

**Public Health and Safety –
Failure of Company Employees to Follow Design and Construction Specifications**

Case No. 14-4

Facts:

Engineer A is a licensed professional engineer in several states and works for a design-build company that provides engineering design and construction services for the coal mining industry. The firm provides a complete turnkey project, including design and construction of conveying systems, screen and crushing buildings, preparation plants, and stacking tubes. The state requires an “engineer-in-charge” to be listed in order for the firm to practice engineering in the state, and Engineer A serves in that role. Engineer A performs all structural design calculations for facilities, trusses, retaining walls, tunnels, and other areas, and he oversees the structural layout drawings that are provided to in-house detailers.

Recently, Engineer A became aware that in some cases his engineering designs were not being detailed according to the drawings. In other cases, his engineering designs were being changed following his final review with the field personnel and items were not installed in accordance with approved drawings. In addition, Engineer A has learned that the construction project manager, the engineering manager, and the VP for construction have made structural design decisions (regarding sizing beams, replacement of deteriorating structures with new components, and revising splice plate locations) without Engineer A’s knowledge or input. Although the VP for construction has 35 years of field experience, none of these managers or officers have engineering degrees and are unable to perform engineering calculations. Engineer A has no management authority over any of these positions. Although state law does not require Engineer A to sign or seal the documents, there is limited inspection, and the federal Mine Safety and Health Administration appears not to be concerned about aboveground facility code requirements unless there is an accident on the site.

Question:

What are Engineer A’s ethical responsibilities under the circumstances?

NSPE Code of Ethics References:

Section I. 1. Engineers, in the fulfillment of their professional duties, shall hold paramount the safety, health, and welfare of the public.

Section II. 1. Engineers shall hold paramount the safety, health, and welfare of the public.

Section II. 1.a. If engineers’ judgment is overruled under circumstances that endanger life or property, they shall notify their employer or client and such other authority as may be appropriate.

- Section II.1.b. Engineers shall approve only those engineering documents that are in conformity with applicable standards.*
- Section II.1.f. Engineers having knowledge of any alleged violation of this Code shall report thereon to appropriate professional bodies and, when relevant, also to public authorities, and cooperate with the proper authorities in furnishing such information or assistance as may be required.*
- Section III.1.b. Engineers shall advise their clients or employers when they believe a project will not be successful.*
- Section III.2.b. Engineers shall not complete, sign, or seal plans and/or specifications that are not in conformity with applicable engineering standards. If the client or employer insists on such unprofessional conduct, they shall notify the proper authorities and withdraw from further service on the project.*
- Section III.8.a. Engineers shall conform with state registration laws in the practice of engineering.*

Discussion:

The most fundamental and basic ethical obligation of an engineer is to hold paramount the public health, safety, and welfare. Over the years, the NSPE Board of Ethical Review has made this essential point on numerous occasions in many of its opinions.

An illustration of how the Board has addressed this dilemma can be found in BER Case No. 00-5. There, Engineer A was an engineer with a local government and learned about a critical situation involving a bridge 280-feet long and 30 feet above a stream. This bridge had a concrete deck on wood piles built in the 1950s by the state. It was part of the secondary roadway system given to the counties many years ago. In June 2000, Engineer A received a telephone call from the bridge inspector stating this bridge needed to be closed due to the large number of rotted pilings. Engineer A had barricades and signs erected within the hour on a Friday afternoon. Residents in the area were required to take a 10-mile detour. On the following Monday, the barricades were found dumped in the river, and the “bridge closed” sign was found beyond the trees by the roadway. More permanent barricades and signs were installed. The press published photos of some of the piles that did not reach the ground and the myriad of patchwork over the years. Within a few days, a detailed inspection report prepared by a consulting engineering firm, signed and sealed, indicated seven pilings required replacement. Within three weeks, Engineer A had obtained authorization for the bridge to be replaced. Several departments in the state and federal transportation departments needed to complete their reviews and tasks before the funds could be used. A rally was held, and a petition with approximately 200 signatures asking that the bridge be reopened to limited traffic was presented to the County Commission. Engineer A explained the extent of the damages and the efforts under way to replace the bridge. The County Commission decided not to reopen the bridge. Preliminary site investigation studies were begun. Environmental, geological, right-of-way, and other studies were also performed. A decision was made to use a design-build contract to avoid a lengthy scour analysis for the pile design. A nonengineer public works director decided to have a retired bridge inspector, who was not an engineer, examine the bridge, and a decision was made to install two crutch piles under the bridge and to open the bridge with a five-ton limit. No follow-up inspection was undertaken.

Engineer A observed that traffic was flowing, which resulted in significant movement of the bridge. Log trucks and tankers crossed it on a regular basis, while school buses went around it. In determining Engineer A's ethical obligation under these circumstances, the Board decided that Engineer A should have taken immediate steps to go to Engineer A's supervisor to press for strict enforcement of the five-ton limit, and if this was ineffective, contact state and/or federal transportation/highway officials, the state engineering licensure board, the director of public works, county commissioners, state officials, and other authorities as appropriate. Engineer A should have also worked with the consulting engineering firm to determine if the two crutch piles with the five-ton limit design solution would be effective and reported this information to his supervisor. In addition, Engineer A should have determined whether a basis existed for reporting the activities of the retired bridge inspector to the state board as the unlicensed practice of engineering.

