REPORT ON THE NATIONAL SUMMIT ON

Separate Licensing of Structural Engineers

November 3, 2000

CASE

STRUCTURAL ENGINEERS ASSOCIATION NATIONAL COUNCIL SEA

SEI Structural Engineering Institute of the American Society of Civil Engineers

Acronyms

ABET	Accreditation Board for Engineering and Technology
BASE	Boston Association of Structural Engineers
CASE	Council of American Structural Engineers
CESB	Council of Engineering and Scientific Specialty Boards
NCEES	National Council of Examiners of Engineering and Surveying
NCSEA	National Council of Structural Engineers Association
SEA	Structural Engineers Association
SEAs	Structural Engineering Associations
SEI	Structural Engineering Institute of ASCE

Introduction

For more than 100 years, licensing of construction industry design professionals has served the public well. Building codes combined with licensing laws have reduced the number of structural failures to a low level. In recent years, work done by structural engineers across state borders has increased. In addition to local and regional companies, today many national structural engineering firms do business throughout the country and, in some cases, around the world. Designs may be done by firms with workers located in the United States, Asia, and Europe so that the design process continues 24 hours a day. Because licensing laws are currently enacted on a state-by-state basis, practice across state lines often is impeded unnecessarily. Adjacent states often enact laws that have small, insignificant differences, thereby limiting cross-border licensing and effectively restraining trade.

History of Licensing for Structural Engineers

Architecture was the first construction-related profession to be licensed in the United States. After the great Chicago fire and the building boom that followed, the Illinois legislature recognized the need to keep "fools and rascals" from building unsafe structures. As a result, the State of Illinois enacted the Architecture Licensing Act of 1887. A few years later in 1907, the state of Wyoming recognized the need to license engineers and enacted the first Professional Engineers Act in the United States. Several other states followed these examples and enacted architectural and professional engineering acts in the early part of the century.

In 1915 as buildings in Chicago were becoming taller and more complex and had higher occupancies, Illinois recognized the need to regulate structural engineers. Thus, in 1915 the first Structural Engineers Act was put into law as the third professional practice act in the United States.

Over the years, all 50 states and U.S. territories have enacted legislation to license architects, professional engineers, and land surveyors. Today, three states — Hawaii, Oregon, and Illinois — license the practice of structural engineers separately. At least six other states recognize structural engineers with a title act, which permits any professional engineer to practice structural engineering.

Although all jurisdictions require a combination of education, experience, and examination before a candidate is licensed, there are substantial differences within the requirements. As a result, structural engineers who practice on a national level are faced with a myriad of differing requirements, some of which serve primarily to prevent cross-border practice and, thus, restrain trade.

Educational Requirements

The educational requirements for licensure as a structural engineer are similar in most jurisdictions. Most commonly candidates must be graduates of an Accreditation Board for Engineering and Technology (ABET) accredited school. Most civil engineering schools in the United States and Canada are ABET accredited.

The curriculum required by ABET provide a basic civil engineering education that may, or may not, have an emphasis on structural engineering. One state, Illinois,

requires that the structural engineers meet minimum educational requirements in the design of structures or have an extra four years of experience prior to taking its exam.

Experience

All jurisdictions have similar, loosely defined requirements for experience. Most states require four years of experience, but some allow the applicant to take the examination and become licensed with as little as two years' experience. Many allow a year of experience for graduate study resulting in a master's or doctor's degree. Others allow co-op time as a student. In some jurisdictions, two of the four years of experience must be obtained while the candidate is in a "position of responsible charge." All states require that the work experience, including co-op experience, be under the personal supervision of a U.S. licensed engineer, legally practicing.

The sequence of experience is considered important in some states. Some jurisdictions allow candidates to take the Principles and Practice exam immediately upon graduation. Others require that the experience be obtained prior to taking the exam. California requires candidates to first obtain a PE license followed by experience as a structural engineer. Then they are permitted to take the structural exam.

Minor differences in the laws from state to state often make it difficult to obtain cross-border licenses. These small differences are often rigidly enforced even when their relevance to the practice of structural engineering is not apparent.

Examination

Prior to the first NCEES Fundamentals of Engineering examination administered in 1965, many jurisdictions administered state-prepared examinations. By 1984, all jurisdictions were using the uniform national engineering examinations for professional engineers. About this time, Illinois requested that NCEES prepare two days of examinations for structural engineers. This exam has been administered since the mid-80s. In 2000, the only state that does not accept the NCEES structural examination is California, which still prepares and administers its own in-state structural examinations. In addition, the State of Washington now uses the NCEES structural examination supplemented with its own four-hour exam.

Changes in the Profession

The field of structural engineering is changing rapidly. Buildings and other structures are becoming larger and more complex and are being constructed with new materials and methods. Along with these advances in the state-of-the-practice, owners and the public alike have increased expectations for performance. Some structures are now expected to remain serviceable even after experiencing a traumatic force such as a seismic tremor or winds. As a result, it is more important than ever for all engineers with responsibility for structural projects to have appropriate credentials, stay current in the field, and demonstrate sound judgment that comes only with experience.

