Structural Engineers Association of Alaska

Recommendations for Implementing a Structural Engineering License

May 28, 2008

I. INTRODUCTION

This paper presents recommendations to the State of Alaska's AELS Board to assist with the establishment of a policy to govern the practice of Structural Engineering. It includes guidelines for the implementation of that policy and presents the minimum requirements to become a licensed Structural Engineer. In developing this paper, the Structural Engineers Association of Alaska (SEAAK) has carefully considered the unique practice and management issues that will need to be addressed in Alaska. The recommendations are made with due consideration of the licensing laws in other jurisdictions in the United States, as well, so that the maximum benefit can be obtained in administering the required tests and facilitating licensure by comity. It is sensitive to the need to protect the practice of those that are currently engaged in the profession of structural engineering. There are no economic benefits to any individuals by the adoption of these regulations. The primary goals are to protect the public and to bring Alaska into conformance with an emerging professional licensing trend across the United States. Given the importance of structural engineering to the built environment, Alaska is remiss to not have a policy to distinguish and regulate this unique practice.

II. BACKGROUND

Historically, Alaska has accepted that any engineer with a civil engineering degree is automatically qualified to also be a Structural Engineer, and to use that title. Engineers who have dedicated their careers to the analysis and design of structures as a profession today, however, recognize that the demands and complexity of the discipline have changed. There is a significant body of knowledge to be mastered, and the consequences of errors and omissions can be serious. Given those consequences, it is reasonable to expect that the practice of structural engineering be recognized.

There is an argument that Professional Engineers would not ethically practice in a field in which they were not qualified. While that is the high moral road to take in a discussion, the reality is that inappropriate structural engineering is performed for a variety of reasons. Self-monitored practice is not reasonable given the complexity of the practice, consequences of failure, and responsibility to society. At some point, the engineering profession, along with the society in which it functions, needs to recognize the unique and distinct nature of its disciplines of practice. To not do so is irresponsible. The point when this recognition is appropriate can depend on many things, but is tied to a community's awareness of the issues of concern and the significance of the Structural Engineer's role in the built environment. In Alaska, that time is now. We have a significant and growing built environment, and our structures experience the most challenging lateral and gravity loads in the country.

One of the primary principles upon which the engineering profession is founded is to provide for the public's safety. While this is true of other professions, and certainly a focus of all engineering disciplines, the role of the Structural Engineer is notable for its direct relation to the stated principle. If structures fail, the public is at risk. That in itself would not necessarily be cause for creating a unique designation for one who is qualified to practice Structural

Engineering in a society. There are other considerations as well, including the increasingly technical body of knowledge to be mastered and the need for an extensive apprenticeship. Without these academic efforts and tutorial experiences, one cannot adequately perform the calculations or produce the documents from which structures are built. These are not trivial skills. It takes dedication and commitment over an extended period of time.

Alaska is at a point in its history when it is time to consider a change in its licensing laws to recognize Structural Engineering as a distinct profession. There is a significant difference in conditions that face the State now, as opposed to when current laws were formulated. In its early history, Alaska did not have a large built environment nor the depth of in-state Engineers to make this distinction necessary. The construction environment was well served by Civil Engineers that were able to practice across a broad field of practice. Not only has the constructed facility environment changed, and the number of practicing engineers increased, but the field of Structural Engineering has also changed considerably. The methods of analysis, code requirements, materials used, and knowledge of Alaskan environmental conditions have grown and changed as a function of the growth of the state and national governing bodies.

III. PROCEDURES FOR LICENSING

A. Practice versus Title Act

Independent structural engineering licensure has currently been established in ten states by regulation of either the Title or Practice of structural engineering. Two states, Hawaii and Illinois, have established full practice acts, requiring all structural engineering to be conducted by licensed Structural Engineers. Five states, California, Oregon, Utah, Washington, and Nevada, have established partial practice statutes or rules to regulate structural engineering to specific types of structures. Three states, Idaho, New Mexico, and Nebraska, have established title rules. Several other states are in the process of implementing similar acts. As the State of Alaska proceeds with the establishment of regulations to govern structural engineering practice, the benefits of a “practice” versus “title” act need to be carefully considered.

