WINDY COVE ENERGY

The Flashlight Test
How I Can Know I Am Acting Ethically

Chuck Fox

Society of Petroleum Evaluation Engineers
Houston Chapter Meeting
September 7, 2016

Ethical Dilemma

§137.59 Engineers' Actions Shall Be Competent

(a) Engineers shall practice only in their areas of competence, in a careful and diligent manner, and in conformance with standards, laws, codes, and rules and regulations applicable to engineering practice.

(b) The engineer shall not perform any engineering assignment for which the engineer is not qualified by education or experience to perform adequately and competently. However, an engineer may accept an assignment which includes phases outside of the engineer's area of competence if those other phases are performed by legally qualified consultants, associates, or employees.

Flashlight Test

Chicago Union Station
Photographer: Jack Delano,
U.S. Farm Security Administration

Agenda

- Introduction
- Case Studies with Interaction
  - Public Criticism of Bridge Safety
  - Obligation to Write a Letter of Recommendation
  - Code Enforcement
  - City Engineer
  - A Problem with the Ethics of Non-Disclosure Agreements
  - Binary Service to Same Client
- William LeMessurier: 59-Story Crisis
- Conclusion
- One More Thing

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Case Studies

Case Studies & 59-Story Crisis

- Online Ethics Center for Engineering and Science
  - www.onlineethics.org
  - National Academies of Sciences, Engineering and Medicine

- Case Studies
  1. Facts
  2. References
  3. Question
  4. Discussion at tables/vote
  5. Conclusion

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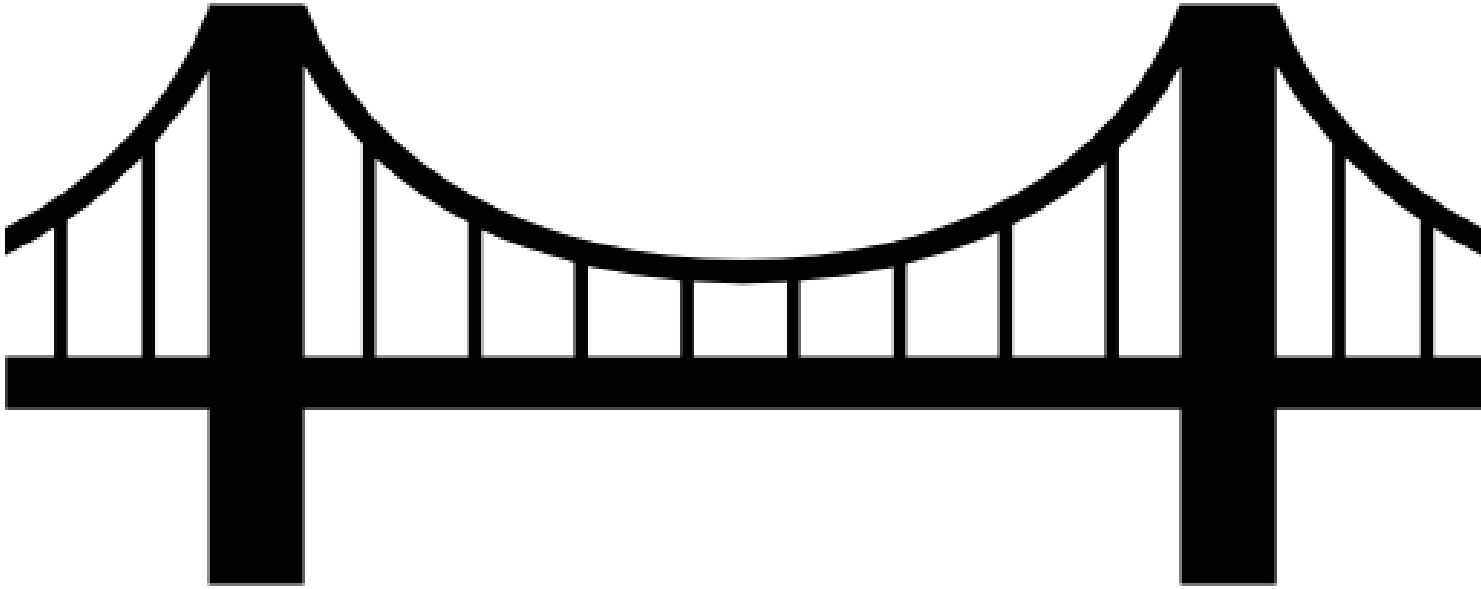
Public Criticism of Bridge Safety

To avoid criticism, do nothing, say nothing and be nothing – Elbert Hubbard

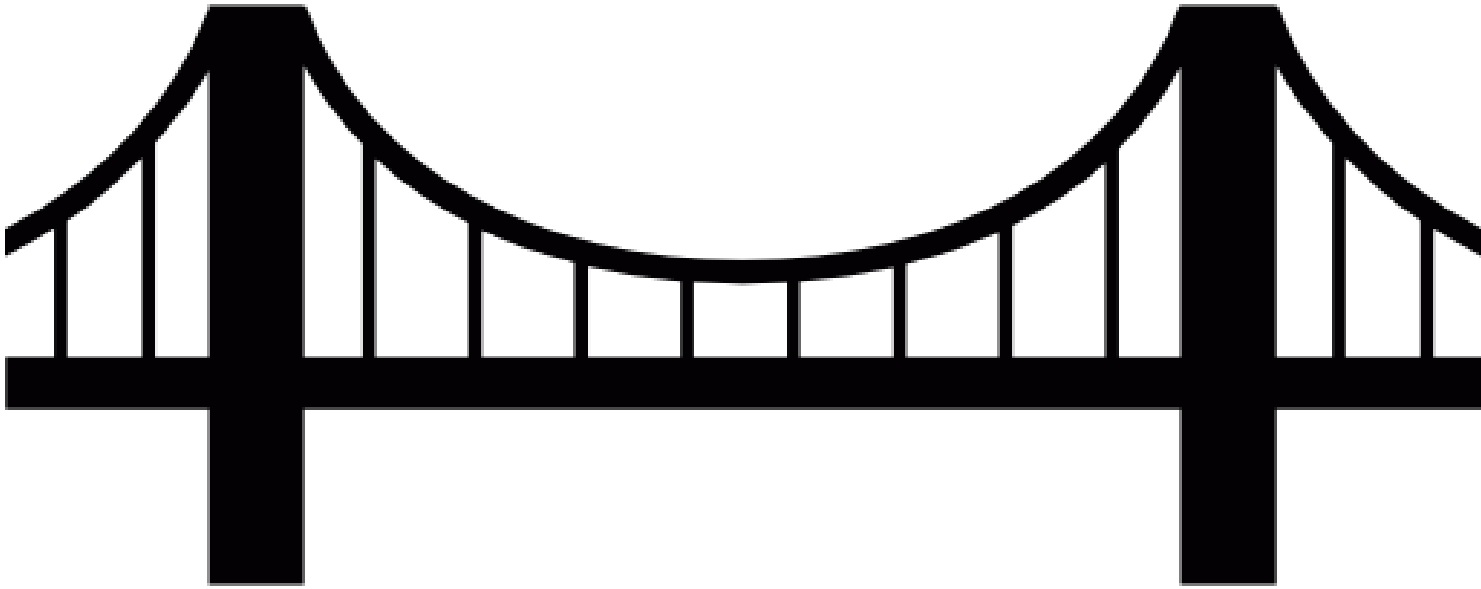
Facts

- Large city newspaper hires structural engineer to visit site of state bridge construction project