Beginning a Dialog

To begin a dialog to assess these issues a National Summit on Separate Licensing of Structural Engineers was held on June 9-10, 2000 at the World Headquarters of the American Society of Civil Engineers (ASCE). The Summit was co-sponsored by the

Council of American Structural Engineers (CASE), the National Council of Structural Engineers Association (NCSEA), and the Structural Engineering Institute (SEI) of ASCE. Nearly 50 leaders in the field of structural engineering met to begin to explore whether the profession should pursue developing separate licensing for structural engineers.

About the Summit

This two-day National Summit on Separate Licensing of Structural Engineers was attended by representatives of many varied structural engineering organizations including SEI, NCSEA, CASE, and many state associations. A copy of the final program of the Summit and an attendance list may be found in Appendix A.

Overview

Gene Corley, PE, SE, Fellow ASCE, opened the Summit by presenting a history of licensing laws, an overview of licensing requirements in the 50 states and four U.S. territories and the District of Columbia today, and other issues relating to separate licensing of structural engineers. He recommended pursuing separate licensure for structural engineers based on a practice act such as exists in Illinois. Additional information on this presentation may be found in Appendix B.

How Other Professions Regulate

Bill Anderson, executive director of the Council of Engineering and Scientific Specialty Boards (CESB), presented a primer on credentials for structural engineering. He explained the differences between licensing, registration, certification, specialty certification, and accreditation and provided an overview of credentials in other engineering fields. He noted that specialty certification is prevalent in the environmental engineering field and also is the model employed by physicians. Physicians are licensed as medical doctors and may then add specialty certifications. He stated that for certification to work, it must have value and be accepted by the profession, employers, and the public. Additional information on this presentation may be found in Appendix C.

Concept of the Master's Degree as the First Professional Degree

Mike Kupferman, managing director, Knowledge Management Division, ASCE, discussed the master's degree as the first professional degree. This position recognizes that the four years required to obtain a bachelor's degree do not provide a sufficient education to practice engineering at a professional level. He noted that civil engineers are required to have 120 to 130 credit hours to obtain a degree versus certified public accounts, who are required to have 150 credit hours of education. He also cited that many engineering employers consider the current four-year degree program a de facto

pre-engineering degree and that more firms are hiring civil engineers with a master's degree. Additional information on this presentation may be found in Appendix D.

Benefits of a Single Professional Engineering License

Walt LeFevre, PE, University of Arkansas, presented a position suggesting that separate licensure for structural engineers is not necessary and that licensing as a professional engineer or civil engineer through the National Council of Examiners of Engineering and Surveying (NCEES) is adequate. He noted that licensure is designed to ensure a minimum level of competence in all practitioners, thereby, protecting the public safety. He said that licensure does not promote excellence, however, and suggested that the profession could create a "diplomate" status for those structural engineers who have achieved a standard of excellence. Additional information on this presentation may be found in Appendix E.

Certificate of Authorization

Jim Trant, vice president of Carter and Burgess, a large architectural and engineering firm with a national practice, discussed Certificates of Authorization (COAs). These state-level regulations stipulate many elements of organizational structure and qualifications for corporate owners, directors, officers, and architects or engineers in charge that must be met in order to do business in the state. Because of conflicting COA requirements between states, engineering companies often need to create multiple corporate entities to do business in more than one state. Jim encouraged the profession to work toward achieving uniform rules for obtaining Certificates of Authorization in all jurisdictions. Additional information on this presentation may be found in Appendix F.

How to Achieve Licensure

The balance of the formal program presented different models for achieving separate licensure or certification for structural engineers. John Shipp, immediate past president of the Structural Engineers Association of California, discussed a potential two-tier model. This model as presented is similar to the present California system where a civil engineer can design most types of buildings, but a structural engineer is required for schools, hospitals, and major structures in some jurisdictions. The approach would create SE-I and SE-II levels of licenses. For instance, an entry-level license, or SE-I, would be sufficient for work on regular, low-rise structures that can be analyzed by static lateral force procedures. A SE-II level would designate full competency for all structures and analysis procedures, including response spectrum and time history dynamic analysis.

Nancy Gavlin, president of the Structural Engineers Association of Illinois, presented a single-tier model. This model is similar to the present system in Illinois. Licensed structural engineers would be qualified to handle all structures — essentially setting the standard for licensing at the SE-II level described above. In this model, other engineers could still work on structural projects, but the responsible engineer for the projects would be required to be a structural engineer who is qualified to work on all structures including those with seismic and wind risks.

Fred Cowen, a practicing structural engineer in Massachusetts and a member of the Boston Association of Structural Engineers (BASE), discussed the feasibility of certification similar to the medical profession. Doctors are licensed by the state and are

then certified to practice a specialty by a board of their peers. Certification is generally required to practice medicine in a hospital.

A final presentation on the case for a national license was led by John Tawresy, vice president of the Structural Engineering Institute (SEI) and a practicing structural engineering in Seattle, Wash. In addition to the obvious benefit of only needing one license to practice structural engineering throughout the U.S., he said that licenses set the standard of ethics, practice, and education required for entry into the profession as well as continuing education to ensure professionals are current with the latest methods and technology.

