



Guidance

For

Civil Engineering Students

On

Licensing and Ethical Responsibilities

From the

American Society of Civil Engineers

Developed for ASCE by the
National Institute for Engineering Ethics
(www.niee.org)
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September 2001

What is a Licensed Civil Engineer?

All states have laws that govern the practice of engineering. Known as an "Engineering Practice Act," the primary purpose of this legislation is *to protect the health, safety and welfare of the citizens of that state*. Such laws define engineering practice and establish requirements for an individual to become licensed as a Professional Engineer (PE) in the state.

Having an engineering license means more than just meeting a State's minimum requirements. It means you have accepted both the technical and the ethical obligations of the engineering profession.

As a Professional Engineer, you can take pride in being officially recognized by the state and by the public as an "engineer" (Ref: *ASCE Policy Statement 433*).

The professional engineer license grants you the opportunity to perform engineering services for the public, and have the privilege of applying your state-authorized engineering seal to your engineering work. With this privilege comes the obligation to take responsibility for your designs, reports, professional opinions, and plans.



What are Licensing Requirements?

Although there are special considerations regarding experience and education requirements in some states, the typical licensure requirements are:

1. Graduating from an ABET accredited engineering program; or an ABET accredited engineering technology program in some states.
2. Passing the national Fundamentals of Engineering (FE) exam offered by the National Council of Examiners for Engineering and Surveying (NCEES);
3. Obtaining four years (or, three years past a masters degree in some states) of acceptable engineering experience, with increasing levels of responsibility, preferably under the guidance of one or more licensed engineers;
4. Submitting a detailed application documenting, among other things, a progressive increase in responsible professional experience, and including both professional and character references; and
5. Passing the Principles and Practice of Engineering (PE) exam offered by NCEES. Some states have an additional exam offered by the state board that covers their principles of conduct and ethics.

Civil Engineering students are encouraged to carefully prepare for the national Fundamentals of Engineering (FE) Exam, which may be taken during the senior year.

Why Should I Become a Licensed Engineer?

Civil Engineering students are strongly encouraged to become licensed engineers. Although many engineers in other disciplines work in an industrial setting where a license is not required to do engineering work inside the company (such as within the confines of a petro-chemical plant), Civil Engineers are most often involved in engineering services directly for the public. Let's consider some other reasons to become a licensed engineer:

- **Technical Responsibility:** Your education and experience will prepare you for technical engineering work. Your license legally allows you to take personal responsibility for the engineering work that you may perform for public and private clients.
- **Public Recognition:** As a licensed engineer, you achieve an enhanced status in the eyes of the public, which equates you with professionals licensed in other fields such as physicians, attorneys, and accountants.
- **Private Practice:** If you think you may now, or someday, want to pursue a career as a consulting engineer, or own your own engineering firm, or be in responsible charge of engineering work for the public, you must be licensed.
- **Public Practice:** Many federal, state, and municipal agencies require that certain responsible engineering positions, particularly those considered "higher level," be filled only by licensed engineers (Ref: ASCE Policy Statement #385).
- **Changing Workplace:** Today's workplace is rapidly changing: restructuring, downsizing, privatization, and outsourcing (where firms terminate employees and then hire them back as consultants) are common. You should be prepared to face a possible transition into a consulting or contract relationship with a former employer in the event of corporate outsourcing. Such a relationship requires an engineering license.
- **Ethical Responsibility:** Licensure also aids you and the profession in the important area of ethics. While technical societies such as ASCE and others have codes of ethics for guidance, none of these codes have "legal" standing in the practice of engineering. On the other hand, state licensing boards have standards of ethical conduct that are legally binding. The recognition and enforcement of these standards gives greater definition to our profession, and significantly enhances the image of licensed Civil Engineers.

What are the Technical & Ethical Responsibilities of Licensed Civil Engineers?

Most of a Civil Engineer's education focuses on technical matters, that is, "how to do things right," and most of the engineer's professional practice is devoted to applying this technical knowledge in service to the needs of society.

Another important element of both education and practice involves *ethics*, or "doing the right thing." (Ref: ASCE Ethics Manual at http://www.asce.org/pdf/ethics_manual.pdf)

Ethics is a vital part of the engineering profession. The ethical issues that face Civil Engineering students, young engineers, and licensed professional engineers are not always easy to answer.

