



NATIONAL SOCIETY OF  
PROFESSIONAL ENGINEERS

## BOARD of ETHICAL REVIEW

CASE REVIEW

# Acknowledging Errors in Design

Case No. 23-4

June 14, 2024

NSPE.ORG



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### Facts

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Engineer T, a senior structural engineer who designs commercial buildings in the employ of XYZ Consulting Engineers, was in responsible charge of the design of major structural modifications to an existing building. In establishing the project scope for the structural modifications, Engineer T selected a straightforward approach that required making structural connections immediately beneath floor level on an upper floor, in a tightly constrained space. Engineer T proceeded with the project per these parameters and did not explore alternative design approaches. Rather, Engineer T completed the design within the identified constraints and issued construction documents for the modifications.

The new structural connections were located in such a way that access was limited, and the drawings clearly noted the constrained access. This design detail required the construction workers to make the connections in a contorted fashion. During construction, an accident occurred with a serious and permanent injury to

a construction worker. Following the accident, Engineer T revisited the site and realized that had alternative design concepts been explored early on, the new structural modifications could have been proposed in a fundamentally different, more complex, but functionally equivalent way. The alternative approach would have been more costly and taken more time, but it would have allowed the construction workers to make all connections while standing on the floor such that injury would have been far less likely. Engineer T felt some personal responsibility for the accident.

Engineer T met with XYZ's Chief Structural Engineer, Engineer B, explained the situation, and expressed a belief that a design error – i.e., not exploring alternative, safer design concepts – had been made and the NSPE Code of Ethics required that the error be acknowledged. Engineer B responded that Engineer T and XYZ Consulting Engineers had responded professionally to the design project, they had recommended a straightforward structural

modification approach, and they were not expected or asked to consider alternative concepts. Further, Engineer T had specifically identified the constrained area of the new connections in the design documents, but because T was not trained in construction safety either by education (since civil engineering education typically does not include construction safety) or by specific experience (working for a construction contractor), Engineer T could not have reasonably known or assessed the level of worker safety risk posed by the connection location. The contractor had not raised questions regarding the construction safety risk or safer construction alternatives. Having thus thoughtfully considered the matter, both Engineer T and Engineer B decided that the situation did not merit acknowledgement of “an error.”

Months later, after a construction claim had been submitted and a lawsuit had been filed, Engineer T met with attorneys representing XYZ and XYZ’s insurance company to prepare for a deposition of Engineer T. During preparation, Engineer T reviewed and discussed the project history, including the conversation with Engineer B relative to T’s feeling there was, potentially, a

professional obligation to acknowledge an error – i.e., not exploring alternative, safer design concepts. Both of XYZ Consulting Engineers’ attorneys agreed that a clear obligation existed not to distort or alter any facts, and that Engineer T should respond to questions with complete transparency during the deposition. They pointed out, however, that whether an error was made was not up to Engineer T and was not clear in this set of circumstances, including for the reasons that Engineer B had indicated to Engineer T earlier. They also pointed out that one of the purposes of the legal process was to determine what errors might have been made and by whom, and what impact such errors might have had on the accident. The attorneys indicated that the legal process would determine whether, based on the facts, an error had been made, and that Engineer T should clearly report the facts, but should not voluntarily characterize the design work as an error.

In the deposition, Engineer T responded factually to all questions regarding the design and the design process. Engineer T was not asked if an error had been made and did not offer an acknowledgement of a possible error.

## Questions

1. Was it ethical for Engineer T and Engineer B to conclude an error had not been made in design?
2. Was it ethical for Engineer T not to acknowledge an error after the accident occurred?
3. Was it ethical for Engineer T not to acknowledge an error during the deposition?

