



# ETHICS IN ENGINEERING

A PANEL DISCUSSION





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# Engineering Code of Ethics

**Engineering is an important and learned profession. As members of this profession, engineers are expected to exhibit the highest standards of honesty and integrity.**

Engineering has a direct and vital impact on the quality of life for all people. Accordingly, the services provided by engineers require honesty, impartiality, fairness, and equity, and must be dedicated to the protection of the public health, safety and welfare. Engineers must perform under a standard of professional behavior that requires adherence to the highest principles of ethical conduct.

*(NSPE)*

# Fundamental Canons

## **Engineers, in the fulfillment of their professional duties, shall:**

- Hold paramount the safety, health and welfare of the public
- Perform services only in areas of their competence
- Issue public statements only in an objective and truthful manner
- Act for each employer or client as faithful agents and trustee
- Avoid deceptive acts
- Conduct themselves honorably, responsibly, ethically, and lawfully so as to enhance the honor, reputation, and usefulness of the profession

# PANELIST PERSPECTIVE

- *What does engineering ethics mean to you?*



# PANELIST PERSPECTIVE

- *What does engineering ethics mean to you?*
- *Are “ethical” and “legal” synonymous?*



# SCENARIO REVIEW

BOARD OF ETHICAL REVIEW CASES: PANELIST PROSPECTIVE





# SCENARIO 1 – Influence – Campaign Contributors



Engineer A is president of an energy consulting company that offers engineering services for public entities. Over the past ten years, a significant percentage of the Company's work has been for a specific County. One of the three county commissioners is up for reelection and solicits campaign donations, directing each potential donor to the state laws that specify the legal limitations on contributions for campaigns in the amount of \$5,000 and noting that the list of specific campaign contributions is required by law to be made public. The Commissioner regularly votes on decisions to retain his company, so Engineer A while wanting to make a contribution, was concerned about a potential perception of impropriety by members of the public or by competitors if Engineer A's donation to the County Commissioner's campaign is significant. Engineer A decided to make a donation of \$100, which is consistent with Company policy on giving and receiving gifts, and which was one of the smaller campaign donations received by this County Commissioner.

**Question 1:** Was Engineer A's \$100 campaign contribution ethical?

**Question 2:** Was Engineer A's concern about the perception of impropriety valid, and would a more significant contribution up to the legal contribution limit be ethical?

Engineer A's decision to contribute a nominal amount of \$100 to the campaign of the County Commissioner was not unethical.

It was recommended by BER that such a contribution be intentionally and carefully considered in terms of the possible perception of impropriety and consequent damage to the profession. In this case, Engineer A balanced those considerations.

Campaign contributions in excess of a nominal amount need to be carefully considered from an ethical standpoint with respect to the intent of the contribution and whether members of the public might reasonably construe the contribution as an influencing the award of a contract.

*Ref. Section I.6, Section II.5.b, Section III.1.e, Section III.2.a*

## SCENARIO 2 – Climate Change Induced Conditions

Engineer B is a consulting engineer representing a developer proposing to develop a healthcare facility requiring a significant upgrade to the property's access road across a tidal saltmarsh. Local regulations require design for a 25-year storm and assume future weather conditions will be consistent with historical data. Engineer B is aware of climate change information that could result in future upstream flooding and recommends a more complex and costly hydrologic evaluation to be safe. The developer directs the Engineer B to proceed without the additional analysis.

**Question 1:** Does Engineer B have an ethical obligation to address impacts in response to climate change induces conditions that have yet to occur?

**Question 2:** In this set of circumstances, what are this Engineer's reasonable courses of action?

Engineer B has an obligation to consider potential impacts on public health, safety, and welfare, regardless of whether that is required by applicable law, including changing weather patterns and climate.

If Engineer B is reasonably certain that the project will result in adverse impacts to public health, safety, and welfare, and if the Client denies the requisite evaluation, Engineer B 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.

*Ref. Section I.1, Section II.1.a, Section II.2.a, Section II.3.a, Section II.3.b, Section III.1.b, Section III.2.d.*

# SCENARIO 3 – Offer of Free or Reduced Services

A State environmental agency notified a small city that its water system is not compliant with drinking water standards and the city must resolve this non-compliance. In response, the city posts a Request for Qualifications (RFQ) for engineering services. Services required include Preliminary Engineering to evaluate alternatives for solution of the non-compliance, and Design and Construction Engineering for the selected alternative. Engineer A, offers to provide free Preliminary Engineering to increase the chances of being selected. The RFQ requests specific information from the engineering firms that respond but did not request any information regarding fees or engineering costs.