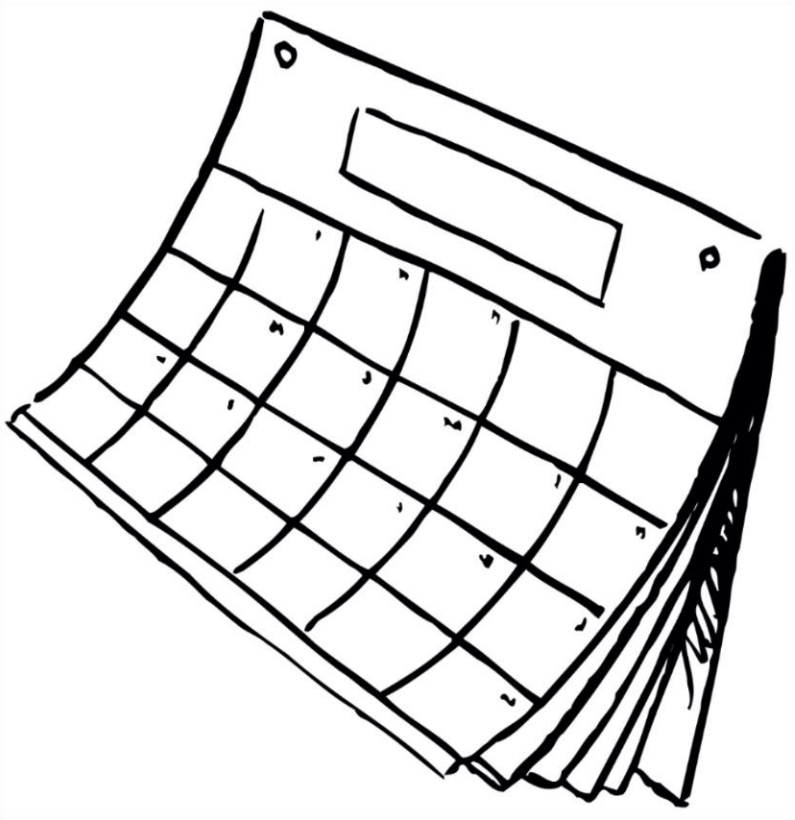
Facts

- Troubled project history includes
  - Construction delays
  - Cost increases
  - On-site accident litigation



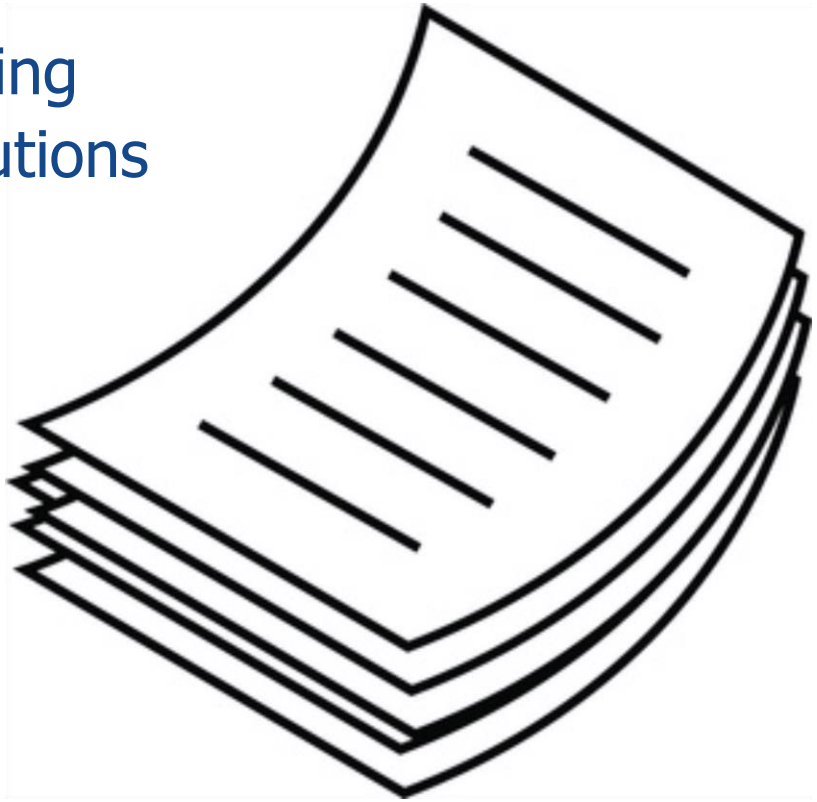
Facts

- Schedule
  - Highway department has announced bridge's opening date
  - State engineers are working to a specific schedule



Facts

- Structural engineer performs one-day visual observation of bridge
- Issues general report including
  - Potential problems
  - Proposals additional testing
  - Possible engineering solutions



Facts

- Newspaper runs feature articles based on report, alleging
  - Major safety problems that jeopardize completion date
  - Misconduct and incompetence of project engineers, contractors and highway department

Facts

- State investigation results
  - Structural engineer states report was only to identify potential safety problems, not to be conclusive about the safety of the bridge

References

- Code of Ethics - Section 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."
- Section II.3.b.: "Engineers may express publicly a professional opinion on technical subjects only when that opinion is founded upon adequate knowledge of the facts and competence in the subject matter."
- Section II.3.c.: "Engineers shall issue no statements, criticisms or arguments on technical matters which are inspired or paid for by interested parties, unless they have prefaced their comments by explicitly identifying the interested parties on whose behalf they are speaking, and by revealing the existence of any interest the engineers may have in the matters."
- Section III.2.a.: "Engineers shall seek opportunities to be of constructive service in civic affairs and work for the advancement of the safety, health and well-being of their community."
- Section III.3.a: Engineers shall avoid the use of statements containing a material misrepresentation of fact or omitting a material fact necessary to keep statements from being misleading or intended or likely to create an unjustified expectation; statements containing prediction of future success; statements containing an opinion as to the quality of the Engineers' services; or statements intended or likely to attract client by the use of showmanship, puffery, or self-laudation, including the use of slogans, jingles, or sensational language or format."

2006

Question:

Was it ethical for the structural engineer to perform an investigation for the newspaper in the manner stated?

Conclusion

- It was not ethical for the engineer to perform an investigation in this manner.
- The engineer had an obligation to require the newspaper to state in the article that the engineer had been retained for a fee to provide her professional opinion.

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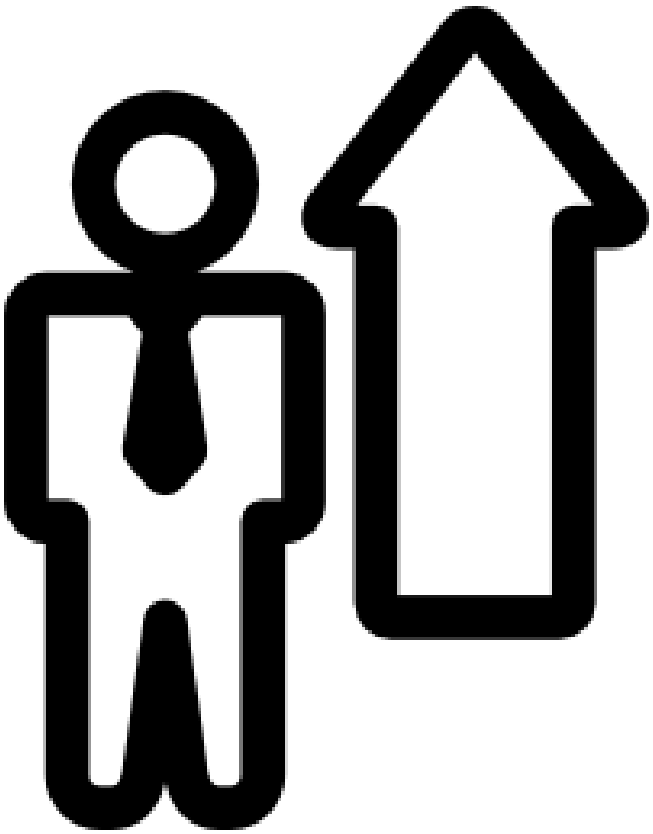
Obligation to Write Letter of Recommendation

Whenever I want to laugh, I read a wonderful book, "Children's Letters to God." You can open it anywhere. One I read recently said, "Dear God, thank you for the baby brother, but what I prayed for was a puppy."