After dinner, Art Johnson discussed recent efforts in Oregon that have resulted in separate licensure of structural engineers in that state. Additional information on the presentations by Shipp, Gavlin, Cowen, Tawresey, and Johnson may be found in Appendices G, H, I, J, and K respectively.

Breakout Sessions and Discussion

The Summit's second day began with a round-robin series of breakout sessions. For each breakout session there was a facilitator, a recorder, and a reporter. Participants had an opportunity to explore each of the five major issues in more depth and assess the benefits and barriers to each approach. A summary of each breakout session was prepared by its recorder and is presented in the balance of this white paper.

Summary

To assist in determining a sense of direction at the Summit's close, Jim Cagley was asked to serve as an impartial observer and provide his observations. Jim's conclusions are contained in the final section of this white paper.

Breakout Session:

Single-Tier Licensing Program

Nancy Gavlin, Facilitator
Mike Matsumoto, Reporter
Prepared by Howard Dutzi, Recorder

A single-tier license at the national level would qualify a structural engineer to practice in all 50 states plus U.S. territories. As envisioned, this license would designate full competency for all structures and analysis procedures. Although other engineers could still work on structural projects, the responsible engineer for those projects would be a structural engineer who is fully knowledgeable and licensed to handle a full spectrum of structures including those with potential exposure to seismic/wind conditions.

Major Issues

Implementing a national single-tier license would require a massive, long-term effort to gain acceptance among the many jurisdictions and professional organizations. To begin with, engineers, their state licensing boards, state legislators, and other stakeholders must be convinced that a problem exists and that change is required. Proponents would also need to establish a standard definition of structural engineering as distinguished from civil engineering. License qualifications, such as minimal education and experience requirements, must be determined. The profession would also need to gain acceptance of the proposal by the public, peers, and other designated professionals and professional organizations. With these requirements accepted in principal, legislation/regulations must be passed in all 55 jurisdictions.

Most Likely Position

The structural engineering profession, in a unified effort through one or more of its professional organizations such as the Structural Engineers Institute, would take the lead in developing and implementing a single-tier model for the licensing of structural engineers. This organization or coalition would need to achieve a consensus that structural engineering is a distinct engineering discipline requiring a separate license. This effort would most likely require the creation of a national licensing board developed and managed by the profession to establish the minimum criteria necessary to be licensed as a structural engineer. The criteria developed by the board must be acceptable to all 50 states and other U.S. territorial jurisdictions. Engineers presently licensed and performing structural engineering services should be granted the new structural engineering license through a grandfathering provision. Implementing a national license would require careful planning and substantial resources to not only achieve consensus among all stakeholders but also ensure that the necessary legislation and/or regulations are adopted in all 55 jurisdictions.

Strengths

A national single-tier license would create uniform minimum requirements for structural engineers throughout the United States and its territories. This in turn would encourage the development of more consistent educational curriculum for structural engineering and enhance status of structural engineers and the profession. Equally important, achieving uniformly high standards for the profession would provide safer design of structures and better protection of the health, safety, and welfare of the public. It would also permit a “seamless” practice across all states.

Barriers

Implementing a national license for Structural Engineers could be a challenging and lengthy task. It would require substantial resources and time to reach a consensus among the stakeholders, which include all U.S. territories and the 50 states, current licensing boards, state legislatures, professional organizations, and structural engineers themselves. The many perspectives represented by engineering organizations may make it difficult to obtain agreement on all the issues. Civil engineers, most of whom do some structural engineering along with civil projects, may view this as an infringement of their rights. The individual state and territorial licensing boards will undoubtedly resist change thus making it difficult to achieve consensus. In addition, the public and other stakeholders may not concur that a problem exists with the present method of licensing. This would make it difficult to convince state legislators that change is required.

Recommendations

The profession needs to achieve a consensus that uniform requirements for structural engineers are needed among all jurisdictions and to develop a strategy to implement a uniform licensing program. This would require the profession to develop a national licensing board and program that is acceptable to all jurisdictions. All current licensees must be grandfathered. The licensing requirements under this single-tier licensing approach would designate full competency for all structures and analysis procedures.

Breakout Session:

Two-Tier Structural License

John Shipp, Facilitator
Williston Warren, Reporter
Prepared by Donald Friedman, Recorder

The two-tier structural license model assumes two levels of structural engineering licenses, referred to as SE-I and SE-II. These levels were defined with SE-I, representing an "entry-level competency" adequate for the design of regular and low-rise structures, and SE-II, representing competency for all structures.

Given that the goal of the two-tier model is to ensure minimum experience and tested competency for two distinct levels of work, the use of a practice act is necessary. When used by a state in its professional licensing administration, a practice act specifies legal responsibility for various types of work. In contrast to a title act, which sets conditions for use of a specific professional title, a practice act directly controls the manner in which a profession's work is conducted.

Major Issues

The following provides an overview of issues discussed during the breakout sessions. Most were mentioned in more than one session, although issues of particular interest are also listed.