Choosing between "good" and "bad" appears easy until unseen variables are introduced such as time constraints, family, promotion opportunities, job security, peer pressure, supervisor pressure, and professional reputation.

Engineers are not only faced with choices between good and bad, but often a more difficult ethical dilemma occurs when making choices between competing goods.



Students are encouraged to develop:

1. **Understanding** - A clear understanding of professional ethics
2. **Communication Skills** - An ability and willingness to communicate about ethical issues
3. **Insight:**
 - a) Ability to recognize ethical issues
 - b) Appreciation of the frequency at which ethical issues occur
 - c) Awareness that guidance on ethical dilemmas is available from ASCE and elsewhere
4. **Comprehension** - "Knowing What's Right"
5. **Desire and Willingness** - to "Do What's Right"
6. **Ability to Resolve Ethical Issues** - by using traditional Civil Engineering methods of inquiry, namely:
 - a) Listing the options
 - b) Testing the options
 - c) Making a decision, and most importantly
 - d) **Acting !**

Real-Life Experiences in the Practice of Civil Engineering

In order to help you to be better prepared to face and resolve ethical dilemmas, we present the following story about an engineer named **"Sara."**

Drawn from real-life situations* that actually occurred to practicing engineers, this story includes some typical ethical situations that may confront Civil Engineers during the course of their engineering career.

This story was designed with three purposes in mind:

- 1) To make Civil Engineering students aware of the importance of licensing and how licensure and ethics are related,
- 2) To encourage Civil Engineering students to become acquainted with the ASCE Code of Ethics, and
- 3) To help students develop an ability to recognize and resolve ethical issues.

** Note: Some situations are based on cases from the NSPE Board of Ethical Review.*

Remember: The following experiences have actually happened to engineers in the past and could happen to you. You will benefit from these experiences best if you consider the circumstances from three viewpoints:

- 1) From a **"personal"** viewpoint - think of yourself as being in **Sara's** situations, viewing them as your own potential experiences,
- 2) From an **"impersonal"** viewpoint - consider being only indirectly involved, like **Sara's** friend or co-worker, and
- 3) From a **"responsibility"** viewpoint - as if you are not **Sara**, but you are responsible for the final outcome of the situations.

Try to resolve the issues as if you were really 'in' the scenario, considering the importance of your family, your clients, your job, your reputation, the public, and the future of the engineering profession.

-- Sara's Story --

Dense fog crept up to the lake shore and Sara's bare feet scarcely left indentations in the wet sand. The night seemed as impenetrable as many of the dilemmas she had encountered in her years as an engineer.

Last month, Sara was reported to her State's Engineer's Board for a possible ethics violation. Tomorrow morning she would meet with the Board and though she felt she had done nothing unethical, Sara's eyes had been opened to the complexity and gravity of ethical dilemmas in engineering practice. She wished she had sought and/or received better guidance regarding ethical issues earlier in her career.



Sara reflected on how she got to this point in her career.

* * *

When Sara had been a senior Civil Engineering student in an ABET-accredited program at the State University, she immersed herself in her course work. Graduating at the top of her class assured Sara that she would have some choice in her career direction.

Knowing that she wanted to become a licensed engineer, Sara took and passed the Fundamentals of Engineering (FE) exam during her senior year and after graduation, went to work as an Engineer Intern (EI) for a company that would allow her to achieve that goal. Sara was excited about her new job -- she worked diligently for four years under licensed engineers and was assigned increasing responsibilities. She was now ready to take the PE exam and become licensed.

Just before taking the PE licensing exam, Sara's firm was retained to investigate the structural integrity of an apartment complex that the firm's client planned to sell. Sara's supervisor informed her in no uncertain terms that the client required that the structural report remain confidential. Later, the client informed Sara that he planned to sell the occupied property "as is."

During Sara's investigation she found no significant structural problems with the apartment complex. However, she did observe some electrical deficiencies that she believed violated city codes and could pose a safety hazard to the occupants.