Reviewing earlier Board of Ethical Review Case Nos. 89-7, 90-5, and 92-6, the Board noted that the facts and circumstances facing Engineer A "involved basic and fundamental issues of public health and safety, which are at the core of engineering ethics." Said the Board, "For an engineer to bow to public pressure or employment situations when the engineer believes there are great dangers present would be an abrogation of the engineer's most fundamental responsibility and obligation." The Board continued by noting that Engineer A should have taken immediate steps to contact the county governing authority and county prosecutors, state and/or federal transportation/highway officials, the state engineering licensure board, and other authorities. By failing to take this action, Engineer A would be ignoring his basic professional and ethical obligations.

More recently, in BER Case No. 07-10, Engineer A designed and built a barn with horse stalls on his property. Four years later, Engineer A sold the property, including the barn, to Jones. Later, Jones proposed to extend the barn and, as part of the extension, removed portions of the columns and footings that supported the roof. The changes were approved by the town, the extension was built, and a certificate of occupancy was issued. Engineer A learned of the extension and was concerned that the structure could collapse due to severe snow loads. Engineer A verbally contacted the town supervisor who agreed to look into the matter, but no action was taken. The Board decided that Engineer A had fulfilled his ethical obligation by notifying the town supervisor, but that Engineer A should also notify the new owner in writing of the perceived deficiency. In reviewing the facts, the Board concluded that prudent action would involve Engineer A notifying in writing the town supervisor—the individual presumably with the most authority in the jurisdiction. At the same time, in the Board's view, it would have been more appropriate to first notify the current owner of his concerns regarding the structural integrity of the barn.

According to the Board's decision, Engineer A should have made a written record of his communication with the owner and town supervisor and followed the verbal communication with a written confirmation to the town supervisor, restating Engineer A's

concern and continued to monitor the situation. If appropriate steps were not taken within a reasonable period of time, Engineer A should have again contacted the town supervisor in writing and indicated that if steps were not taken within a specific period of time to adequately address the situation, Engineer A would be required to bring the matter to the attention of county or state building officials, as appropriate.

In 2012, the Board considered BER Case 12-11. In that case, Engineer A was a professional engineer employed by OPQ Construction. OPQ Construction was a construction contractor hired by the state department of transportation to inspect and repair a series of state highway and parkway “on and off” ramps. Commercial vehicles were not permitted on the parkway. Engineer A was directed by his supervisor to design inspection and construction scaffolding for a noncommercial parkway cloverleaf ramp with limited height and width clearance. From his personal experience driving on the parkway to and from work, Engineer A had observed commercial vehicles illegally driving on the parkway. Engineer A was concerned that the safety of inspection and construction employees (as well as others) could be endangered if one of these commercial vehicles passes by the proposed inspection and construction scaffolding.

The Board decided that Engineer A should immediately notify verbally (and in writing if necessary) Engineer A’s immediate supervisor at OPQ Construction of the safety hazards to employees and others due to commercial vehicles passing by while inspection and repair is being performed on the ramps. Additionally, the Board noted that it is probable that state department of transportation officials, and law enforcement officials as necessary, will also need to be advised of the situation by either Engineer A’s supervisor or other appropriate responsible party within OPQ Construction so that appropriate corrective action can be considered and implemented prior to the design and assembly of the inspection and construction scaffolding by Engineer A and OPQ Construction. This might include heightened law enforcement on the parkway and ramps, closing down traffic on the affected exits, a design accommodating commercial vehicles, or some other method for the protection of the inspection and construction employees as well as others.

Turning to the facts in the present case, it is the Board’s view that Engineer A has an ethical obligation to take action to address concerns relating to the design and construction processes and procedures. There may have been a justification or explanation for some of the decisions made by management personnel. The fact that Engineer A’s final drawings were changed without his knowledge or input and that changes were made in the field in a manner inconsistent with Engineer A’s final drawings raise serious and potentially troubling questions and doubts about the integrity and the management of the company’s design and construction practices.

Regardless of the fact that state law does not require Engineer A to sign and seal the engineering documents, the work performed by Engineer A is Engineer A’s professional work product, and as the “engineer-in-charge” under state law, Engineer A is responsible

and accountable for the engineering design. As such, Engineer A has an ethical responsibility to take all necessary and appropriate steps to pursue his concerns within the company. However, if after pursuing those concerns internally Engineer A is unable to obtain satisfactory resolution of his concerns, Engineer A should bring this matter to the attention of public officials at the local, state, and federal levels as appropriate.

Conclusion:

Engineer A has an ethical responsibility to take all necessary and appropriate steps to pursue his concerns within the company. However, if after pursuing those concerns internally Engineer A is unable to obtain satisfactory resolution of his concerns, Engineer A should bring this matter to the attention of public officials at the local, state, and federal levels as appropriate.

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