- **Segregation of the Profession**. A concern was expressed that the structural engineering profession — already split from other engineering disciplines and split between buildings, bridges, and civil works — would be split again into two levels.
- **Perception of Lower Quality**. Despite the fact that establishing two levels is designed to ensure a better match between the education, experience, and abilities of individual engineers and the projects on which they work, the public may perceive SE-I engineers as providing lower quality services. This concern may be addressed through the names selected for the two levels.
- **Regional Differences**. The issues of concern to structural engineers vary from state to state, including seismic load, wind load, expansive or other exceptional soil conditions, and the interaction between structural systems and fire-protection. The issues that separate the two levels cannot be defined in terms of any one of these conditions, but should refer to basic principles that can be applied across differing conditions.
- **Peer Acceptance**. Because the model is a practice act, it must be enacted by each of the 55 jurisdictions that provide engineering licenses in the U.S. A coordinated effort reaching across the country and territories will only take place if members of the profession are in agreement on the issue. Thus, peer acceptance becomes a high priority.
- **Complexity and Cost for Relatively Few Engineers**. The administration of a two-tier system, including separate tests for the two levels, tracking two sets of criteria for licenses, and enforcing the practice act differentiation will be complex. This complexity must be put in the context of an overall benefit provided.
- **Defining Two Levels**. There was no clear consensus on the exact definition of the

two levels, although the broad definitions as presented were generally accepted. An exact definition is required.

- **Grandfathering**. Some form of grandfathering is necessary both to obtain acceptance from individual engineers and engineering organizations and to ensure that no one now practicing structural engineering loses their livelihood. Given the mismatch between current licensing laws in most jurisdictions and the proposed model, it is likely that grandfathering will require evaluation of individual cases in addition to a set of broad rules.
- **Re-certification**. Participants expressed concern that not all practitioners would be grandfathered at the level of their choice without re-certification by the state, possibly by examination.
- **Delegation of Work**. As previously discussed by professional organizations in other contexts, the issue of structural engineers of record delegating work must be addressed. Licensing requirements should specify whether an SE-II can delegate portions of a project (e.g. curtain wall supports) to an SE-I. If not, the two-tier model may require changes in standard definitions of scope of work.

Most Likely Position

Assuming that the two-tier model is accepted, the following issues define the most likely position.

- Grandfathering on a state-by-state basis by experience (set regulation) for SE-I and further evaluation by the state organization enforcing the licensure for SE-II.
- National certification for the SE-I and SE-II incorporating a consistent examination nationwide.
- CASE, NCSEA, and SEI should develop a nationwide model for adoption by the jurisdictions.
- The NCSEA and the individual state structural engineering associations (SEAs) should establish the exam content and qualifications.
- The individual SEAs should provide certification for SE-II.
- By stating the education, experience, and examination requirements for the two tiers in detail, the national model would allow each jurisdiction to determine which level is required for different types of structural design locally.

Strengths

The benefits of this position to the profession and the public include:

- A nationwide exam with SEA content and uniform qualifications will be more consistent than the current licensure requirements.
- Current practitioners are likely to support the model because of the grandfathering provisions.
- Nationwide certification for the SE-I and SE-II will provide uniform requirements across jurisdictions and uniform significance to the licenses.
- Uniform requirements promote the profession by elevating the status of structural licenses.
- Licensure administration would be standardized through the SEI/CASE/NCSEA model.
- Having two tiers provides flexibility to meet the needs of individual jurisdictions. While the definition of the tiers would remain consistent across the country, each jurisdiction is free to define the types of projects that require SE-II involvement.

This allows local control over the level of expertise required for differing occupancy uses, applied loads, and building configurations.

Barriers

Barriers to the adoption of the two-tier model were discussed during the sessions. Although each barrier was answered, they represent issues that must be directly addressed in any formal statement of the model.

- Financing must be provided to create the NCSEA/SEI/CASE nationwide model.
- Grandfathering can appear to be self-serving to the public and critical members of the profession.
- Grandfathering means that people who do not qualify under the new requirements will remain in practice.
- National certification runs counter to states' rights arguments in professional licensure.
- Individual jurisdiction licensure boards may be unwilling to give up their individual requirements and distinct examination content.
- Individuals in areas with little work requiring SE-II certification may have difficulty in obtaining experience under the supervision of an SE-II, limiting their professional advancement.
- The profession may be unwilling to accept a two-tier model.

Recommendations

To ensure the success of a two-tier model, several issues must be resolved. The definitions of SE-I (possibly called "Structural Engineer"), and SE-II (possibly called "Structural Engineer Diplomate") must be provided in depth. Consensus on the model must be reached to allow the national professional organizations to begin work on a nationwide model to present to the profession and to the jurisdictions. Grandfathering must be detailed to gain the support of the profession and to ensure fair treatment of current practitioners.

Break-Out Session:

Certificate of Authorization

Marc Barter, PE, Facilitator
Jim Trant, PE, Reporter
Prepared by Greg Schindler, PE, Recorder

Many states require a Certificate of Authorization (COA) for engineering firms to practice in the state. This document is issued by the state government and authorizes the engineering firm to do business in the state. The general principle is that these states want to verify that an engineering firm has the proper qualifications to practice engineering. The administration of this process is usually given to the state board of registration for engineers, although in some states the secretary of state administers the process.

