

PROFESSIONAL COMPETENCE IN CURRENT STRUCTURAL DESIGN

Case No. 02-5

Facts:

Engineer A is involved in the design of the structural system on a building project in an area of the country that experiences severe weather conditions. Engineer A, who has experience with structural designs in this area of the country, designs the structural system based upon what Engineer A believes constitutes sound structural engineering principles. Although Engineer A has knowledge and experience in structural design, new and improved design methods have recently been developed to address the severe weather conditions in the location in which Engineer A practices. These new and improved severe weather design standards have been published in the most recent technical literature. While Engineer A generally attempts to stay current on changing structural design trends, Engineer A was not familiar with this recent technical literature. Engineer A completes his design which is later incorporated in the plans and specifications for the building and the building is built. Within one year following construction, severe weather conditions cause significant structural damage to the building. It is determined that had Engineer A followed the severe weather design parameters, the structural failure would not have occurred.

Question:

Was it ethical for Engineer A to fail to follow the most recent design parameters for structural design in severe weather areas published in the most recent technical literature?

References:

- Section II.1.* - *Code of Ethics: Engineers shall hold paramount the safety, health, and welfare of the public.*
- Section II.1.b.* - *Code of Ethics: Engineers shall approve only those engineering documents that are in conformity with applicable standards.*
- Section II.2.* - *Code of Ethics: Engineers shall perform services only in the areas of their competence.*
- Section II.2.a.* - *Code of Ethics: Engineers shall undertake assignments only when qualified by education or experience in the specific technical fields involved.*
- Section III.8.* - *Code of Ethics: Engineers shall accept personal responsibility for their professional activities, provided, however, that Engineers may seek indemnification for services arising out of their practice for other than gross negligence, where the Engineer's interests cannot otherwise be protected.*

Discussion:

As with any profession, engineers have a fundamental ethical obligation to practice in a professional and competent manner. The determination of whether an engineer is practicing in a competent manner is not something that is subject to simple evaluation, but can only be determined on the basis of all of the facts and circumstances involved in a particular situation. It is often based upon the local standards, the time period in which the individual is practicing, client-imposed requirements, and various other considerations.

The NSPE Board of Ethical Review (Board) considered the issue of professional competency on several occasions. In BER Case 98-8, the Board had the opportunity to review the question of the ethical obligation of licensed engineers to practice solely within their area of competency. In that case, Engineer A, a professional engineer with expertise in civil engineering, served as a Civilian Building and Grounds Division Chief at a U.S. Army installation. An Army official requested that Engineer A certify that certain arms storage rooms and arms storage racks on the military installation were in accordance with certain specific, lengthy, and detailed Army physical security, arms, ammunition, and explosive regulations, which are cross-referenced with other Army regulations. Engineer A had no significant training or knowledge in these areas. There were comprehensive training programs available for this type of work, but training funds were not available. The Board determined that it would not be ethical for Engineer A to certify as a qualified engineer the arms storage rooms and arms storage racks as requested by the Army official, noting that the competency issues at stake posed a clear and present danger to the public health and safety. Said the Board, “making certain that a military hardware storage facility was designed and built safely involves keen awareness of many complex and detailed procedures, rules, and regulations that are unique to this field of endeavor and while Engineer A may be a very competent engineer, Engineer A is clearly not knowledgeable in this very technical and complicated area. While there may be comprehensive training programs available, the facts reveal that insufficient funds exist for Engineer A to participate in such programs.”

In BER Case 94-8, Engineer A, a professional engineer, was working with a construction contractor on a design/build project for the construction of an industrial facility. During the construction of the project, the construction contractor separately retained the services of Engineer B, a professional engineer, to design structural footings as part of the facility. Engineer B's degree and background were in chemical engineering. Engineer A was unable to establish that Engineer B had any apparent subsequent training in foundation design and Engineer A had reservations concerning the competence of Engineer B to design the structural footings and reported his concerns to the contractor. The Board determined that it would be unethical for Engineer B to perform the design of the structural footings as part of the facility and also that Engineer A had an ethical responsibility to question Engineer B's competency and report his concerns to the contractor. This position was based upon a variety of considerations. The Board noted that there was at least a reasonable basis for Engineer A to conclude that Engineer B did not possess the competence to perform the required task. While it may be possible for Engineer B, as a consultant to the contractor, to retain the services of a competent structural engineer to design the structural footings for the facility, the Board did not think it would be

feasible under the facts. It appeared that under the facts, Engineer B was retained specifically for the sole and exclusive purpose of designing the structural footings in question. If Engineer B were to seek a separate firm to perform that task, the Board would have to seriously wonder what it was Engineer B was actually hired to perform and for what Engineer B was being paid.