– Maya Angelou

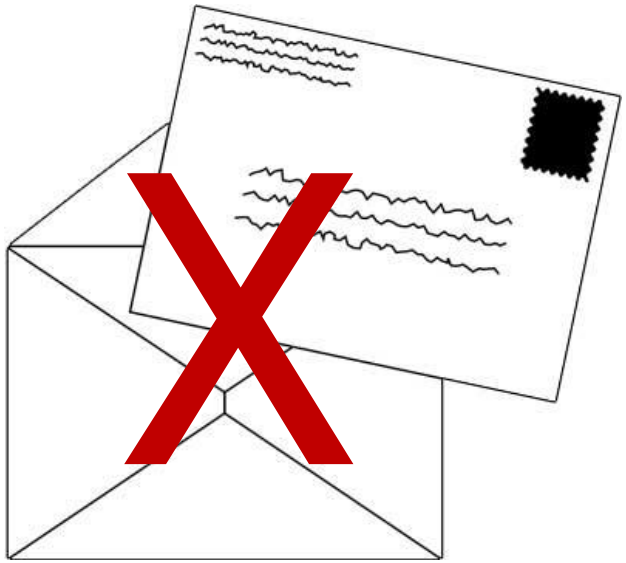
Facts

- **Engineer Smith** is up for promotion to higher level professional position
- Smith's employer contacts engineers who had previously worked with him, including **Engineer Doe**



Facts

- **Engineer Doe**
  - Has no current, direct, professional relationship with Smith
  - Tells Smith's employer he will not comment because
    - Smith dropped his membership in state professional engineering society
    - It is professionally incumbent on all engineers to support their profession through membership in the professional society



References

- Code of Ethics - Section 12: "The Engineer will not attempt to injure, maliciously or falsely, directly or indirectly, the professional reputation, prospects, practice, or employment of another engineer, nor will he indiscriminately criticize another engineer's work. If he believes that another engineer is guilty of unethical or illegal practice, he shall present such information to the proper authority for action."

- Section 15: "The Engineer will cooperate in extending the effectiveness of the profession by interchanging information and experience with other engineers and students, and will endeavor to provide opportunity for the professional development and advancement of engineers under his supervision."

2006

Question:

Was it ethical for Doe to submit his response on Smith's professional qualifications solely on the reasons he gave?

Conclusion

- It was not ethical for Doe to submit his reply for the reasons given.
- There is nothing in the Code of Ethics that imposes a duty to write a letter of recommendation. An engineer can ethically decide to ignore a request.
- But he didn't ignore the request. He submitted negative comments while taking the position that he did not wish to comment on Smith's qualifications.
- This was a close question.

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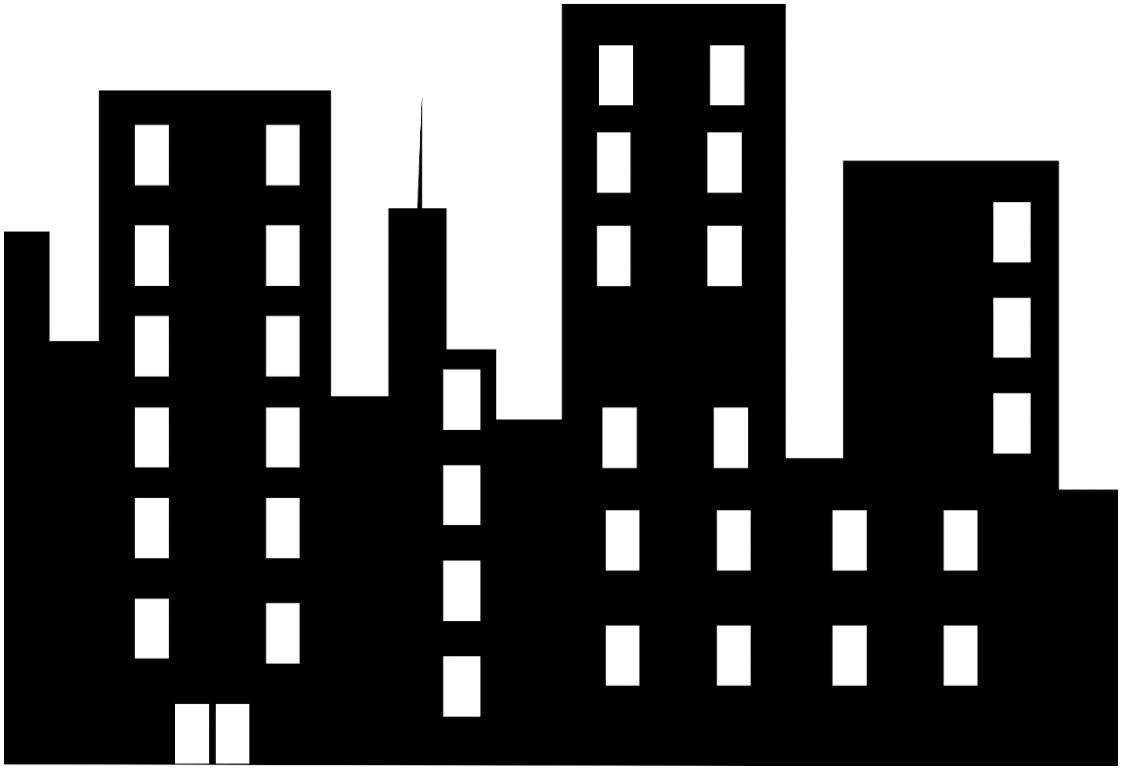
Code Enforcement

Every society gets the kind of criminal it deserves. What is equally true is that every community gets the kind of law enforcement it insists upon.

– Robert Kennedy

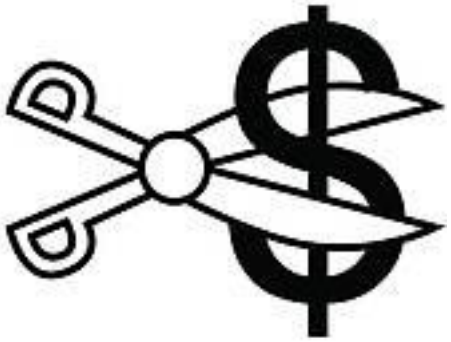
Facts

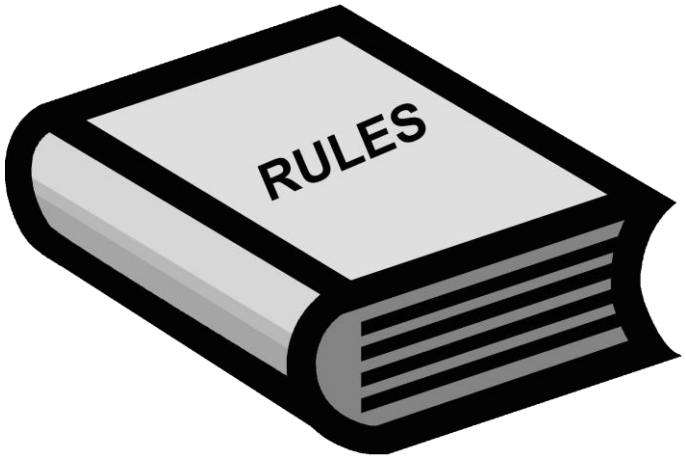
Engineer A is director of building department in a major city with signature authority for all final inspection reports



Facts

- Budget cutbacks and stricter code requirements are putting stress on current inspection staff





- Inspection quality and timeliness compromised
- 60 inspections per inspector per day: impossible

Facts

- Engineer A caught between conflicting agendas:

Facts

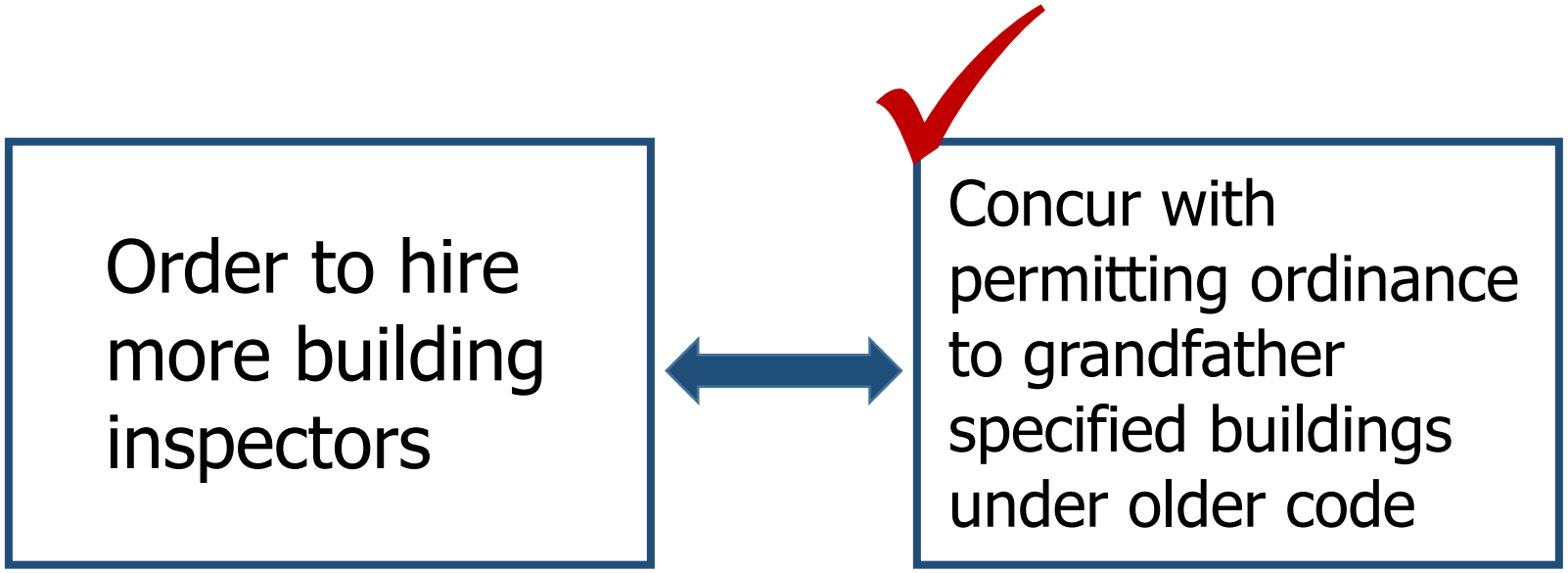
- Engineer discusses concerns with city council chairman
- Chairman
  - Sympathizes and proposes:

Order to hire more building inspectors

Concur with permitting ordinance to grandfather specified buildings under older code

?

Facts



- Engineer A agrees to concur with Chairman's proposal
- Chairman issues order to hire more inspectors

References

- Code of Ethics - 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.b.: Engineers shall approve only those engineering documents which are in conformity with applicable standards.

- Section II.3.b.: Engineers may express publicly technical opinions that are founded upon knowledge of the facts and competence in the subject matter.

- Section III.1.b.: Engineers shall advise their clients or employers when they believe a project will not be successful.

2006

Question:

Was it ethical for Engineer A to agree to concur with the chairman's proposal under the facts?

Conclusion

- It was not ethical for the city engineer to concur with the chairman's proposal.
- It was not ethical to sign inadequate inspection reports.

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City Engineer

I think superheroes today are like whistle blowers – Robert Englund

Facts

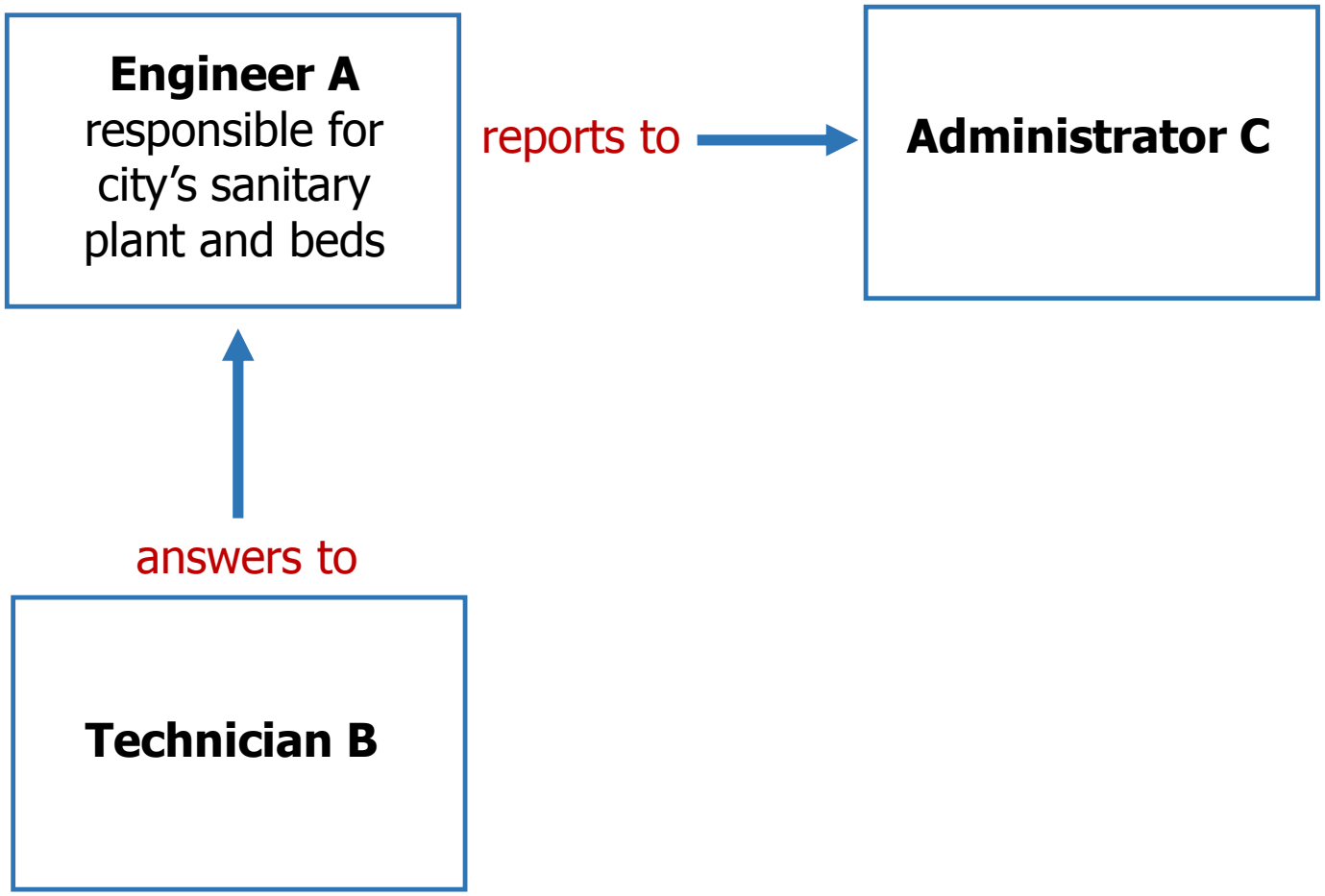
- Engineer A
  - City engineer/director of public works in medium-sized city

- Is only licensed professional engineer in position of responsibility in city government