The regulations for authorization vary greatly from state to state. In some states the process amounts to little more than the formality of filling out forms and paying a fee. Other states have more stringent rules, some of which are quite onerous to engineering firms. The rules for one state often are in direct conflict with those of another. Sometimes a firm wishing to practice in a state other than it's domicile will be forced to set up a separate corporation to comply with that state's rules. These rules often center on the requirements for firm ownership. In some states the requirements amount to little more than "gatekeeping" as an attempt to limit work by firms outside the state. In other states, the aim is to protect the public from unscrupulous practitioners.

In some states, an out-of-state engineering firm technically is breaking the law by even proposing on a project in the state without first having a Certificate of Authorization to practice there. In some instances firms are forced to circumvent COA rules by having a staff engineer who is licensed in the project's domicile seal the documents as a sole practitioner.

The inconsistency of rules from state to state and difficulty in complying with them are problems throughout the engineering community. They cause unnecessary effort and expense for engineering firms wishing to do legitimate business with their clients, many of whom have projects in multiple jurisdictions. Restraint of trade also can result as a byproduct of the complications with COA requirements.

The participants in the Summit attempted to address many of these issues in the Certificate of Authorization session. The following provides an overview of issues and possible positions resulting from the COA breakout sessions.

Major Issues

State Regulations

- No organization currently coordinates or even catalogs individual state requirements.
- The definition of what constitutes "working in the state" varies by state.
- The enforcement and policing of the COA regulations vary greatly.
- Any change or attempt to develop consistency in the system may require legislation in most states.

Nationalization

- Common rules on a national basis would require issues of comity, reciprocity, and transferability to be addressed.
- Acceptable rules for a national system would need to address the concerns of the states as well as the engineering community.
- It would be difficult to get 55 jurisdictions to agree on common rules.

Required Qualifications

- Individual states have different rules of qualification for a COA.
- The profession would need to develop a "standard" set of qualifications acceptable to all jurisdictions.
- Most states require firms to have a qualified PE on staff.

Firm Organization

- The requirements for the organization of firms also vary between states.
- The name of the firm, state of formation, type of legal entity (i.e., P.A., P.S.), and insurance status are among the issues that determine a firm's eligibility within a state.

Non-Professional Issues

- COAs can be little more than gatekeeping.
- COAs don't promote uniformity in practice or raise the standard of practice.
- COAs can be a source of revenue for the state government, which brings into question the primary motive for COAs. Are they a public safety or revenue issue?

Professional Issues

- Professional ethics require that firms comply with the laws in the state in which they practice. Many firms do not or cannot — either by error or intent — comply with conflicting requirements of various jurisdictions.
- COAs occasionally force firms to invent "intriguing" approaches to doing business in certain states.
- COAs need to be structured to allow businesses to practice ethically and professionally.

Do We Need COAs? Who Benefits?

The engineering community and state boards of registration should attempt to justify the need for COAs and assess whether they provide a benefit to engineering firms. Some believe that small firms benefit by making it harder for large firms to do work in the state. Others believe that large firms derive a competitive advantage because they have the resources to spend on certification. Additionally, COAs may impede small firms from seeking work across state lines. A national certification program might benefit small firms by making it easier to comply with the rules.

Most Likely Positions

Participants in the breakout sessions on Certificate of Authority identified the following four possible positions that the profession should propose:

1. Establish Common Rules

A common and consistent set of rules should be developed for all jurisdictions to accept as evidence of authority to practice. This should be done nationally, if possible, or at least regionally so that jurisdictions with similar concerns would have similar, non-conflicting regulations.

Benefits of establishing common rules:

- Recognizes that a problem exists.
- Simplifies the certification process both for the applicant and the government.
- Creates transparent borders to increase competition as well as the public's choice for engineering service.
- Provides a higher level of compliance for firms practicing across state lines
- Improves business efficiency for all firms, large and small.
- Promotes a uniform code of conduct.

Barriers to the adoption of common rules:

- Adoption of a uniform standard runs counter to "states rights" issues.
- Jurisdictions may be unwilling to change.
- Laws are difficult to change.
- Special state rules and fees provide a source of revenue for jurisdictions.
- Politicians will undoubtedly get involved, which makes change difficult.
- Developing rules that all jurisdictions can agree upon will be difficult.

2. Study and Eliminate

An effort should be undertaken to study the effectiveness of COA regulations and justify the need based on public safety concerns. Requirements should be eliminated if there is little justification other than gatekeeping.

Benefits of eliminating the COA rules:

- Precludes uneven compliance.
- Allows the focus to be returned to professional registration.

Barriers to eliminating COA rules:

- It will be difficult to gain political acceptance.
- States would be reluctant to remove a source of revenue.

3. Develop Model Law

The engineering community could develop model law as a basis for state laws, not unlike model codes.

Benefits of having a model law:

- Would facilitate the adoption of uniform requirements.
- Would establish a uniform level of practice.
- Would better address justification.
- Would promote uniform compliance.

Barriers to establishing a model law:

- Individual states must adopt it.
- States would be resistant to crafting a law specifically for the state's needs.

4. Publish a Guide

The engineering community could publish an overview or guide document that outlines the issues and obstacles to compliance with COA rules. Such a document would help explain the business and professional aspects of COA compliance.