Importantly, in BER Case 94-8, the Board also noted that Engineer A had an objective basis to determine whether Engineer B had sufficient education, experience, and training to perform the required structural design services. If Engineer A determined that Engineer B did not possess the required education, training, and experience to perform the services, the Board was of the view that Engineer A had an ethical obligation to confront Engineer B to make his concerns known to

Engineer B, thus, recommending that Engineer B withdraw from the project. If Engineer B refused to acquiesce to Engineer A's recommendation, Engineer A had an obligation under the NSPE Code of Ethics to bring the matter to the attention of his client and to the authorities as appropriate, and if necessary, withdraw from the project if his concerns were not met.

In another case, BER Case 85-3, a local county ordinance required that the position of county surveyor be filled by a Professional Engineer. The first appointee to the position was not a P.E. and was therefore deemed unqualified to continue in the position. The county commissioners met and decided to appoint an engineer, a P.E., with experience and educational background solely in the field of chemical engineering. The engineer accepted the position. The duties and responsibilities of the position of county surveyor included oversight of surveying reports and highway improvement projects, but did not include actual preparation of engineering or surveying documents. After considering the two earlier cases, the Board decided it was unethical for Engineer A to accept the position as county surveyor.

As the Board noted in BER Case 85-3, obviously there are important distinctions in applying the NSPE Code language to a consulting practice and applying the language in the context of an employment relationship. In the former situation, the firm has a good deal more discretion and flexibility and may be able to structure its workforce to fit the needs and requirements of a particular job for which the firm is being retained. For example, if an engineering firm is retained to perform engineering and land surveying services and the firm does not have expertise in the area of land surveying, under the provisions of the NSPE Code, the firm should retain individuals with that expertise. Because of the relatively dynamic nature of private consulting practice, engineering firms frequently establish joint ventures and subcontracts, hire additional qualified personnel, or make other arrangements in order to serve the needs of a client more effectively and efficiently. However, the Board noted that from a practical standpoint, it would be extremely difficult, if not impossible in the usual employment context, for a county surveyor with no background or expertise in surveying to perform effective oversight of surveying reports and highway improvement projects for the county. The Board could not see any way in which the engineer could be acting in accordance with NSPE Code Section II.2.b. under these facts,

because whatever course of action he took would result in unethical conduct and compromise his role as county surveyor.

Although, the cases cited are not precisely the same as the facts in the present case, the Board believes these cases illustrate the important fundamental point that licensed engineers must make all efforts to perform professional services solely within their area of competence and not be unduly influenced either by employer or client pressures that could cause grave danger to the public health and safety. In the instant case, a fundamental question that must be addressed is a somewhat different question for the Board: Is performing engineering design work that may result in a failure unethical? The comment is sometimes made that “in medicine, physicians take steps that sometimes cause patients to die and in the law attorneys take steps that cause clients to lose lawsuits” and those events are not generally considered to be unethical per se, without more facts and circumstances to demonstrate that the individual’s actions were improper. Ethical impropriety involves more than the fact that an engineer designed a facility that fails. In fact, an engineer may design a facility that fails and that alone does not mean that the engineer is negligent—much less unethical. But even where an engineer is found negligent, should that necessarily mean that the engineer was acting in an unethical manner? Clearly, there is a distinction between ethical issues and legal issues.

An engineer certainly has a duty to seek to stay current on design trends and technology, and as suggested in BER Case 98-8, seek appropriate education and training before undertaking new and different tasks. In addition, it is critical for engineers practicing in a specific area to maintain current knowledge about new practice developments and incorporate those methods, as appropriate, into their professional practice. However, necessary questions to ask are how far it is necessary for an engineer to go in order to remain current? What is the definition of “current?” Would this require knowledge of each and every recent practice development, design parameter, etc.?

While the Board recognizes that in some situations, it may be necessary for an engineer to follow the most recent practice developments and design parameters in order to protect the public health, safety, and welfare, we do not believe that the facts in this case would reach that threshold. It is the Board’s view that in order for an engineer to be found unethical for a design failure, the engineer must demonstrate some level of moral culpability. In other words, there must be some demonstration that the engineer was acting in an intentional, reckless, or malicious manner. For example, if the engineer was reckless or refused to take appropriate action, the Board could conclude that the engineer acted in an unethical manner. However, the mere fact that an engineer did not follow the most recent literature and the professional practice resulted in some harm is insufficient, in the Board’s view, to find the engineer to be deemed unethical. Under the facts presented, the Board is of the view that Engineer A’s actions were within the basic standards of the profession of engineering, as well as most professions and the Board cannot conclude that Engineer A acted unethically. The Board believes that the definition of what is “current” must be reasonable as engineers cannot be expected to incorporate each and

every new and innovative technique or parameter that has not been fully tested or peer reviewed. Following a reasonable period of time, innovative techniques and parameters may be incorporated into generally accepted practice and at such time, once well defined, and as part of the body of technical knowledge, such techniques become standards that should be followed.

The Board would note that the facts and circumstances in this case do not indicate that the severe weather design parameters and methods constituted “standards.” Had those parameters and methods constituted “standards,” this Board may have reached another result. (See NSPE Code Section II.1.b.).

Conclusion:

It was not unethical for Engineer A to fail to follow the most recent design parameters for structural design in severe weather areas published in the most recent technical literature.

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