Realizing that electrical matters were, in a manner of speaking, *not* her direct area of expertise, Sara discussed possible approaches with her colleague and friend, Tom. Also an Engineer Intern, Tom had been an officer in the student chapter of ASCE during their college years. During their conversation, Tom commented that based on the ASCE Code of Ethics, he believed Sara had an ethical obligation to disclose this health-safety problem.

Sara felt Tom did not appreciate the fact that she had been clearly instructed to keep such information confidential, and she certainly did not want to damage the client relationship. Nevertheless, with reluctance, Sara verbally informed the client about the problem and made an oblique reference to the electrical deficiencies in her report, which her supervisor signed and sealed. Several weeks later, Sara learned that her client did not inform either the residents of the apartment complex or the prospective buyer about her concerns.

Although Sara felt confident and pleased with her work on the project, the situation about the electrical deficiencies continued to bother her. She wondered if she had an ethical obligation to do more than just tell the client and state her concerns in her report. The thought of informing the proper authorities occurred to her, especially since the client was not disclosing the potential safety concerns to either the occupants or the buyer. She toyed with the idea of discussing the situation with her immediate supervisor but since everyone seemed satisfied, Sara moved onto other projects and eventually put it out of her mind.



Questions:

- What were the main issues Sara was wrestling with in this situation?
- Do you think Sara had a “right” or an “obligation” to report the deficiency to the proper authorities?
- Who might Sara have spoken with about the dilemma?
- Who should be responsible for what happened? Sara, Sara’s employer, the client, or someone else?
- How does this situation conflict with Sara’s obligation to be faithful to her client?
- Is it wise practice to ignore “gut feelings” that arise?

These and other questions will surface again later and most will be considered at that point, but let’s continue for now with Sara’s story.

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During her first few years with the company, and under the supervision of several managers, Sara was encouraged to become active in technical and professional societies (which was the policy of the company). But then she found her involvement with those groups diminishing as her current supervisor opposed Sara’s participation in meetings and conferences unless she used vacation time. Sara was very frustrated but did not really know how to rectify the situation.

In the course of time, Sara attended a meeting with the CEO on a different matter and she took the opportunity to inquire about attending technical and professional society meetings. The CEO reaffirmed that the company thought it important and that he wanted Sara to participate in such meetings. Sara informed her supervisor and though he did begin approving Sara’s requests for leave to participate in society meetings, their relationship was strained.

Questions:

- What might Sara have done differently to seek a remedy and yet preserve her relationship with her supervisor?
- Where could Sara have found guidance in the ASCE Code of Ethics, appropriate to this situation?

Regarding the relationship with her supervisor: Although Sara violated no ethical principle by discussing the matter with the CEO, she would have likely observed a less strained relationship if she had mentioned her intention to her supervisor beforehand. Sara could have found guidance in the ASCE Code of Ethics.

Canon 6: *Engineers shall act in such a manner as to uphold and enhance the honor, integrity, and dignity of the engineering profession.*

Canon 7: *Engineers shall continue their professional development throughout their careers, and shall provide opportunities for the professional development of those engineers under their supervision.*

a. *Engineers should keep current in their specialty fields by engaging in professional practice, participating in continuing education courses, reading in the technical literature, and attending professional meetings and seminars...*

c. *Engineers should encourage engineering employees to attend and present papers at professional and technical society meetings.*

As Christmas approached the following year, Sara discovered a gift bag on her desk. Inside the gift bag was an expensive honey-glazed spiral cut ham and a Christmas greeting card from a vendor who called on Sara from time to time.

This concerned Sara as she felt it might cast doubt on the integrity of their business relationship. She asked around and found that several others received gifts from the vendor as well. After sleeping on it, Sara sent a polite note to the vendor returning the ham.

Questions:

- Was Sara really obligated to return the ham?
- Or was this taking ethics too far?
- On the other hand, could Sara be obligated to pursue the matter further than just returning the gift she had received?

Sara could have found guidance in the ASCE Code of Ethics:

Canon 4: *Engineers shall act in professional matters for each employer or client as faithful agents or trustees, and shall avoid conflicts of interest.*

c. Engineers shall not solicit or accept gratuities, directly or indirectly, from contractors, their agents, or other parties dealing with their clients or employers in connection with work for which they are responsible.

