Separate Structural Engineering Licensing Summit

"Moving Forward"

ASCE/SEI Friday 18 JULY 2008

Title Act v. Practice Act

"The Differences and Obstacles to Each"

by

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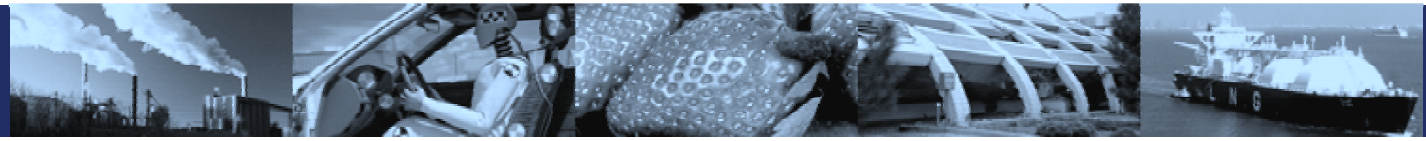
Outline

- Definitions
- Structural licensing: why, issues, policy and goals
- Practice Act: stand alone vs. linked/coupled
- Title Act: only linked/coupled
- Differences and obstacles
- Observations/findings/summary

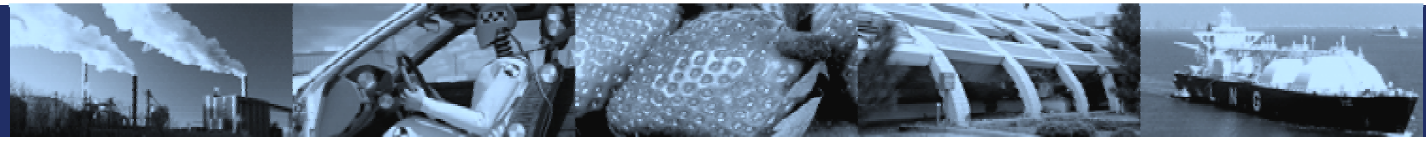


Definition – Structural Engineering

- Structural Engineering – consists of the application of the principals of mathematics, statics, dynamics, and material science, mechanics of materials and structural analysis for the purpose of evaluating the behavior of structures and their foundations under the influence of static and dynamic loads and the design of such structures to safely support these loads while providing serviceability.

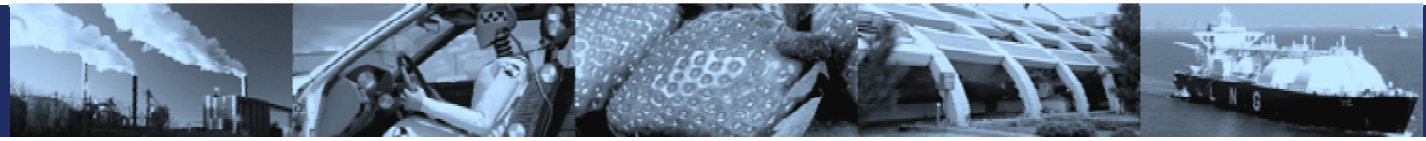
Definition – Structural Engineer

- Structural Engineer – an engineer involved in structural engineering including the design, evaluation, alteration, and renovation of structures and the implementation of the design, alteration and renovation during the construction process



Definition - Structures

- Structure – any building, bridge, industrial or agricultural facility, hydraulic structures, transmission facilities, infrastructure, or together self-supporting assemblage of elements placed on or attached to a foundation system.



Structural Licensing - Why

- Protection of the public health, safety and welfare
- Not gate keeping
- Public protection and life safety

Issue - ASCE

- While the practice of civil engineering may require the performance of tasks within specialty areas, the successful completion of civil engineering projects requires comprehensive knowledge, experience, and judgment in a variety of related elements within the profession.

Issue – ASCE (cont'd.)

- Furthermore, the National Council of Examiners for Engineering and Surveying (NCEES) Model Law states that "licensees must demonstrate by education, experience, and examination that they are competent in their field." Therefore, licensure in accordance with the Model Law conveys to the public the Professional Engineer's qualifications.
- Note that is is required to have education, experience and be tested in specific area of practice, i.e., civil versus structural.

Issue – ASCE (cont'd.)

- Additionally, following licensure as a Professional Engineer there is a desire to recognize those with engineering expertise in specialized areas of civil engineering.
- Note that alternate position would be to have separate "stand alone" license for each specific area of practice, i.e., civil versus structural

Issue – ASCE (cont'd.)