## NSPE Code of Ethics References

- I.1** Engineers, in the fulfillment of their professional duties, shall hold paramount the safety, health and welfare of the public.
- I.2** Engineers... shall perform services only in areas of their competence.
- I.3** Engineers... shall issue public statements only in an objective and truthful manner.
- I.4** Engineers... shall act for each employer or client as faithful agents or trustees.
- II.3.a.** Engineers shall be objective and truthful in professional reports, statements, or testimony. They shall include all relevant and pertinent information in such reports, statements, or testimony, which should bear the date indicating when it was current.
- III.1.a.** Engineers shall acknowledge their errors and shall not distort or alter the facts.
- III.3.a.** Engineers shall avoid the use of statements containing a material misrepresentation of fact or omitting a material fact.
- III.8.** 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.

## NSPE BER Case References: 97-13, 02-5, and 21-2

### Discussion

This case addresses two ethical issues in engineering practice: to what extent are design engineers obligated to account for construction safety risks in their designs if they are not trained or have experience in construction safety methods, and are engineers obligated by the NSPE Code of Ethics to “acknowledge errors” when it is not clear an error has been made.

The first issue, having to do with considering construction safety risks in the design, can be

approached from both a legal/contractual (i.e., risk management) perspective and from an ethical perspective. On the legal/contractual side, many professional engineers familiar with construction contracts believe contract language sufficiently settles the matter. They point to standard construction contract provisions such as, “Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction”

(Engineers Joint Contract Documents Committee [EJCDC], C-700, Standard General Conditions of the Construction Contract, Article 7, Paragraph 7.01A). The construction contracts also include provisions identifying the Contractor's sole responsibility for initiating, maintaining, and supervising all safety programs and precautions (Article 7, Paragraph 7.13A), for obtaining additional services as needed to carry out Contractor's safety responsibilities (Article 7, Paragraph 7.01B), and for taking necessary precautions for safety and providing necessary protection to prevent damage, injury, or loss to all persons on the site who may be affected by the work (Article 7, Paragraph 7.13C). Through these legal/contractual mechanisms, risk and responsibility for worker safety during construction are formally transferred to the contractor, the contractor being the party best positioned to provide for project safety. By this view, and with reference to the present case, the contractor is solely responsible for project safety, so Engineer T did not make any design error so long as the design met the professional standard of care (which the facts suggest it did).

But engineers must also consider the ethical perspective, and that is the primary area of concern for the Board of Ethical Review. Ethically, the facts of this case reveal a tension between the engineer doing what is professionally required, versus "going above and beyond" in the interest of the public health, safety, and welfare. The Board has considered this ethical tension in various ways over the years.

[BER Case 97-13](#) introduces Engineer A, a civil engineer, who serves as a subconsultant to perform bridge inspection services on a major bridge overhaul project. Engineer A's scope of

work is solely to identify any pavement damage on the bridge and report the damage to its client, VWX Architects. While conducting the bridge inspection, and although not part of the scope of services for which he was retained, Engineer A notices an apparent pre-existing defective condition in a retaining wall which failed to restrain a vehicle, leading to a fatal accident involving Police Officer B. Engineer A surmises that the defective condition may have been a contributing factor in the wall failure and notes this in the engineering notes. Engineer A verbally reports this information to the client, which then verbally reports the information to the public agency. In finding it was ethical for Engineer A to retain the information in the engineering notes, but not include it in the final written report, the Board noted that Engineer A did the appropriate thing in coming forward to the client with the information and also by documenting the information for possible future reference as appropriate. But under the circumstances "it would have been improper for Engineer A to include reference to the information in his final report, particularly since it would have been based upon mere speculation and not careful testing or evaluation by a competent individual or firm." In fact, the Board opined that had Engineer A formally "reported" the matter publicly, it would have been "an overreaction and could easily have risked jeopardizing the professional reputations of [Engineer A's] client and the public agency." The key finding from Case 97-13 is that the public welfare was best served by Engineer A exercising restraint in reporting. This parallels the current case, where Engineer A identified a safety risk in the design details, but per customary professional practice relied on the contractor



(who had specific construction safety expertise) to address the issue.