A “title act” regulates the use of the title of “Structural Engineer” by limiting the use of the title to licensees who have demonstrated a level of expertise in structural engineering through a combination of education, testing, and experience, as established by the board. A title act would not limit the practice of structural engineering to only licensed Structural Engineers. Civil Engineers or Architects would continue to be able to provide structural designs for structures for which they are competent. However, only individuals licensed by the state as structural engineers would be permitted to refer to themselves or advertise as a Structural Engineer. Regulation of who can use the term “Structural Engineer” would benefit the public by establishing the title of Structural Engineer as identifying those individuals with specific expertise in structural design. The public could utilize this designation to determine the level of qualifications needed for specific projects. The primary negative with a title act is that it does nothing to limit the practice of structural engineering to those who have demonstrated specific competence in structural design.

A "practice act" limits the practice of structural engineering to those who have demonstrated a level of expertise in structural engineering through a combination of education, testing, and experience as established by the board. A practice act prohibits engineers, architects, or other individuals not specifically licensed as a Structural Engineer from providing structural design services. The primary benefit of a practice act is that it provides the maximum protection to the public life, safety, and welfare by strictly limiting structural design services to those who meet the standards set by the board. The primary negative of a practice act is that those who currently provide structural engineering services as Civil Engineers or Architects, but do not meet the grandfather or testing requirements established by the Board, would no longer be permitted to practice structural engineering.

SEAAK recommends adoption of a partial practice act, regulating the practice of structural engineering in regards to specific structures where increased health, safety, and welfare risks are inherent to their design. Structures which are not identified by the board as requiring design by a Structural Engineer would be permitted to be designed by a Civil Engineer or Architect, as currently established by the board. A partial practice act would increase protection to the public by limiting the design of all essential, higher risk facilities to those with the education and expertise required for their design. The use of the title of "Structural Engineer" should also be limited to those who have been issued a separate structural engineering license by the State. The partial practice act as proposed would continue to allow licensed Civil Engineers or Architects to provide structural design services on lower risk structures where the additional expertise of a Structural Engineer is not required. By regulating the title and practice of structural engineering as proposed, the health, safety, and welfare of the public will be afforded a much greater level of protection than provided by current regulation.

B. Structures Requiring a Structural Engineer

The purpose of this section is to define significant structures, which will require the work to be done under the direct supervision of, and sealed by, a Structural Engineer registered in the State of Alaska.

For buildings and structures meeting the definition of a significant structure, defined herein, all new significant construction, including additions, structural remodels, components, cladding, and other accessories requiring structural analysis and design, shall be provided by a Structural Engineer registered in the State of Alaska

Professional structural engineering or the practice of "structural engineering" means the design and analysis of significant structures, including:

1. Buildings and other structures, greater than 5,000 square feet in area, representing a substantial hazard to human life in the event of failure. The definition of these buildings shall be as described as "Category III Buildings"[*] in the edition of the International Building Code (IBC) adopted by the State Fire Marshall's office.

[*] As defined in the IBC 2006 (see Appendix A). As this document is revised periodically, it is the intent that the definition of structures requiring a Structural Engineer be revised in the same way.

2. Buildings and other structures, greater than 5,000 square feet in area, designated as essential facilities as described as "Category IV Buildings"* in the edition of the IBC adopted by the State Fire Marshall's office.

3. Buildings and other structures requiring special consideration, including:

    a. Structures or buildings that are:

        (1) Normally occupied by human beings; and
        (2) Three stories or more in height; or
        (3) Have an average roof height more than 50 feet above the average ground level measured at the perimeter of the structure.

    b. All buildings over 50,000 aggregate gross square feet in area.

    c. Buildings in remote communities, greater than 5,000 square feet in area, that serve as the emergency shelter for that community.