- Post-PE credentialing helps achieve this goal. Credentialing is a generic term defining the granting of a credential; for example diplomas, LICENCES, and/or certifications.

Policy – ASCE

- The American Society of Civil Engineers (ASCE) supports licensure as a Professional Engineer (PE) that recognizes the traditional breadth of the civil engineering practice.

Policy – ASCE (cont'd.)

- ASCE also supports post-PE credentialing (i.e., structural engineer) that attests to a Professional Engineer's expertise in a civil engineering specialty area.
- This ASCE policy does not support a stand alone practice act.

Policy – ASCE (cont'd.)

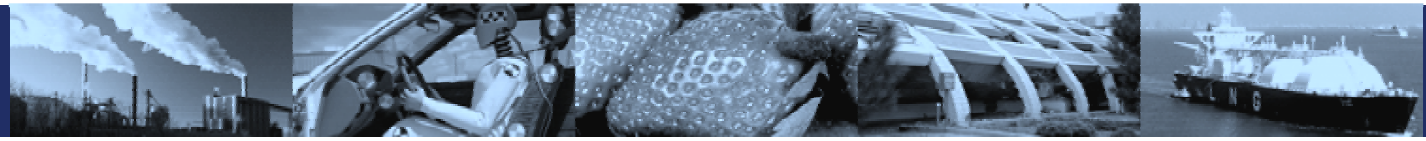
- Obtaining a PE license or post-PE credential shall require the engineer to demonstrate attainment of an appropriate body of knowledge through experience and examination.
- Licensure and advanced credentialing within the Civil Engineering profession approved by the Committee on Professional Practice on February 13, 2008, approved by the Engineering Practice Policy Committee on March 6, 2008, approved by the Policy Review Committee on March 7, 2008, and adopted by the Board of Direction on May 2, 2008.

Issue - NCSEA Position Statement

- Licensing and continuing education laws differ, and in some cases, are non-existent, for structural engineers in various states. A national standard for minimum competency with consistent licensing and continuing education requirements will better protect the public health, safety, and welfare.

NCSEA Position Statement

- Development of legislation to establish a licensing law for structural engineers and to develop unified national examination for structural engineers to license structural engineers including mandatory provisions for continuing education/professional development.
- Comity is major issue… ability to work in other states.



NCSEA Position Statement (cont'd.)

- Legislation shall also define the area of responsibility and types of buildings, bridges and other structures that are required to be designed by a structural engineer.
- "Significant Structure" = must be designed by a licensed structural engineer.

The Goal – NCSEA

- Uniform Structural practice acts in all 55 jurisdictions
  - Permit engineering practice to transport across state lines … comity
  - Ensure that engineers who do cross state lines are competent to practice in all environments they will encounter
  - Establishment of high but fair and equitable standards

NCEES Educational Requirements for PE

- September 2006 – confirmed August 2007.
- Approved modification to the licensure model law to require that an engineer intern with a bachelor's degree must have "… an additional 30 semester credits of acceptable upper-level undergraduate or graduate-level course work to be admitted to the P.E. examination."
- Effective in 2015. U.S. licensing jurisdictions that adopt this provision of the model law will require a master's degree or equivalent.
- Similar requirement currently exist in NCEES SE model law.

What is a Model Law Structural Engineer?

The term Model Law Structural Engineer (MLSE) refers to a licensed engineer who meets the following criteria:

- Graduated from an engineering program accredited by EAC/ABET.
- Passed a minimum of 18 semester (27 quarter) hours of structural analysis and design courses. At least 9 semester (14 quarter) hours must be structural design courses.
- Passed the NCEES Fundamentals of Engineering exam.

What is a Model Law Structural Engineer? (cont'd.)

- Passed 16 hours of structural examinations consisting of one of the following:
  - NCEES structural examinations, 8 hours of which are the Structural II examination
  - 16-hour state-written structural examinations taken priot to 2004
  - NCEES SE II plus 8-hour state-written examinations

What is a Model Law Structural Engineer? (cont'd.)

- Completed 4 years of acceptable structural engineering experience after confirmation of a bachelor's degree. A maximum of 1 year of credit may be given for graduate engineering degrees that include at least 6 semester (9 quarter) hours of structural engineering (in addition to the 18 hours noted above).
- Has no disciplinary action on record.