A second example is [BER Case 21-2](#), where a second Engineer A serves as a consulting engineer representing Client B, a developer who is proposing to develop a healthcare facility that requires a significant upgrade to the property's access road that crosses a tidal saltmarsh. Engineer A's scope includes design and local permitting of the roadway, including an upgrade of the tidal crossing from a small culvert to a small bridge, increasing its hydraulic capacity. The local development regulations and national design codes and standards have not yet been updated to reflect changing conditions and weather patterns, including effects of sea level rise and changes in precipitation intensities and recurrence intervals effected by on-going climate change. It is Engineer A's judgment, based on hydraulic evaluation procedures presented at a recent transportation agency conference, that the proposed project may result in some upstream homes becoming uninhabitable a decade or more earlier than would otherwise be the case. Engineer A proposes a complex and costly hydrologic and hydraulic analysis by a specialized subconsultant to predict the extent to which sea level rise and the increased hydraulic capacity of the tidal crossing will result in flood damage to a neighborhood of twenty upstream homes during future high tides and storm surges, anticipating this to be a difficult question to answer in the project's public hearings. Client B directs Engineer A to proceed without the costly analysis unless and until such an analysis is requested by the applicable regulatory authorities. In this case, the BER found that "if Engineer A is reasonably certain that the project will result in adverse impacts to public health,

safety, and welfare, and if the Client B denies the requisite evaluation, Engineer A should include the concern regarding potential adverse public health, safety, and welfare impacts in an engineering report for consideration by regulatory agencies and the public." Thus, the key finding from BER Case 21-2 is that the public welfare was best served by Engineer A reporting the public health, safety, and welfare concerns, even if the client did not wish for this to be done. This differs from the current case, not because public health, safety, and welfare is somehow less important now than in BER Case 21-2, but because a project delivery process exists in this case by which it was accepted professional practice for Engineer A to complete the structural design, and rely on the contractor to handle safety aspects of construction. The Engineer A from BER Case 21-2 did not have this option.

Finally, there is [BER Case 02-5](#) where a third Engineer A, a structural engineer with experience in the design of structures in the region in which the current project is located, designed a structural system that Engineer A believed was sound and met applicable codes. However, new and improved design methods had recently been suggested in an article published in a technical journal, addressing new information regarding severe weather design in that region. Engineer A had not read that technical journal article. Within a year following construction, the building was damaged by severe weather conditions. It was determined that had the methods suggested in the technical articles been utilized in design, the damage would not have occurred. The BER concluded that it was not unethical for Engineer A to fail to follow methods suggested in a recent technical journal article that Engineer

A had not reviewed. The BER indicated that they believed that the definition of what is “current practice” must be discerning and reasonable. The key finding from BER Case 02-5 was that engineers cannot be expected (obligated) to incorporate each and every new, innovative technique until such techniques are incorporated into generally accepted practice and become standards that should be followed. Engineer T (in the current case) and Engineer A (BER Case 02-5) both followed accepted standard design practice. But these same engineers also had the opportunity (not obligation) to take the public welfare more firmly into account, to go above and beyond what was legally and ethically required. While they cannot be ethically faulted for not “going the extra mile” for the sake of the public health, safety, and welfare, the project outcomes likely would have been better if these engineers had done so. In hindsight, knowing the outcomes, the BER believes all parties would have wanted to at least consider the opportunity.

Collectively, the prior BER Cases reveal several principles to guide the engineer relative to the ethics of the situation. First, the engineer must hold paramount the safety, health, and welfare of the public. Second, engineers must be competent in their areas of service. Third, engineers must be honest, and issue public statements only in an objective and truthful manner. Fourth, the engineer must acknowledge their errors and not distort or alter the facts. These ethical obligations are required, and non-negotiable. So it is within this context that the engineer must determine how best to satisfy their obligations. The facts of the present case do not raise concerns about Engineer T’s competence in performing structural engineering design work. Further, Engineer T’s

structural modification approach appears to have been straightforward, professionally designed, and properly presented in the construction documents. Not only this, but the design specifically mentions that the new structural connections were located in such a way that access was limited. These points demonstrate proper awareness and consideration of public safety, health, and welfare. When the design was completed, the facts imply Engineer T relied on the contractor to provide for worker safety during construction, and formally transferred this risk and responsibility via standard contractual language. Further, the facts indicate the contractor accepted the construction risk and responsibility without any question. On this basis, the facts do not suggest Engineer T made a design error. As with Engineer A in BER Case 97-13, the fact that Engineer T (this present case) noticed after the accident that an alternative design approach could have prevented the worker injury does not mean that Engineer T was required to report this as an error.