**Question:** Was the offer by Engineer A for free Preliminary Engineering ethical?

The offer by Engineer A for free Preliminary Engineering should be considered a gift or valuable consideration in order to secure work and provided an unfair advantage over other firms. Therefore, the offer was unethical. Furthermore, if this matter occurs in a state in which Qualification-Based Selection (QBS) is required, the action of Engineer A is both unethical and potentially illegal.

*Ref. Section II.5.b, Section III.1.f, Section III.8.a.*

# SCENARIO 4 – Temporary Disability

Engineer C is an engineer in private practice diagnosed with a medical condition that could affect cognitive abilities. Although the condition is treatable and Engineer C has started treatment, this engineer is concerned that the medical condition could affect the professional level of standards of quality or standards of care provided clients. It is expected that Engineer C will return to health in a few months, but Engineer C is concerned about ethical obligations.

**Question 1:** Is Engineer C obligated to reveal this condition to clients?

**Question 2:** Should Engineer C refrain from accepting engineering work until full recovery?

# SCENARIO 4 – BOARD CONCLUSION

Engineer C is not obligated to reveal the medical condition to clients.

Engineer C may continue accepting work while under treatment provided Engineer C retains a trusted colleague or 3<sup>rd</sup> party reviewer to review the work for their own records, as necessary.

*Ref. Section I.1, Section I.4, Section I.6.*



# SCENARIO 5 – Conflict of Interest

Engineer D is the Engineer of Record for a design-build team led by Contractor W. Under the terms of the Agency funding the project, the project is required to have an independent peer review of the design, the design approach, compatibility with the site, and a constructability assessment related to the design approach. The design and drawings are created by Engineer D, and Engineer F is directly hired by Engineer D to perform the required peer review.

**Question:** Was it ethical for Engineer D to hire Engineer F to perform the required peer review?

The peer review was not independent as required by the agency. Therefore, it would not be ethical for Engineer D to hire and enter into a direct contractual relationship with Engineer F to perform the peer review.

*Ref. Section II.1, Section II.1.a, Section II.2.a, Section II.4, Section II.4.a, Section III.1.b.*

## SCENARIO 6 – Internal Plan Reviews vs. Third Party Peer Reviews



Engineer B is a design engineer from Firm X who has completed a 30% design. To cover the extra cost for the work performed to complete the 30% design, Engineer B has requested the project manager to assign someone to perform the 60% design review. Engineer B has also requested the design reviewer to consider a completely new design concept.

Another Engineer from Firm X (Engineer A) who typically provides quality assurance/quality control (QA/QC) plan reviews on in-house projects, has been assigned to perform the 60% review. Engineer A normally provides QA/QC reviews using general corporate design checklists for level of design completeness.

Frequently, designs that Engineer A has been given to review do not reach the level of completeness required for this project – a project which needs a review of the accuracy and content of both plans and specifications, identification of design elements requiring additional analysis, revision, and/or improvement to fulfill the anticipated percent level of the design.

## SCENARIO 6 – Internal Plan Reviews vs. Third Party Peer Reviews



An independent consulting engineer with Firm Y, Engineer C, who occasionally performs peer reviews for project owners and public agencies, has been retained to perform a peer review of the 60% progress design from Engineer B of Firm X. Engineer B and Firm X ask Engineer C to sign a three-party agreement that provides for consent but also addresses costs, liabilities, procedures, indemnification, and other relevant factors. Firm Y signs a three-party agreement that agrees to provide a 60% review of Engineer B's design and follows EJCDC Doc. No. E-581 which calls for an independent peer review of another engineer's design work. If the peer review is on a design that is not 60%, Engineer C is asked to stop work immediately and return design documents to Firm X.

# SCENARIO 6 – Internal Plan Reviews vs. Third Party Peer Reviews



**Question 1:** Was it ethical for Engineer B to knowingly submit a 30% design for a 60% design review?

**Question 2:** Would it be ethical for Engineer B to make a re-request for radically different design recommendations by (in-house) Engineer A including recommendations for total redesign?

**Question 3:** What were Engineer A's ethical obligations for the plan review?

**Question 4:** What were Engineer C's obligations for the peer review?

# SCENARIO 6 – CONCLUSIONS

It is unethical for Engineer B to knowingly submit a 30% design for a 60% design review.