Lexington, Kentucky
Photographer: Britt Selvitelle
Creative Commons Licensing

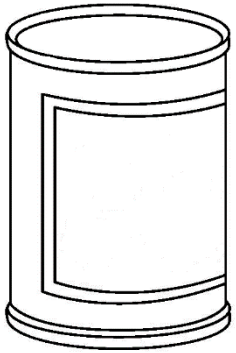
Facts

- Chain of command

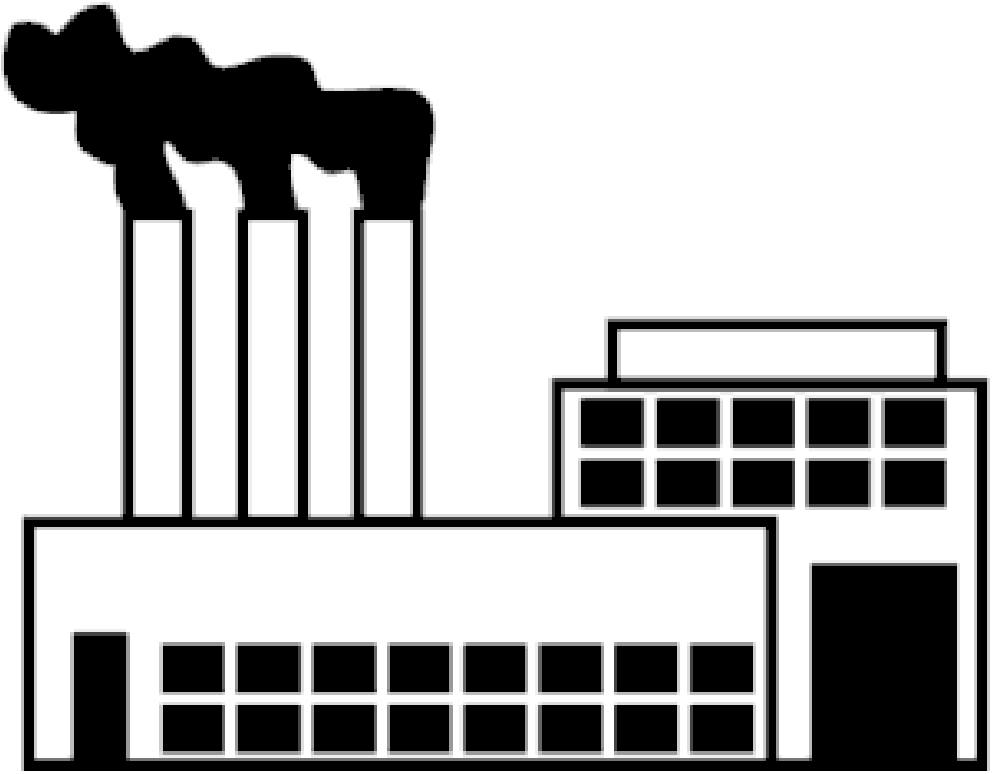


Facts

- City has several large food processing plants
- Processing plants discharge large amounts of vegetable waste into city's sanitary system during canning season



- Canning season coincides with rainy season



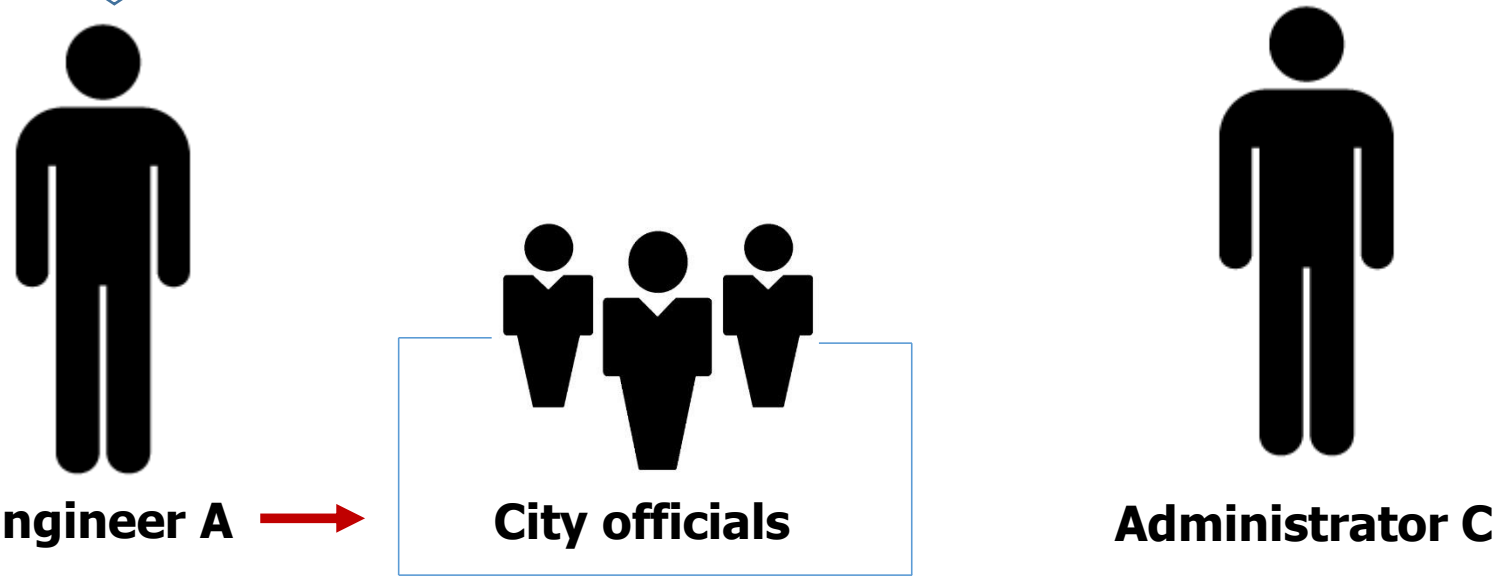
Facts

The disposal plant and beds lack the capacity to handle the potential overflow during rainy season.

Here are some possible solutions....

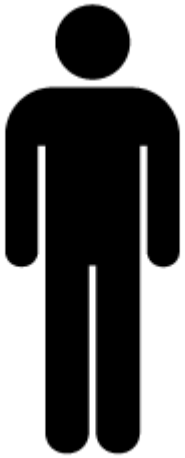
We will face the problem when it comes.

Keep this between us or lose your job.

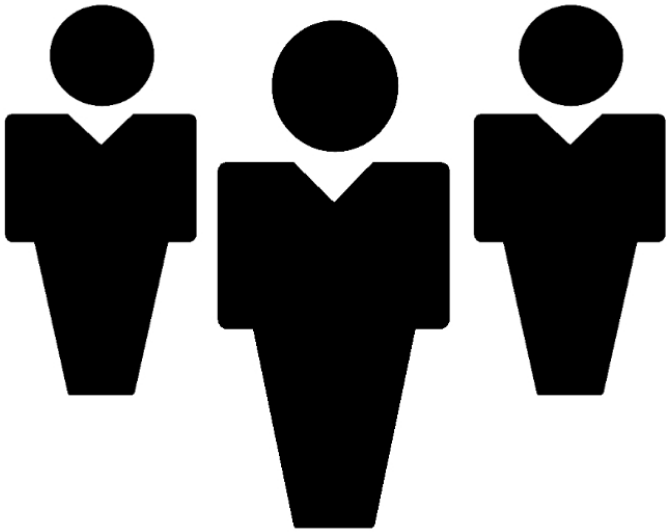


Facts

- Engineer A continues to privately discuss problem with other city officials

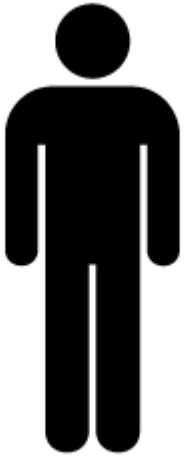


Engineer A



City officials

Facts

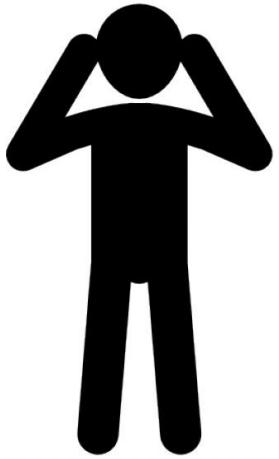


Engineer A

- No longer responsible for entire sanitary system and chain of command
- On probation; under threat of termination
- Ordered to stop discussing issue

Administrator C

- Responsible for entire sanitary system and chain of command
- Reports to Administrator C
- Instructed to report 3rd party interference