        Comment: These regulations will not apply to residential structures that are exempted in accordance with Alaska Statue 08.48.331(6).

4. Bridges and Piers

    a. Bridges longer than 100 feet; or

    b. Bridges classified as Essential or Critical by the latest addition of the AASHTO LRFD Bridge Design Specification.

5. Docks and port facilities, including piers, mooring structures, breasting structures, gangways and transfer bridges, that:

    a. Are greater than 10,000 square feet in area; or

    b. Serve public passenger ships carrying 250 passengers or more; or

    c. Have been designated by a local governing body as one that plays a role in emergency response efforts.

    Comment: *The design and construction of marine facilities is vaguely covered by the International Building Code and some cities and municipalities directly exclude them from the jurisdiction of the building department. Marine facilities are designed under many standards: parts that are subject to vehicle loadings falling under standards of bridge design, other elements, such as those that are open to pedestrians, fall under standards citied in the building code. Lateral load resisting systems on docks, piers,*

* As defined in the IBC 2006 (see Appendix A). As this document is revised periodically, it is the intent that the definition of structures requiring a Structural Engineer be revised in the same way.

mooring structures and breasting structures are often governed by the mooring loads, breasting loads and loads from wind and wave forces and not seismic or wind loads. Those who specialize in the design of these facilities do not necessarily design buildings. It is recognized that this area of concern will deserve further review prior to implementing a structural engineering license.

C. Testing

Alaska would be best served to implement a testing policy that is similar to what is done in other states. We should make an effort to conform with the national trend for uniformity in the licensing methodology. This will simplify future developments and make registration by comity between states simpler to manage. It also will make it easy for the AELS Board to administer the tests that are required. Currently there are structural examinations that are administered by NCEES in all states except California. They are known as the SE I and the SE II, and they are both 8-hour examinations. The SE I is somewhat equivalent to the test one would take if they only did structural problems on the PE examination.

The SE II test is administered in many States, includes testing for a more experienced Structural Engineer, but it does not contain a rigorous seismic component. As a result of this omission, the most western states, including California, Oregon, Washington and Hawaii require that the SE take a 16-hour, two-day test to provide competency. To address that requirement, Washington and Oregon, along with British Columbia, prepare a common 8 hour test, known as the SE III, which tests seismic design skills. There is also a current effort in NCEES to develop a 16-hour examination which tests advanced structural knowledge, including the seismic component, which will take the place of the SE II and SE III series. The 16-hour NCEES examination is expected to be the national standard when it comes out in 2011.

At this point in time Alaska should specify in its rules that Structural Engineer applicant should take a 16-hour examination after successful completion of the PE test, and not be specific about what that exam is. The Board would have the jurisdiction to select the test now, and revise the requirement as appropriate in the future. In recent conversations with representatives in Washington it appears that Alaska would probably be able to share in the use of the SE III test that they have prepared with Oregon and BC. The Structural Engineer candidate would need to include the cost for that test in the application fee. The requirement for a 16-hour examination is consistent with the majority of current states with a Structural Engineering License.

1. Proposed Testing Requirements

   To become licensed as a professional engineer in the branch of structural engineering the candidate must pass:

   a. The fundamentals-of-engineering examination (FE), and

   b. The NCEES Principals and Practice examination (or successful completion of the NCEES Structures I examination), and

   c. A 16-hour structural examination as directed by the AELS Board.

This does not preclude the requirement for other licensing steps such as the Arctic Engineering test, ethical tests, or legal tests that may be appropriate.

D. Experience

As with the testing requirements, Alaska's policies for Structural Engineering candidates should match the requirements in other states as much as possible. While the requirements differ somewhat in the states, it is in Alaska's best interest to match the requirements of Washington, which are relatively uniform. Those requirements are for the candidate to have two years of verifiable experience, after passing the PE examination, under the direction of a licensed Structural Engineer.