Although it is not unethical at any design state of a project for Engineer B to request Engineer A for radically different design recommendations leading to complete redesign, such recommendations are normally outside the scope of an in-house QA/QC review. If Engineer B is looking for a sounding board or for additional ideas, Engineer B is free to approach any of the engineering employees for an informal discussion. However, if Engineer B has serious doubts about the efficacy of the proposed design, such concerns should be raised as soon as possible for a full review.

Engineer A is ethically obligated to return the 30% plans submitted as 60% complete.

Likewise, as a 3<sup>rd</sup> party peer review, Engineer C's obligations is to review documents for primarily technical content and not to review documents that are only 30% complete submitted as 60% complete.

*Ref. Section I.1, Section I.2, Section I.5, Section II.4, Section II.4.a, Section III.1.b, Section III.7.a., Section III.8.a*

# SCENARIO 7 – Avoiding Rolling Blackouts

Engineer A works for a facility that generates its power on site. The generator is reaching the end of its life and will require substantial investment to remain operational. Stakeholders desire to reduce the facility's carbon footprint, eliminate the generator and replace it with solar panels. Engineer A is satisfied that under normal conditions the solar panels can supply electric energy equivalent to that provided by the existing generator. The cost of installing the solar panels is the same as repairing the generator, but capital constraints prevent the organization from installing a system of batteries to store energy for use at night or in bad weather... (continued next page)

## SCENARIO 7 – Avoiding Rolling Blackouts (continued)

When discussing the analysis of electric load with the local utility, Engineer A learns that during extreme weather events the utility may be forced to institute rolling outages. Engineer A is convinced that the solar project, when considered in isolation, is viable and will satisfy the stakeholders interest in reducing the organizations carbon footprint. Engineer A also realizes that a move to solar production without storage may stress the local utility and increase the likelihood of rolling blackouts.

**Question 1:** Should Engineer A include information about the utility and rolling blackouts in the report to the board?

**Question 2:** Should Engineer A include information about cost of battery storage and the potential consequences of not having battery storage?



# SCENARIO 7 – BOARD CONCLUSION

Engineer A has an ethical obligation to include information about the utility and potential rolling blackouts in a report to the organization's board.

Engineer A's report should also include information about cost of battery storage and the potential consequences of not having battery storage on system reliability relative to public safety, health, and welfare.

*Ref. Section I.1, Section I.6, Section II.1.c, Section II.3.a, Section II.3.b, Section II.4, Section III.1.b, Section III.2.d*



# SCENARIO 8 – Good Samaritan Laws

Engineer A, a registered professional engineer, is discussing with a colleague, Engineer B, a recently enacted law in their state that provides design professionals with immunity from liability when they volunteer during a natural or man-made disaster.

Engineer B believes that the new law significantly improves the ability of design professionals to assist communities in need during times of trouble . Engineer A feels that the new law does not change and engineer’s ethical obligations.

**Question 1:** Is Engineer A correct?

**Question 2:** Is Engineer B correct?

# SCENARIO 8 – BOARD CONCLUSION

Both Engineer A and Engineer B are correct. Although Good Samaritan Laws may make it easier to volunteer during natural or man-made disasters, they do not change an engineer's ethical obligations.

*Ref. Section I.6, Section II.1, Section II.2, Section III.2.a, Section III.6.b, Section III.6.c, Section III.8*

# SCENARIO 9 – Misrepresentation of Qualifications



Engineer A is a licensed Professional Engineer in three states and is a Board-certified Diplomate in Forensic Engineering. An Attorney contacts Engineer A, seeking the services of a non-engineering expert to provide testimony in a state where Engineer A is not licensed. Engineer A agrees to evaluate the case, prepare an expert opinion, and provide testimony. The licensing statute in the state in question specifies that any engineer providing expert testimony in a state court must be licensed in that state. Engineer A signs the report as “Consultant A, Board-certified Diplomate in Forensic Engineering” making no reference whatsoever to licensure status.

**Question:** Was Engineer A’s self description in the expert report ethical?

Incorporating “Engineer” or “Engineering” into Engineer A’s signature brought Engineer A under the purview of the state’s licensing law, with which Engineer A was not in compliance. That constitutes unlicensed practice, which is both unethical and unlawful.

Provided that Engineer A qualified as an expert without relying on engineering qualifications, Engineer A’s self-presentation as a consultant-expert without identifying status as a licensed professional engineer was not unethical. However, when Engineer A claimed status as a Board-certified Diplomate in Forensic Engineering, Engineer A’s self presentation became unethical.