Technician B

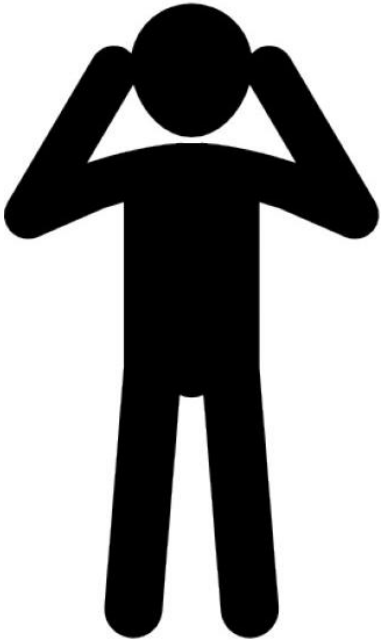
Facts

City engineer

Engineer A

- stays on the job
- privately advises Technician B

- assumes no responsibility for sanitary plant and beds



Technician B

Facts

- Heavy storms during canning season
- Waste water from ponds needs to be released to local river
- If ponds overflow levees, waste will be dumped into larger river
- Event must be reported to state water pollution control authority

References

- Code of Ethics - Section I.1.: "Engineers, in the fulfillment of their professional duties, shall hold paramount the safety, health and welfare of the public in the performance of their professional duties."
- Section II.1.a.: "Engineers shall at all times recognize that their primary obligation is to protect the safety, health, property and welfare of the public. If their professional judgment is overruled under circumstances where the safety, health, property or welfare of the public are endangered, they shall notify their employer or client and such other authority as may be appropriate."
- Section II.4.: "Engineers shall act in professional matters for each employer or client as faithful agents or trustees."
- Section III.2.b.: "Engineers shall not complete, sign, or seal plans and/or specifications that are not of a design safe to the public health and welfare and in conformity with accepted 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."

2006

Question:

Did Engineer A fulfill her ethical obligation by informing City Administrator C and certain members of the city council of her concerns?

Conclusion

- Engineer A did not fulfill her obligations by informing the City Administrator and certain members of the city council of her concerns.

Discussion

- Clearly the case involved "endangerment to the public safety, heath and welfare." Engineer A had a obligation to report the matter to her employer. She did.
- But, she had an obligation to go further.
- Engineer A's act of reporting the matter to City Administrator C or certain members of the city council did not constitute reporting the matter to the proper authorities.
- And
- Her decision to assume no responsibility for the plant and beds did not constitute "withdrawal from further service to the project."

Why?

- She should have known that proper "authorities" were not the city officials but more probably state officials (state water pollution control authority). Her inaction permitted a serious violation of the law to continue.
- It is hard to say when she should have gone to the state.
- Further, as the legally established city engineer and director of public works, she allowed her engineering judgment to be overruled by a non-engineer. She had an ethical obligation to report that to the proper authorities.
- And
- By blowing the whistle, she might be faced with unemployment

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A Problem with the Ethics of Non-Disclosure Agreements

Non-disclosure in the Internet Age is quickly perceived as a breach of trust. Government, corporations and each of us as individuals must recalibrate how we live and share our lives appropriate to the information now available and the expectations of others.

– Simon Mainwaring

Background

- Entry-level engineer
- Works at Dynamic Computing
  - High performance computing company
- Signs non-disclosure agreement
  - Can’t share trade secrets
  - Can’t share proprietary information
  - No non-compete

Background

- At Dynamic
  - Engineer is on a team studying network topologies
  - Team spends several months writing software models
  - Team uses performance benchmarks and cost to choose one topology for Dynamic's next generation of computers

Background

- Job change
- Engineer accepts lead engineering position with Panther Systems
- Panther interviewers
  - Like engineer's knowledge of creating network topologies
  - Need team leader to create topology for their next line of computers

Background

- Panther Systems
  - Small
  - Startup
  - Offers more career opportunities than Dynamic
    - Project management
    - Advancement to other management positions

Background

- At Panther, engineer learns
  - Company is behind on topology study
  - Other areas hinge on topology decision
  - Topology decision irreversible
  - Change is expensive
  - High pressure to finish quickly

Background

- Bait and Switch
  - Panther may have lied by omission about project's urgency
  - Engineer assumed adequate time for topology development

The Conflict

To share or not to share
Dynamic's topology
study results?

References

- Code of Ethics - Section II.1.c.: Engineers shall not reveal facts, data, or information without the prior consent of the client or employer except as authorized or required by law or this Code.
- Section II.4.: Engineers shall act for each employer or client as faithful agents or trustees.
- Section II.4.a.: Engineers shall disclose all known or potential conflicts of interest that could influence or appear to influence their judgment or the quality of their services.
- Section III.1.: Engineers shall be guided in all their relations by the highest standards of honesty and integrity.
- Section III.1.e.: Engineers shall not promote their own interest at the expense of the dignity and integrity of the profession.
- Section III.4.: Engineers shall not disclose, without consent, confidential information concerning the business affairs or technical processes of any present or former client or employer, or public body on which they serve.

References

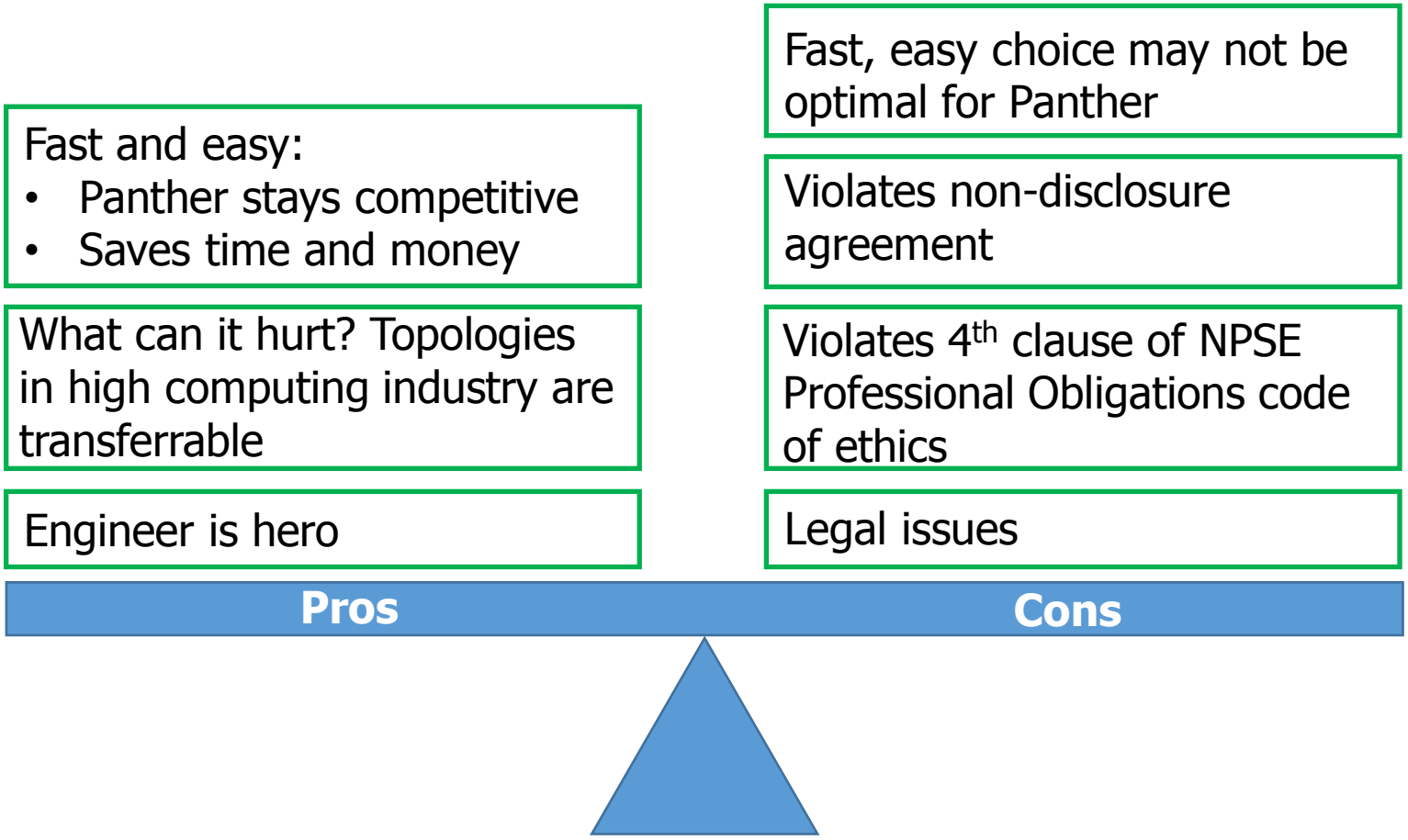
- Section III.4.a.: Engineers shall not, without the consent of all interested parties, promote or arrange for new employment or practice in connection with a specific project for which the engineer has gained particular and specialized knowledge.
- Section III.4.b.: Engineers shall not, without the consent of all interested parties, participate in or represent an adversary interest in connection with a specific project or proceeding in which the engineer has gained particular specialized knowledge on behalf of a former client or employer.
- Section III.7.: Engineers shall not attempt to injure, maliciously or falsely, directly or indirectly, the professional reputation, prospects, practice, or employment of other engineers.
- Section III.9.: Engineers shall give credit for engineering work to those to whom credit is due, and will recognize the proprietary interests of others.