National Academy of Engineering – 2005 Report

- Published *Educating the Engineer of 2020* stating, "The B.S. degree should be considered as a pre-engineering or 'engineer-in-training' degree. Engineering programs should be accredited at both the B.S. and M.S. levels so that the M.S. degree can be recognized as the engineering professional degree."
- First time that a U.S.-based, pan-engineering society called for dual-level accreditation and recommended the M.S. as the engineering professional degree.

Practice Act – General

- Defines the specific type of work (i.e. design of buildings, bridges, or other structures) that a licensed engineer in that discipline can legally perform, along with the correspondence responsibilities and liabilities
- Some states have discipline specific practice acts for civil engineers, mechanical engineers and electrical engineers – all called Professional Engineers
- Some states have a generic registration for "Professional Engineers" to perform work in any discipline for which they determine that they are qualified/competent

Structural Engineering Practice Act

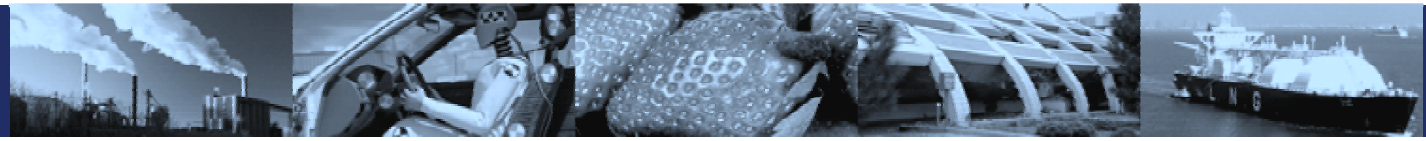
- Required to "protect public health, safety and welfare"
- Require SE license to provide SE services
- Special skill set required to practice … E^3
  - Education – MS or equivalent in SE beyond NCEES for PE
  - Experience – Design complex structures with current codes
  - Examination – Test knowledge required to design for both vertical loads and extreme environmental forces (i.e., wind, seismic…)
- Structures: buildings, bridges, other structures
- Stand alone vs. linked/coupled

Stand Alone – Practice Act
Structural Engineering – Hawaii and Illinois

- Structural engineering is separate “stand alone” practice
- Not required to be CE prior to license as SE
- SE cannot do civil, mechanical, electrical or other engineering
- CE cannot do structural
- All buildings, bridges and other structures must be designed by SE

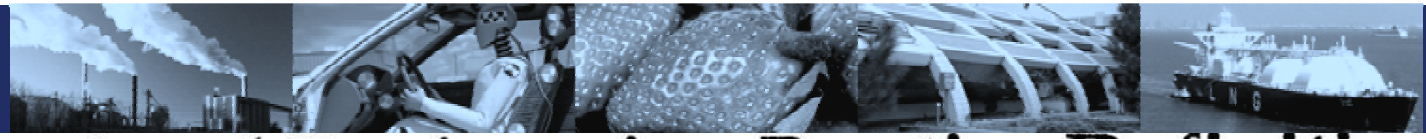
Stand Alone – Practice Act
Structural Engineering – Hawaii and Illinois (cont'd.)

- Note that a separate civil engineering practice act is required to allow only civil engineers to design highways, earth movement, water works, urban planning and other broad-based civil engineering activities, excluding those that require a structural engineering license
- Engineer can be licensed as SE and CE



Practicing Structural Engineering (State of Illinois)

"(340/5. Practicing Structural Engineering) Section 5. A person shall be regarded as practicing structural engineering within the meaning of this Act who is engaged in the designing or supervising of the construction, enlargement or alteration of structures, or any part thereof, for others, to be constructed by persons other than himself. Structures within the meaning of this Act are all structures having as essential features foundations, columns, girders, trusses, arches and beams, with or without other parts, in which safe design and construction require that loads and stresses must be computed and the size and strength of parts determined by mathematical calculations based upon scientific principle and engineering data. A person shall also be regarded as practicing structural engineering within the meaning of this Act who is engaged as a principal in the designing and supervision of the construction of structures of or the structural part of edifices designed solely for the generation of electricity; or for the hoisting, cleaning, sizing of storing of coal, cement, sand, grain, gravel or similar materials; elevators; manufacturing plants; docks; bridges; blast furnaces; rolling mills; gas produces and reservoirs; smelters; dams; reservoirs; waterworks; sanitary works as applied to the purification of water; plants for waste and sewage disposal; round houses for locomotives; railroad shops; pumping or power stations for drainage districts; or power houses, even though such structures may come within the definition of 'buildings' as defined in any Act in force in this State relating to the regulation of the practice of architecture."