Another way of ethically handling this might have been to contribute the gift to a charitable organization and inform the vendor. In this way, she could preserve her relationship with the salesman while also making it clear that she did not accept favors that could be perceived as a conflict of interest.

* * *

A few years later, friends and colleagues urged Sara, now a highly successful principal in a respected engineering firm, to run for public office. Sara carefully considered this step, realizing it would be a challenge to juggle work, family, and such intense community involvement. Ultimately, she agreed to run and soon found herself immersed in the campaign. A draft political advertisement was prepared that included her photograph, her engineering seal, and the following text:

"Vote for Sara! We need an engineer on the City Council. That is simple common sense, isn't it? Sara is an experienced licensed engineer with years of rich accomplishments, who disdains delays and takes action now!"

Questions:

- Should Sara's engineering seal be included in the advertisement?
- Should she ask someone in ASCE his or her opinion before deciding?

Sara contacted her old friend, Tom, who now happened to be vice president of the local ASCE Branch, and discussed the matter with him over lunch. They concluded, based on Canon 5.f. of the ASCE Code regarding advertisements (*Engineers may advertise professional services in a way that does not contain misleading language or is in any other manner derogatory to the dignity of the profession*), it would not be appropriate to include her engineering seal in the advertisement.

So Sara submitted the revised advertisement and continued with her campaign.

As fate would have it, a few days later, just after



announcing her candidacy for City Council, the matter of Sara's investigation of the apartment complex so many years ago resurfaced.

Sara learned that the apartment complex caught on fire, and people had been seriously injured. During the investigation of the cause of the fire, Sara's report was reviewed, and somehow the cause of the fire was traced to the electrical deficiencies, which she had briefly mentioned. Immediately this hit the local newspapers, attorneys became involved, and subsequently the Licensing Board was asked to look into the ethical responsibilities related to the report.

Now, sitting alone by the shore of the lake, Sara pondered her situation. Legally, she felt she might claim some immunity since she was not a licensed engineer at the time of her work on the apartment complex. But professionally, she keenly felt she had let the public down, and she could not get this, or those who had been hurt in the fire, out of her mind.

Having carefully studied the ASCE Code of Ethics, she now realized that occasionally some elements of the code may be in conflict with other elements. In her case, this was Canon 1 (her obligation to protect the health, safety and welfare of the public) versus Canon 4 (her obligation to her client) but she also noted that Canon 1 uses the word "paramount" which gives that Canon precedence over Canon 4.

Canon 1: *Engineers shall hold paramount the safety, health and welfare of the public ... in the performance of their professional duties.*

Canon 4: *Engineers shall act in professional matters for each employer or client as faithful agents or trustees....*

* * *

The meeting with the Licensing Board began early the following morning. While the State Licensing Board only enforces their own Rules of Conduct and Ethics, they noted that their rules are very similar to the ASCE Code of Ethics. They carefully reviewed the issue brought before them and asked for Sara's input.

In the discussion that ensued during the informal hearing, several points were brought out:

- 1) It is important for Sara, or any licensed engineer, when faced with an ethical dilemma, to realize the engineer's paramount responsibility is for the safety of the public;
- 2) The occupants of the apartment complex were not aware of the electrical deficiencies;
- 3) Although not an electrical engineer, Sara had some knowledge of city building codes and the ability to foresee the potential dangers of the inadequacies with the electrical systems;

- 4) Sara had informed her client of the possible electrical deficiencies, but she failed to mention possible consequences of ignoring her concerns; and
- 5) Sara could have referred to the ASCE Code of Ethics before making a decision.

If she had done so, here is some of the guidance she would have found.