Options

1. Share Dynamic's results with Panther
2. Ask for reassignment
3. Manage project team revealing no prior knowledge
4. Ask Dynamic for permission to use study results
5. Discuss non-disclosure concern with Panther Suggest only sharing testing methods without divulging test results

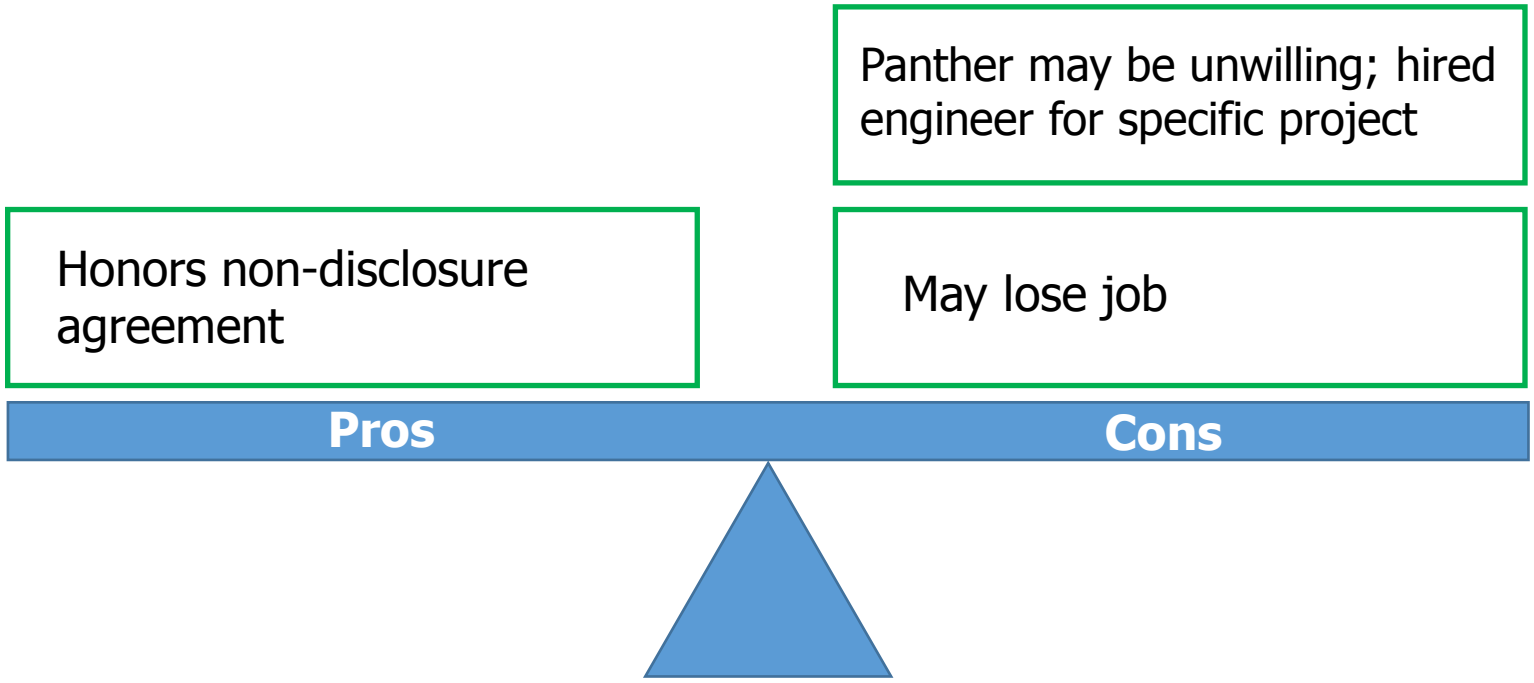