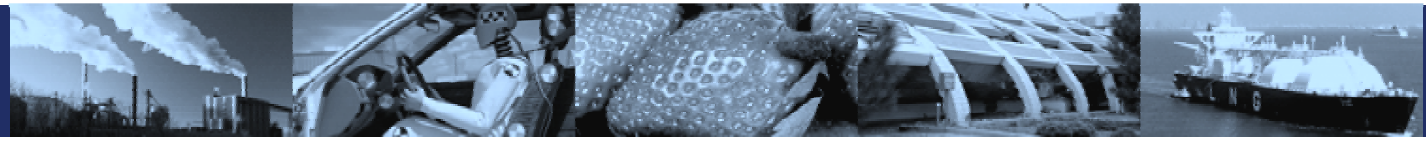
Professional Engineering Practice Definition (State of Illinois)

(325/4.(o) "Professional engineering practice" means the consultation on, conception, investigation, evaluation, planning, and design of, and selection of materials and methods to be used in, administration of construction contracts for, or site observatio of an engineering system or facility, where such consultation, conception, investigation, evaluation, planning, design, selection, administration, or observation requires extensive knowledge of engineering laws, formulae, materials, practice, and constructio methods. A person shall be construed to practice or offer to practice professional engineering, within the meaning and intent of this Act, who practices, or who, by verbal claim, sign, advertisement, letterhead, card, or any other way, is represented to be a professional engineer, or through the use of the initials "P.E." or the title "engineer" or any of its derivations or some other title implies licensure as a professional engineer, or holds himself out as able to perform any service which is recognized as professional engineering practice.

Examples of the practice of professional engineering include, but need not be limited to, transportation facilities and publicly owned utilities for a region or community, railroads, railways, highways, subways, canals, harbors, river improvements; irrigation works; aircraft, airports and landing fields; waterworks, piping systems and appurtenances, sewers, sewage disposal works; plants for the generation of power; devices for the utilization of power; boilers; refrigeration plants, air conditioning systems and plants; heating systems and plants; plants for the transmission or distribution of power; electrical plants which produce, transmit, distribute, or utilize electrical energy; works for the extraction of minerals from the earth; plants for the refining, alloying or treating of metals; chemical works and industrial plants involving the use of chemicals and chemical processes; plants for the production, conversion, or utilization of nuclear, chemical, or radiant energy; forensic engineering, geotechnical engineering including, subsurface investigations; soil classification, geology and geohydrology, incidental to the practice of professional engineering; energy analysis, environmental design, hazardous waste mitigation and control; recognition, measurement, evaluation and control of environmental systems and emissions; automated building management systems; or the provision of professional engineering site observation of the construction of works and engineering systems. Nothing contained in this Section imposes upon a person licensed under this Act the responsibility for the performance of any of the foregoing functions unless such person specifically contracts to provide it.

Linked/Coupled Practice Act
Structural Engineering – State of Washington

- Specialized Branch of Professional Engineering – additional/special experience and examination – must be PE prior to SE
- Must be registered as structural engineer in order to provide structural engineering services for “significant structures”



Linked/Coupled Practice Act

Structural Engineering – State of Washington (cont'd.)

- Significant Structures include:
  - Hazardous facilities – structures housing explosive substances
  - Essential facilities – more than 5000 sq. ft. and 20 ft in height
    - Hospitals and medical facilities having surgery and emergency treatment
    - Fire and Police stations
    - Tank w/fire water or fire suppression materials
    - Emergency preparedness centers including vehicle shelters and garages
    - Aviation control towers and air traffic control centers
  - Structures exceeding 100 ft. above ground

Linked/Coupled Practice Act

Structural Engineering – State of Washington (cont'd.)