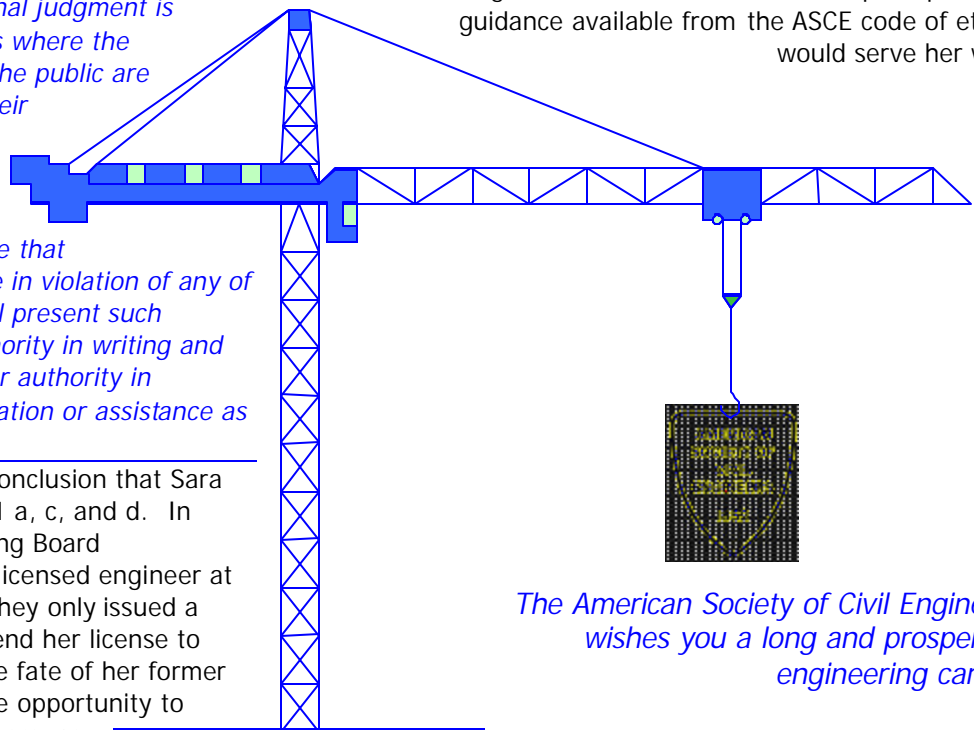
Canon 1. *Engineers shall hold paramount the safety, health and welfare of the public....*

a. Engineers shall recognize that the lives, safety, health and welfare of the general public are dependent upon engineering judgments, decisions and practices incorporated into structures

c. Engineers whose professional judgment is overruled under circumstances where the safety, health and welfare of the public are endangered, ... shall inform their clients or employers of the possible consequences.

d. Engineers who have knowledge or reason to believe that another person or firm may be in violation of any of the provisions of Canon 1 shall present such information to the proper authority in writing and shall cooperate with the proper authority in furnishing such further information or assistance as may be required.

The Board ultimately reached the conclusion that Sara should have followed ASCE Canon 1 a, c, and d. In their summary findings, the Licensing Board acknowledged that Sara was not a licensed engineer at the time of the incident, and thus they only issued a formal reprimand and did not suspend her license to practice engineering (which was the fate of her former supervisor). But, the Board took the opportunity to remind Sara that all licensed engineers, as professionals, have an obligation to understand and keep in mind their ethical responsibilities.



* * *

In the backseat of the taxi on the way to the airport, Sara thumbed through her hometown newspaper that she had purchased at a newsstand. She stopped when she saw an editorial about her City Council campaign. The article claimed that, as a result of the allegations against her, she was no longer fit for public office.

Could this be true?

How should she respond to such claims?

Then, for the first time in a long while, Sara smiled and breathed a sigh. She did not know the answer to this question, but now knew how to find it – using a healthy reliance on her own judgment, now seasoned with wisdom and experience.

This, combined with good counsel from friends and colleagues, and an awareness of the principles and guidance available from the ASCE code of ethics would serve her well.



The American Society of Civil Engineers wishes you a long and prosperous engineering career!

Question: Where can I find requirements for licensure and ethical responsibilities in various states?

- *The web site of the National Council of Examiners for Engineering and Surveying (NCEES) contains links to all state licensing boards. (www.ncees.org)*

Question: What are web sites that would help guide students on ethical issues in engineering?

- *American Society of Civil Engineers (www.asce.org and <http://www.asce.org/about/ethics.cfm>)*
- *National Institute for Engineering Ethics (www.niee.org)*
- *Murdough Center for Engineering Professionalism, Texas Tech University (www.murdough.ttu.edu)*
- *Online Ethics Center for Engineering and Science (<http://onlineethics.org/>)*
- *Web Clearinghouse for Engineering & Computer Ethics (<http://www4.ncsu.edu/~jherkert/ethicind.html>)*

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