But the question remains – similar to BER Case 21-2 and BER Case 02-5 – whether Engineer T did all that could have been done for worker safety? After all, the solution approach Engineer T followed for this project did include an unusual and challenging construction aspect. Was it enough simply to call attention to this and shift safety responsibility to the contractor? BER Case 21-2 suggests it would have been ethically appropriate (an opportunity, not an obligation) for Engineer T to identify not just the straightforward design alternative, but also the more involved structural modification concept, to identify and discuss the benefits and drawbacks of both options, and to place these matters before the client and other members of the

design team, possibly including the contractor, early in the process. Another option would have been for Engineer T to request a constructability review, or an independent construction safety review, or to inquire whether the contractor's construction safety plan had flagged the heightened safety risk. If so, perhaps the issue would have been raised and alternatives might have been addressed. But Engineer T did not actively seek this input, and perhaps that is why Engineer T "felt some personal responsibility for the accident."

But was this an "error?" Did Engineer T and/or Engineer B deviate from ethical engineering practice under the facts? The BER affirms the "ethical high road" of considering more than one design approach, and certainly the BER would agree with seeking critical input from construction safety professionals. But as in BER Case 02-5, the BER does not view Engineer T's design as unethical. While the construction accident and worker injury are tragic outcomes, because Engineer T's design approach represented professional practice consistent with the standard of care, the BER sees this more as a missed opportunity than an ethical lapse and concludes that no "error" was made in design.

Was it ethical for Engineer T not to acknowledge an error after the accident occurred? The facts of this case and especially the discussion between Engineer T and Engineer B, as well as the legal/contractual perspective and ethical considerations outlined above, provide a rationale as to why Engineer T's design was not an "error." Because there was no error, Engineer T was not ethically obligated to acknowledge an error after the accident occurred. However, the BER believes this project was a missed opportunity for

Engineer T to more fully and carefully hold paramount the public safety, health, and welfare.

The BER believes Engineer T should state that while no error was made, based on hindsight, other ways to approach the project existed which may have prevented the accident and worker injury. The view is consistent with ethics provisions that require engineers to be objective and truthful in professional reports, statements, or testimony; that engineers include all relevant and pertinent information, that they not distort or alter the facts, and avoid the use of statements containing a material misrepresentation of fact or omitting a material fact; and that they accept personal responsibility for their professional activities. Such conversation will not only allow Engineer T's firm and others to benefit from lessons learned through this very difficult experience but will also promote continued professional development relative to projects of this type.

Was it ethical for Engineer T not to acknowledge an error during the deposition? Again, using the same analysis presented above, the BER concludes that Engineer T's design was not an "error." Because there was no error, Engineer T was not ethically obligated to acknowledge an error during the deposition. Engineer T should respond clearly and honestly when questioned about the project, including T's views on alternative design approaches vis-à-vis the public safety, health, and welfare, but should not characterize the work as a design error.



## Conclusions

1. It was ethical for Engineer T and Engineer B to conclude no error had been made in design, based on review and analysis of the facts from both from a legal/contractual perspective and from an ethical perspective. Engineer T's design approach represented professional practice consistent with the standard of care.
2. It was ethical for Engineer T not to acknowledge an error after the accident occurred because there was no error. However, based on hindsight, other ways to approach the project may have prevented the accident and worker injury, and this was a missed opportunity to hold paramount the public safety, health, and welfare. Engineer T is encouraged to share this hard "lesson learned" as part of continued professional development.
3. It was ethical for Engineer T to refrain from acknowledging an error during the deposition because there was no error. Engineer T should respond clearly and honestly when questioned about the project, including views on alternative design approaches vis-à-vis the public safety, health, and welfare, but should not characterize the work as a design error.

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