- Building occupied by human beings and are 5 stories or more above ground
- Bridges having a total span of more than 200 ft. and piers having a surface area greater than 10,000 sq. ft.
- Buildings and other structures with occupancy of more than 300 people in one area

- SSB 5984 : signed 21 APR 07 and effective 1 JUL 08
- A SE can design any structure, while a PE can design only those structures not defined as significant structures ... overlap legislation

Linked/Coupled Practice Act

Structural Engineering – States of Oregon, Nevada, Utah and California

- Specialized branch of professional engineer – additional/special experience and examination – must be PE prior to SE
- Must be licensed as Structural Engineer in order to design "significant structures"
- Significant structures include:
  - UBC Category I, II and III structures over 4 stories or 45 ft. in height or buildings with occupancy over 300 persons - Oregon
  - Buildings greater than 3 stories or 45 ft. in height - Nevada
  - Hospitals and public schools – California … (title authority)

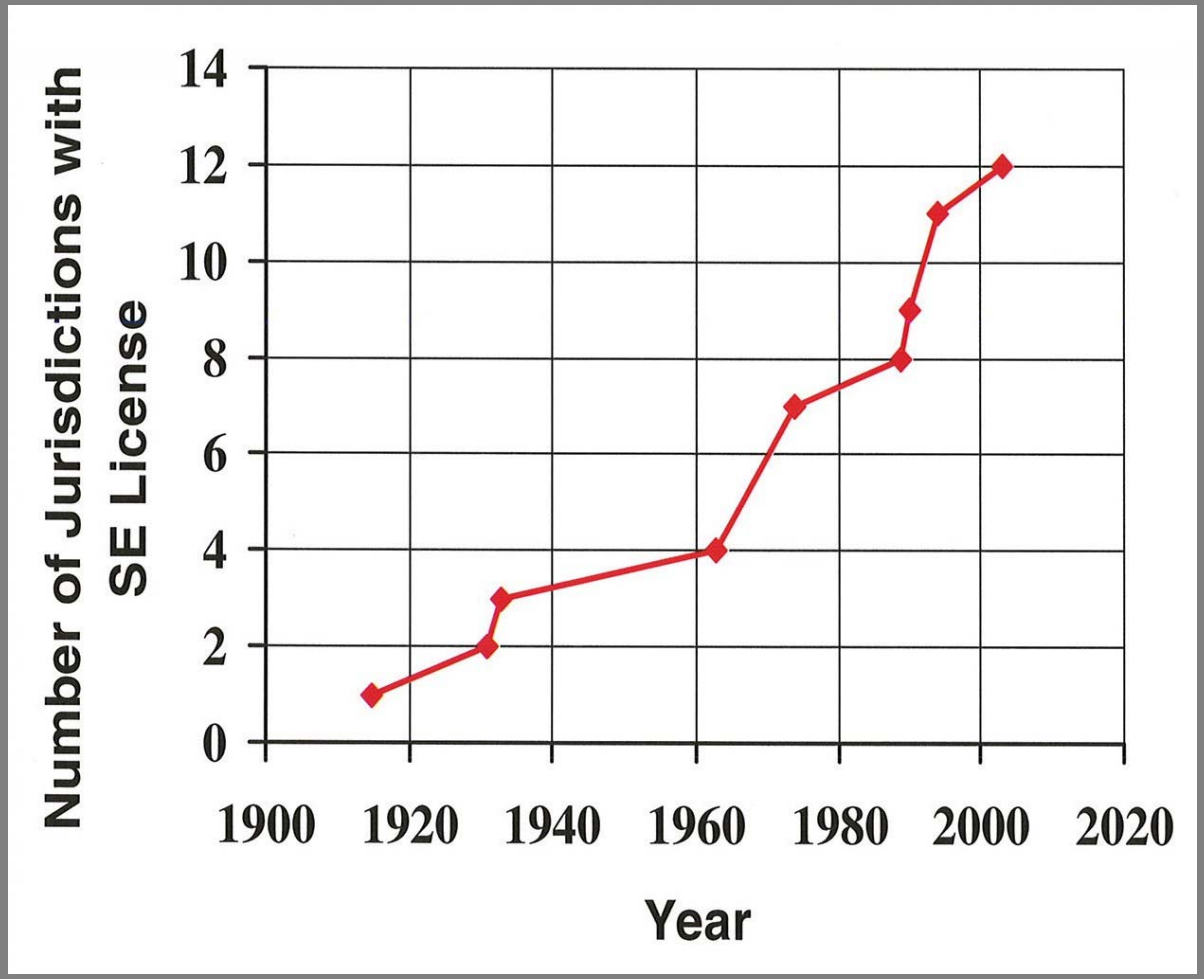
Title Act

Structural Engineering – States of Arizona, Idaho, New Mexico and Nebraska

- Structural Engineer is separate "title" additional/special experience and/or examination is required beyond PE requirements
- The Title Act only allows a licensed engineer to use a specific title (Chemical Engineer, Traffic Engineer, Geotechnical Engineer, Structural Engineer)
- Must be licensed as Professional or Civil Engineer prior to use Title-"Structural Engineer," i.e. SE is linked to CE/PE
- No Distinction of the type of structure a PE or SE can design
- Must pass NCEES exam SEI to be licensed Professional Engineer and must pass NCEES exams SEI and SEII to use title "Structural Engineer" (Nebraska)
- Compromise – stepping stone to Practice Act

Trends in SE Licensing

- Illinois – 1915
- California – 1931
- Hawaii – 1933 (?)
- Washington – 1963
- Nevada – 1974
- Oregon – 1974
- Guam - 1974
- Idaho – 1989
- Arizona - 1990
- Nebraska – 1994
- Utah - 1994
- Louisiana – 2003
- Northern Mariana Islands (?)



Obstacle: Grandfathering

- Appropriate consideration must be given when transition from Professional Engineer Practice Act to Structural Engineer Practice (or Title) Act
- Grandfather clause is needed to allow engineers licensed as of a specific date to continue providing the engineering services they are currently providing and are authorized to provide
- As with any new engineering licensing level, it is not appropriate to restrict licensed engineers from continuing to provide the services they are currently providing and are authorized to provide.

Obstacle: Grandfathering

- There would need to be a definite period of time during which currently licensed engineers could apply for licensing based on their current licenses and experience. Therefore, only the licensing of future engineers would be affected.