Benefits of publishing a guideline paper:

- Assist engineering firms to comply with the conflicting laws.
- Increase awareness of the COA issue.

Barriers to publishing a guide

- A guide would not ensure compliance by firms.
- A national group must be interested enough to undertake the study and research and write the document.
- The group would need to distribute the guide.

Summary

Certificates of Authority are confusing at best and chaotic and wasteful at worst. The conflicting rules of the various jurisdictions impede interstate business and promote uneven compliance in the engineering community. The opportunities for interstate practice by engineering firms are commonplace today. Outdated rules in some states result in firms either practicing illegally, spending excessive effort in compliance or undertaking dubious practices to circumvent the laws.

While the rules for COA's affect all disciplines of engineering, it is the recommendation of the participants in this Summit session that the structural engineering community undertake the following tasks:

- Commission a study of the COA regulations nationwide.
- Produce a manual or guideline of information and advice to the profession.
- Work toward the ultimate goal of having uniform rules for obtaining Certificates of Authority in all jurisdictions.

Breakout Session:

Education & Examination Requirements

Prepared by Craig Barnes, Facilitator and Recorder
Art Johnson, Reporter

While there was significant ambivalence as to whether structural engineers should be civil or architectural engineers with a specialty in structural engineering or enrolled in a separate program for structural engineers, there was general consensus that examinations and requirements for education and experience should be uniform, making structural engineering credentials transportable from state to state. In addition, most participants expressed a need for structural engineers to be more involved in shaping the curriculum and testing requirements for the profession.

Major Issues

Many civil and architectural engineering programs lack the courses needed to qualify graduates for structural engineer positions in practitioner firms. In some cases the universities do not offer the right courses; in others the courses are poorly designed. Even when good courses are available, students are often not encouraged to take those courses needed to practice structural engineering.

In addition to curriculum, there are many other issues that must be considered in developing appropriate education and examination requirements for structural engineers. Engineering education should be transportable geographically, and examinations for structural engineers should be uniform for licensure. Summit participants also agreed that there should be an apprentice program incorporating experience with testing and that the experience must be relevant to structural engineering, providing a broad perspective of the structural practice rather than being limited to a specific function such as designing beams/columns.

Equally important, participants agreed that the profession should have input into the accreditation of universities by developing model accreditation criteria. Examinations should be structured for real world situations and leveled to fit the practitioners/test taker.

Most Likely Position

The structural engineering profession should develop a national board to establish uniform education, experience, and examination requirements to certify/license structural engineers in much the same way the American Medical Association and American Bar Association set standards for their professions. This board should draw upon seasoned practitioners in the field to ensure the standards provide adequate educational and experience requirements for candidates to function effectively in the structural engineering workforce.

Strengths

- Raises the level of practice, which in turn supports the national license concept.
- Provides greater public protection through better qualified structural engineers.
- Ensures graduate structural engineers have a more solid educational and experience base so that employer resources currently devoted to remedial training can be freed for other professional and business development.
- Ensures that education and experience are complimentary.
- Improves the dialog between universities and practitioners and helps to develop more practical curriculum content.
- More clearly defines the role of the structural engineer and helps potential structural engineers better understand what will be required of them.
- Provides a supply of better prepared entry-level engineers.
- Allows graduates to seek employment nationally because their credentials are transportable.
- Enhances the image of structural engineers.
- Helps graduates secure larger salaries.

Barriers

- Administration may be complex.
- It may be difficult to achieve consensus on education and experience requirements.
- Implementation might not reduce the failure level.
- Proponents will have to overcome resistance to change.
- Re-examination may be required for existing practitioners seeking registration in another state.
- Implementing uniform education and experience requirements may be politically difficult and may be perceived as “gatekeeping” by structural engineers.
- Academia may oppose splitting the civil engineering curriculum into two distinct disciplines, which could result in separate civil engineer and structural engineer degrees. Architectural engineering programs may also resist the change to structural engineering as a separate curriculum.
- Universities may feel that there are an insufficient number of structural engineers to offer the required courses.
- State boards may not want to use standardized tests.
- ABET and other groups who are currently involved in curriculum development may resist change.

Recommendations

Based on the discussion sessions, most participants agreed that one national professional board should be created to establish uniform education and examination requirements from state to state to certify or license structural engineers. In addition, session participants expressed that leaders in the profession must be more involved in working with universities to improve their curricula to better prepare students with the practical information needed to practice successfully in the field. The group encouraged support for NCSEA’s minimum requirement curriculum as outlined in Table 1. They also expressed that more emphasis should be placed on both education and experience and that the profession needs to provide better input into the education of SE’s.

Table 1

Basic Education Requirements for Structural Engineers

The prerequisite education, training, and examination for certification as a structural engineer shall consist of:

- An equivalent of one full academic year of formal education in structural engineering beyond Elementary Strength of Materials at a school of higher education.
- Four years of supervised structural engineering practice/training under a registered structural engineer.
- Passage of the Fundamentals of Engineering Examination.
- Passage of the Structural Discipline Principles and Practice Examination.

The following provides an example of how these criteria might be met. Academic hours are based on the semester system.

