaiian law exempts some agricultural buildings as well as privately owned one- and two-story buildings, dwellings, or structures if the cost is below a specified dollar amount (ranging between \$35,000 and \$50,000). The intent of the exemptions is generally to exclude structures that would put a relatively small number of people in a single building at risk at any one time. These may include structures that are prescriptive by nature, built according to conventionally accepted methods, and that have often not required input from a registered design professional.

Where do we go from here?

Most of the jurisdictions that restrict the design of designated structures to S.E.s are in high seismic and/or high wind areas. However, based on the recent revisions to the IBC, there are areas in nearly all states, depending on the nature of the soils and the new U.S. Geological Survey seismic maps, where seismic forces can govern the design. Many areas of the United States, particularly along the coasts, have regions of high winds, and wind design has become incredibly complex over the last four or five code cycles. All structural designers, but particularly those designing Risk Category III and IV structures, need to be intimately familiar with these codes and special material and detailing requirements that they may never have needed to use in the past.

In 2015 at the NCEES annual meeting, the Advisory Committee on Council Activities proposed a motion that, among other things, would have directed a task group to look at the definitions of significant or threshold structures. The motion failed by one vote. It was not expected that there would have been a consensus on the definition of these structures (and certainly not an easy consensus). Nor was there any idea as to how or even whether to incorporate these definitions into the *Model Law*. But the debate and exchange of ideas through a vehicle like a task group could only have helped jurisdictions to better understand why this approach to licensing has been taken in some regions. It would have helped board members, board administrators, and policy makers better understand how to either accept or reduce the risks facing the public. Discussions such as these are good things. We can learn how other jurisdictions are handling S.E. licensing and what their reasoning is. We can share ideas and see if there is any possibility of common ground. For all of us, our ultimate goal is the protection of the public. Perhaps the time has come to at least open the dialogue.

UPCOMING

EVENTS

June 1-3

SE Exam Scoring Workshop
Clemson, South Carolina

June 6

Engineering Education
Award Jury Meeting
Clemson, South Carolina

June 8-10

PE Electrical and Computer
Exam Meeting
Clemson, South Carolina

June 9-11

PE Nuclear Exam Meeting
San Francisco, California

June 15

Surveying Education
Award Jury Meeting
Clemson, South Carolina

June 15-17

FS/PS Exam Meeting
Clemson, South Carolina

June 22-23

PS Exam PAKS Meeting
Minneapolis, Minnesota

June 23-24

PE Architectural Engineering
Exam Meeting
PE Metallurgical and Materials
Exam Meeting
PE Mining and Mineral Processing
Exam Meeting
Clemson, South Carolina

July 7-8

PE Mechanical Exam Meeting
Clemson, South Carolina

July 14-15

PE Civil Exam Meeting
Clemson, South Carolina

July 16-18

PE Agricultural and Biological
Engineering Exam Meeting
Spokane, Washington

MEMBER BOARD NEWS

ALABAMA

Rick Huett has been named interim executive director. He replaces Regina Dinger, who has retired.

MAINE PE

Susan Lessard is a new appointee. John Guimond is no longer a member.

RHODE ISLAND PE

Virginia Porter is the new board administrator, replacing Dawne Broadfield.

EMERITUS

The board of directors approved the following emeritus members at its February 2017 meeting. **Florida PS:** Howard Ehmke, Nickolas Fusco; **Iowa:** Jerry Shellberg; **Minnesota:** Doug Cooley; **Vermont PE:** William Atkinson

NCEES OUTREACH

JUNE 25-28

American Society for Engineering
Education Annual Conference,
Columbus, Ohio

JULY 19-23

National Society of Professional
Engineers Conference,
Atlanta, Georgia

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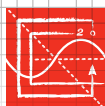
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The 96th NCEES annual meeting will be held August 23–26 in Miami Beach, Florida.

NCEES annual meeting registration open online until July 7

Registration is now open for the 2017 NCEES annual meeting, which will be held August 23–26 in Miami Beach, Florida.

In addition to the business sessions, where Council members will convene to decide key engineering and surveying licensure issues, the annual meeting agenda includes technical workshops, forums to discuss issues of importance to the professions, and social events to network with members and staff of other licensing boards. Those attending the meeting for the first time will meet at the First-Time Attendee Luncheon to get to know NCEES and some of the organization's leaders and to learn more about the important role the annual meeting plays in advancing licensure.

Details of all of this year's workshops, business sessions, and social events are available on the Member Resources section of ncees.org (see Board Resources, Annual Meeting). Registration will remain open online until July 7. Late registration fees will apply after this date.