- Engineers who were licensed by a specific date would be authorized to continue to provide the engineering services permitted under the old practice act licensing law.
- Broad based within a given state-but limitations on comity.

Obstacles: Linked/Coupled Practice Act v. Title Acts v. Stand Alone Practice Act

- The requirement to be a civil engineer prior to application to become a structural engineer has difficulties that are a result of the increasing complexity of each of the disciplines
- The Link/Couple of the structural engineering license to the civil engineering license, was a natural evolution for the original licensing, due to structural engineering starting as a specialty within civil engineering.

Obstacles: Linked/Coupled Practice Act v. Title Acts v. Stand Alone Practice Act (cont'd.)

- Our current technological "state of practice" for both the design of structures and more traditional civil projects has specialized the work to the point where the common areas are not as common anymore
- Each of these is a separate discipline and requires a specific focus and course of study with different design requirements.

Obstacles: Linked/Coupled Practice Act v. Title Acts v. Stand Alone Practice Act (cont'd.)

- These include different codes, guidelines, regulations, and standards that govern the work and standards of practice that govern the responsibilities.
- Engineers who practice civil engineering are not subjected to regulations by the structural engineering codes and should not be expected to be current with their requirements.
- Strong "traditional" position by ASCE to require Linked/Coupled Practice Act and only position supported by ASCE.

Observations/Findings/Summary

- Practice Act: Stand Alone vs. Linked/Coupled
  - Stand alone separate practice for each discipline: civil vs. structural.
  - Linked/Coupled Practice Act: must be civil engineer prior to license as structural engineer
  - Act to define the specific work that can be performed, along with the corresponding responsibilities and liabilities (i.e., significant structures)
  - Overlap/crossover … significant structures require SE, other structures may be designed by SE or PE

Observations/Findings/Summary (cont'd.)

- Title Act: Linked/Coupled
  - Must first be a licensed professional/civil engineer
  - Only allows a licensed PE to use an additional specific title (i.e., structural engineer)
  - Additional/special experience and/or examination is required
  - No distinction of the type of structure a PE or SE can design
  - Stepping stone verses road block to Practice Act

Observations/Findings/Summary (cont'd.)

- Special skill set required to practice … E^3
  - Education – MS or equivalent in SE beyond or instead of NCEES for PE
  - Experience – Design complex and/or significant structures with current codes for vertical loads and extreme environmental forces (i.e., wind, seismic) … 4 years minimum
  - Examination – test knowledge required to design for both vertical loads and extreme environmental forces … 24 hours minimum