Course	# of courses	Semester credit hours per course
Analysis	2	3
Matrix Methods	1	3
Steel Design (including code application)	2	3
Concrete Design (including code application)	2	3
Timber Behavior and Design	1	3
Masonry Behavior and Design	1	3
Dynamic Behavior (including Seismic)	1	3
Foundation Mechanics/Soils	1	3
Technical Writing	1	3

Break-Out Session:

Certification and Self-Regulation

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Another option presented for consideration was professional certification. In it's favor, certification could be overseen by a coalition of professional societies serving as a national certification board. In contrast, national licensing would require developing model legislation/regulations and implementing them in 55 separate legislatures. A national certification program would help regulate the professional practice standards and qualifications to practice. In addition, certification could be used as a first step towards achieving uniform licensing for structural engineers. Because professional certification would not have the force of law, it would require the support of the profession to become the de facto standard for professional practice.

Most Likely Position

The profession should build a strong structural engineering organization that promotes certification and re-certification of licensed professional engineers. The certification board should include representatives from all structural engineering organizations. Such a program could designate a diplomate status, certifying that the structural engineer has achieved a standard of excellence. A board-certified diplomate would have privileges and responsibilities, clearly defined by the board, with the aim of raising the standards of practice of structural engineering.

Strengths

Professional standards would be set by the structural engineering community and reflect the profession's desire to raise its standard of excellence in education and practice. Standards established for the structural engineering certificate could also be adopted by states and, as a result, help to standardize licensing requirements from state to state. Long-term, if certification is well accepted by the profession, state boards may lower their involvement in licensing structural engineers, leaving certification to the profession.

Raising the standards for practice certification could also lower liability insurance rates for certified structural engineers. Developing professional certification on a national level would ensure acceptance among clients anywhere in the country.

In addition, certification can help the structural engineering professional gain parity with other professions, thus enhancing the prestige and position of a structural engineer.

Barriers

There are also challenges to establishing a widely accepted certification program, including turf issues, organizational constraints, and governmental red tape. Implementation would also require a major educational effort on the advantages and usefulness of the certificate. If the profession chose to promote the certification program as the basis for licensure, it would have to lobby state by state to gain acceptance. Most government agencies are resistant to change, hence efforts to gain professional and public acceptance would be diluted by efforts to gain state agency acceptance.

Developing the issuing authority, the costs of certification, and the slow process to change state regulations are among the challenges for this position. In addition, a certification program developed by the profession may have the perception of being self-serving.

Recommendation

Certification provides the quickest and easiest way to move toward a uniform standard for structural engineering, circumventing the need to work through all 55 jurisdictions to achieve consensus. It allows the profession to explore the issues, achieve consensus, and build momentum for a unified standard. When standards are accepted by a professional community many jurisdictions will review them and consider adopting them.

The profession should develop a coalition with SEI, NCSEA, and CASE to spearhead the certification program and develop the process and procedures to certify structural engineers in the United States. The program should be developed working closely with NCEES and cover certification, re-certification, minimum qualifications, and continuing education requirements in such a fashion as to raise the professional standards rather than lower them.

Once a certification program is in place, the coalition can begin to move forward lobbying states to adopt the uniform standard. The coalition should work to help states recognize the benefits of adopting a standard established and maintained by a professional organization. These benefits include substantial savings in manpower and resources when states no longer need to maintain and enforce a separate professional standard for structural engineers.

Summary

Prepared by Jim Cagley

The field of structural engineering is changing rapidly. The structures being designed are larger and more complex. Structural engineers have access to new materials and methods. In addition, owners and the public alike have increased expectations for performance. It is no longer good enough for a building not to fail, for the structures to be safe. Some structures are now expected to remain serviceable even after experiencing a traumatic force such as a seismic tremor or winds. As a result, it's more important than ever for all engineers with responsibility for structural projects to have appropriate credentials, stay current in the field, and demonstrate sound judgment that comes only with experience.

The Summit addressed academic credentials, testing, licensing, and national certification for structural engineers, as well as issues related to certificates of authorization for engineering firms. While a majority of Summit participants favored some sort of separate licensing as a way to ensure only qualified professionals practice structural engineering, there was significant debate about the best way to achieve that goal.

Single-Tier License

One group championed a one-tier model with licensed structural engineers being qualified to handle all structures, essentially setting the standard for licensing at the SE-II level described above. Proponents of this option said that although other engineers could still work on structural projects, the responsible engineer for those projects should be a structural engineer who is fully knowledgeable in the field. Major points on this position include:

- Change is warranted.
- The profession needs to develop a strategy and implementation plan for uniform licensing of structural engineers.
- The profession should create a national licensing board accepted by all jurisdictions.
- All current licensees should be grandfathered.
- The development of a model law and a national examination board would be steps toward achieving this goal.

Two-Tier License

Others favored a two-tier model. An entry-level license, or SE-I, would be sufficient for regular, low-rise structures that can be analyzed by static lateral force procedures. A SE-II level would designate full competency for all structures and analysis procedures, including response spectrum and time history dynamic analysis. Major points of the position include:

- Grandfather current practitioners by experience for SE-I and further evaluation for SE-II.
- Develop national certification for structural engineers (SE's).