E. Grandfathering Policy

SEAAK believes that a grandfathering process is necessary to prevent loss of practice for those who are currently providing structural engineering services in Alaska. There are three elements to this process. First, this process should be such that the members of the board can evaluate the experience of applicants without specialized help and the incumbent expense. Secondly, it should not be too onerous for the applicant to produce. Finally, there should be a time limit on the process.

We suggest the following criteria for granting of a structural engineering license to individuals claiming to be practicing structural engineering in Alaska:

1. The individual must be licensed as a Civil Engineer in the State of Alaska at the time of adoption of the Structural Engineer licensing regulations.

2. The individual must have practiced Civil Engineering for a minimum of two years after licensure.

3. The individual must also meet one of the following three criteria:

    a. Be licensed as a Structural Engineer in another state.

    b. Have passed a 16 hour Structural examination as determined by the AELS Board..

    c. Demonstrate to the satisfaction of the Board that the engineer has sufficient experience in the duties typically provided by a professional Structural Engineer. This shall require a resume describing the engineer's practice and listing the names and descriptions of representative structures, for which the engineer was the Engineer in responsible charge, in the last ten years, and a brief summary of the duties performed by the engineer. A form similar to the State of Washington's experience verification form (part of the Structural Engineer's license application) may be used to verify experience. It will also require the submittal of three references from other licensed Engineers or Architects verifying that the applicant's experience meets the State's expectations for Structural Engineer licensure.

The engineer should have one year or until the end of the current biennium, whichever is longer, to present qualifications to the Board for granting of structural engineering licensure via the grandfathering process.

F. Comity

Comity should not be a difficult rule to establish. We would expect that this language would reflect what is done now for comity in other disciplines. The goal is to grant comity for those that have met similar requirements for testing and experience to what is required in Alaska

The State, however, will always need to keep a record of which Engineers have received their Structural Engineering license by test, versus the ones that received it by the initial grandfathering process. This will be important to Engineers that are using their Alaskan registration to acquire licensure in other states.

Appendix A

SIGNIFICANT STRUCTURES

The IBC 2006 description of Category III and Category IV structures that is in place at this time is presented below. As this document is revised periodically, it is the intent that the definition of structures requiring a Structural Engineer be revised in the same way.

1. Buildings and other structures, greater than 5,000 square feet in area, representing a substantial hazard to human life in the event of failure. The definition of these buildings shall be as described as "Category III Buildings" in the edition of the International Building Code (IBC) adopted by the State Fire Marshall's office.

    a. Buildings and other structures whose primary occupancy is public assembly with an occupant load greater than 300;

    b. Buildings and other structures with elementary school, secondary school, or day care facilities with an occupant load greater than 250;

    c. Buildings and other structures with an occupant load greater than 500 for colleges or adult education facilities;

    d. Health care facilities with an occupant load of 50 or more resident patients, but not having surgery or emergency treatment facilities;

    e. Jails and detention facilities; or

    f. An occupancy with an occupant load greater than 5,000;

    g. Power-generating stations, water treatment for potable water, waste water treatment facilities and other public utility facilities not included in Item 2 below.

    h. Buildings and other structures not included in Item 2 below, containing sufficient quantities, determined by the authority having jurisdiction, of toxic or explosive substances to be dangerous to the public if released.

2. Buildings and other structures, greater than 5,000 square feet in area, designated as "essential facilities" as described as "Category IV Buildings" in the edition of the IBC adopted by the State Fire Marshall's office.

    a. Hospitals and other health care facilities having surgery or emergency treatment facilities;

    b. Fire, rescue, and police stations and emergency vehicle garages;

    c. Designated earthquake, hurricane, or other emergency shelters;

d. Designated emergency preparedness, communication, and operation centers and other buildings required for emergency response;

e. Power-generating stations and other public utility facilities required as emergency backup facilities;

f. Structures containing highly toxic materials as defined by the division by rule, where the quantity of the material exceeds the maximum allowable quantities set by the division by rule;

g. Aviation control towers, air traffic control centers, and emergency aircraft hangars;

h. Water treatment facilities required to maintain water pressure for fire suppression.