*Ref. Section I.1, Section II.5.a, Section III.1.d, Section III.3.a*

A city passes a new ordinance requiring sprinkler systems in residences built less than eight feet apart. The ordinance applies to all new construction and all existing construction which has not yet received a certificate of occupancy. This means that projects under construction must have a sprinkler system added. Engineer A who happens to have both structural and fire protection credentials, is hired by a homeowner to design a retaining wall system to stabilize a rear yard. The homeowner allowed Engineer A to store equipment in the attached garage. Engineer A observes that the builder of homeowner's garage routed the piping for the retrofitted sprinkler system through the unheated garage space, potentially exposing the pipes to freezing temperatures.

**Question:** What are Engineer A's obligations?

If Engineer A reasonably believes that the probability of property damage is high and that the probable amount of property damage is significant, Engineer A has a duty to advise the Owner/Client of the risk.

If Engineer A reasonably believes that frozen pipes would cause the sprinkler system to become inoperable, Engineer A could reasonably conclude that there is an imminent risk to the public's health, safety, and welfare, triggering a duty to report the issue to the Owner/Client.

*Ref. Section I.1, Section I.4, Section II.1.c, Section II.1.f, Section III.1.b, Section III.4*

# SCENARIO 11 – Public Welfare at What Cost?

A consultant determined an old town water main to be in good condition but no longer large enough for all the properties served. The larger replacement water main cost is currently unaffordable at \$750,000.

The State DOT is planning a highway reconstruction project. Under DOT's policy they will only pay for unavoidable utility conflicts as part of a highway project. Other utility work would be considered as a betterment that must be paid by the local municipality. Engineer W is the senior DOT engineer responsible for this project and delegates this project Engineer Intern D, who is about to sit for the PE exam. Engineer Intern D initiates the design layout for this project to avoid conflicts with the existing utilities. Engineer W conveys to Engineer Intern D in an indirect way that the design should be revised so that the old water main is impacted. In this case, the town would pay an affordable \$50,000 for the water main upgrade since they would only have to pay the difference in price between the existing size of the water main and the proposed larger size, rather than the entire replacement cost. Engineer W tells Engineer Intern D, "I'll sign off on it."

**Question 1:** Would it be ethical for Engineer Intern D to revise the design so that the old water main is impacted by the DOT project?

**Question 2:** Would it be unethical for Engineer W to sign off on the design where the old water main is impacted by the DOT project?



# SCENARIO 11 – BOARD CONCLUSION

Better approaches are available. For example, Engineer W could request a joint meeting to discuss the situation. Or Engineer W could run this up the chain of command with the State DOT. Perhaps the town could be allowed to benefit from construction activities the DOT was already undertaking. However, secretly diverting \$700,000 of state DOT funds is not an ethical solution.

So, It would not be ethical for Engineer Intern D to accede to Engineer W's veiled directive to revise the design so that the old water main is impacted by the DOT project.

It would not be ethical for Engineer W to sign off on a design altered so that the old water main is impacted by the DOT project. Engineer W would not be acting as a faithful agent of the DOT.

*Ref. Section 1.3, Section 1.4, Section 1.5, Section 1.6*



## SCENARIO 12 – Duty to Report – Material Information



Engineer B is a PE and DOT director who is supervising Engineer Intern A, an unlicensed engineer in the DOT's bridge inspection program. While reviewing the inspection report for a bridge, Engineer Intern A observed that an inspector under the supervision of Engineer Intern A failed to report a visibly obvious defect in a concrete bridge member. Engineer Intern A decided to review the inspector's reports and photos for the past five years and discovered that this inspector had failed to report this same defect for the last five years. Engineer Intern A reported the defect to Engineer B but did not report the fact that the defect has been visibly obvious for the last five years.

**Question:** Was it ethical for Engineer Intern A to fail to report to Engineer B that the defect had been missed for at least five annual inspections?

**Engineer Intern A had a responsibility to report all material facts related to the visibly obvious defect. As a practical matter, revealing that the visibly obvious defect had been in existence and unchanged for at least five years might have reduced the urgency of any investigation, but Engineer Intern A was not yet qualified to either make that determination or evaluate the materiality of the information.**

**It was not ethical for Engineer Intern A to fail to report to Engineer B that the defect had been missed for at least five years. That is material information that could have been critical to Engineer B's decision-making.**

*Ref. Section I.1, Section I.5, Section I.6, Section II.3.a, Section III.3.a*



## Our Take-Away:

- Ethical and Legal are not synonymous
- The same action can be either ethical or unethical depending upon the circumstances
- Each situation needs to be tested against the fundamental cannons of the Engineer's Code of Ethics