- Develop a national model law through NCSEA/SEI/CASE.
- Require licensure for structural engineers.
- Have the Structural Engineer Associations (SEA) establish exam content and qualifications.
- Provide SEA certification for SE-II.

The two-tier model could be defined with SE-I titled “Structural Engineer” and SE-II titled “Structural Diplomate.”

Certification

Another option presented was professional certification. In it’s favor, certification could be overseen by a coalition of professional societies serving as the national certification board. In contrast, national licensing would require developing model legislation/regulation and working for implementation with 55 separate legislatures. Points for consideration include:

- Building a strong SE organization that promotes certification.
- Developing a consensus in our SE community.
- Preparing a strategic plan for certification.
- Using certification as an interim step to the goal of structural licensing.
- Overcoming concern that non-mandatory certification does not protect the public.
- Instituting an issuing authority through SEI, CASE, and NCSEA.

Even if the certification is non-mandatory it can be effective. Structural engineers have an excellent model in the National Practice Guidelines for the Structural Engineer of Record (SER). In many geographic areas, the use of SER practice guidelines has become the way to do business.

Certificates of Authorization

Much in the same way that the IBC model building code provides a common standard for construction, participants expressed a need to have uniform standards from jurisdiction to jurisdiction for Certificates of Authorization. These state-level regulations, stipulate many elements of organizational structure and qualifications for corporate owners, directors, officers, and architects or engineers in charge. Because of conflicting requirements between states, engineering companies often need to create multiple corporate entities to practice in multiple states. Options to consider include:

- Developing nationally acceptable rules for Certificates of Authority (COA).
- Developing a common COA process.
- Eliminating the requirement.
- Developing consistent requirements for use on a national basis.
- Proposing a model law to states.
- Publishing a unified opinion to explain the structural engineer position.

It seems unlikely that states will give up Certificates of Authority because they provide a basis to regulate and tax business in their state. Thus, the profession should work to make COAs as consistent and acceptable as possible.

Education and Examination Requirements

Education and examination requirements for structural engineers should be uniform from state to state. Many civil engineering programs lack the courses needed to qualify graduates for structural engineer positions in practitioner firms. Points to consider include:

- Testing procedures and examinations should be uniform.
- A separate SE license would protect the public.
- University curricula need to be improved.
- One national board would provide uniform education and exam requirements and certify structural engineers.
- Professional requirements should place emphasis on education and experience.
- The profession needs better input into the education of SE's.
- Post-graduate education requirements could address undergraduate deficiencies.
- Minimum continuing education requirements should be included as part of renewing the SE license.

The structural engineering community should develop a recommended curriculum and promote it to the universities. The profession needs to inform academia of its needs. An NCSEA committee, chaired by Craig Barnes, has developed a curriculum that has been tested at the universities in the Boston area with some success.

Other Issues

Summit participants also discussed whether structural engineers should be civil engineers with a specialty in structural engineering or a discrete discipline. Most participants expressed a need for structural engineers to have the broad perspective civil engineering provides. They suggested that structural engineers need to understand the whole environment in which a structure will function, not just the structural components.

The issue of CE vs. SE also has broad ramifications for the educational system. While there was significant ambivalence as to whether structural engineers should be civil engineers with a specialty in structural engineering or enrolled in a separate program for structural engineers, there was general consensus that it takes about 160 credit hours in a civil/structural engineering curriculum to provide adequate background. Because of rapid advancements in the field, participants generally agreed that any licensing or certification program should include a requirement for continuing education.

Where Do We Go From Here?

While the Summit's goal was to engender dialog rather than seek consensus among its participants, a few broad areas of agreement emerged from the discussions:

- Requirements, testing, and exams for structural engineers should be uniform from state to state.
- University curricula for structural engineering need to be improved and that the profession should work more closely with universities to ensure curricula prepares engineers to practice in the field.
- More emphasis should be placed on experience and judgement of structural engineers in licensing exams. This requires essay rather than multiple-choice questions.
- There is a need to enhance the professional recognition of structural engineers and

achieve compensation and respect commensurate with their level of responsibility and risk.

Based on recommendations developed in the discussion groups, the following may provide realistic objectives for the profession:

1. Develop a model law that could be used by each state to provide more uniform licensing requirements.
2. Create a National Examination Board.
3. Develop a model law for Certificates of Authority.
4. Develop a curriculum that the profession feels will prepare structural engineering students for our field. Promote this curriculum to the universities and the legislatures.
5. Develop a certification procedure as an interim step to separate licensure.
6. Meet again in a year to assess our progress.

Practicing structural engineers should review this white paper, challenge its thoughts and recommendations, and let their views be known. While the group present at the Summit represented a fair cross section of the profession, input from as many structural engineers as possible is needed to ensure the profession achieves consensus and is able to move forward on these issues of vital interest.

Please feel free to send any comments, opinions, or observations you might have regarding either the content of this white paper or any aspect of separate licensing of structural engineers to Jim Rossberg, Structural Engineering Institute, 1801 Alexander Bell Drive, Reston, VA 20191 or jrossberg@asce.org. All comments received will be circulated to all members of the joint task committee of CASE, NCSEA, and SEI.