Option #1

Share Dynamic's results with Panther



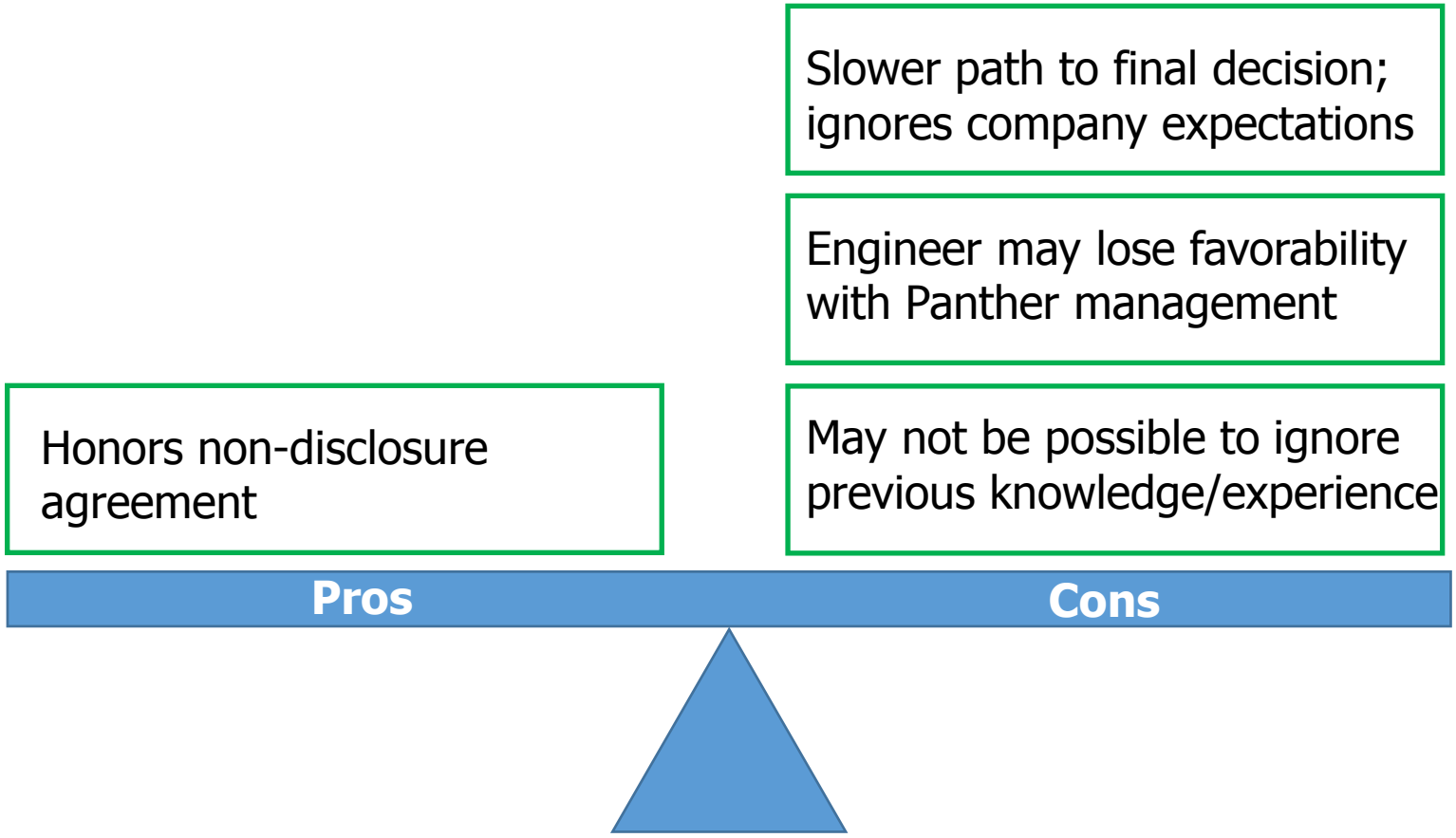
Option #2

Ask for reassignment



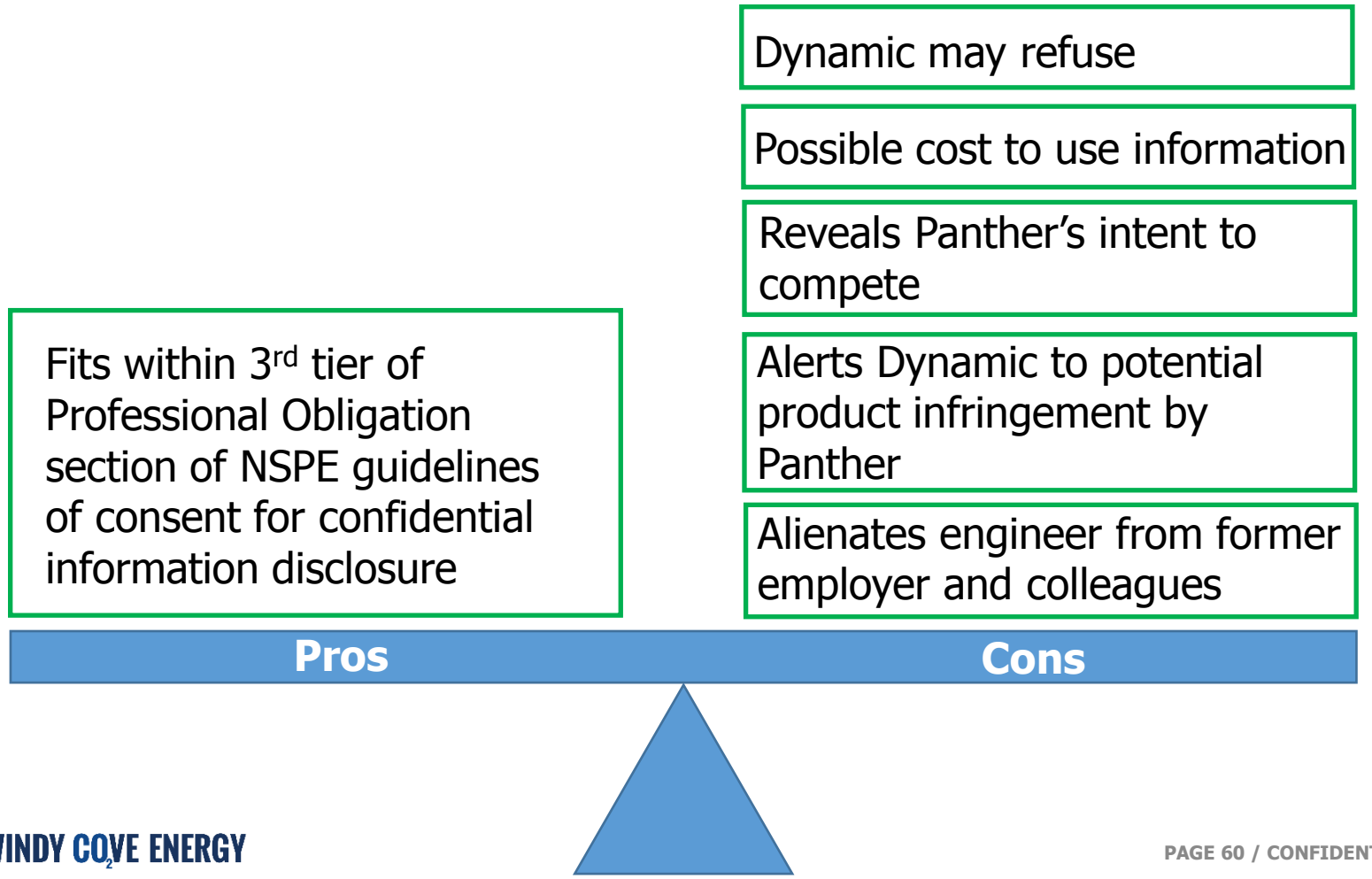
Option #3

Manage project team revealing no prior knowledge



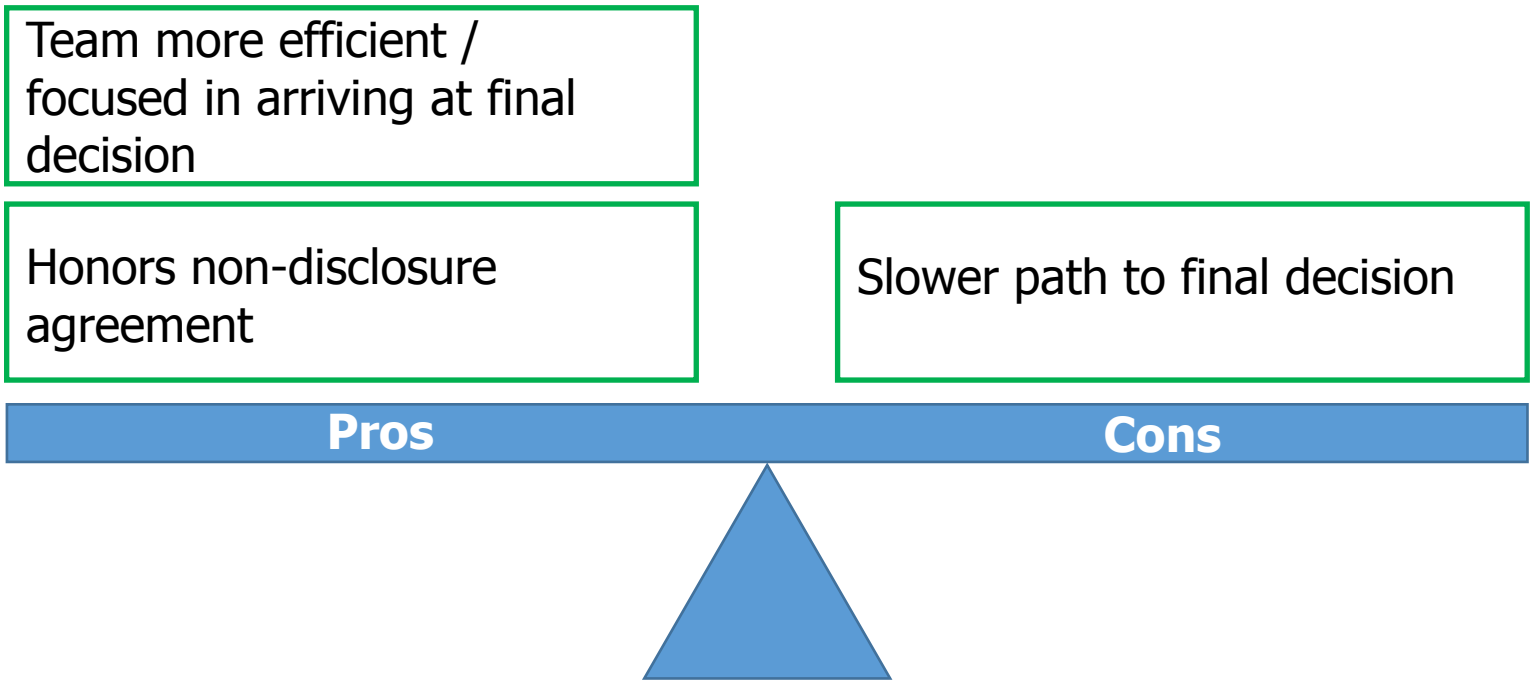
Option #4

Ask Dynamic for permission to use study results

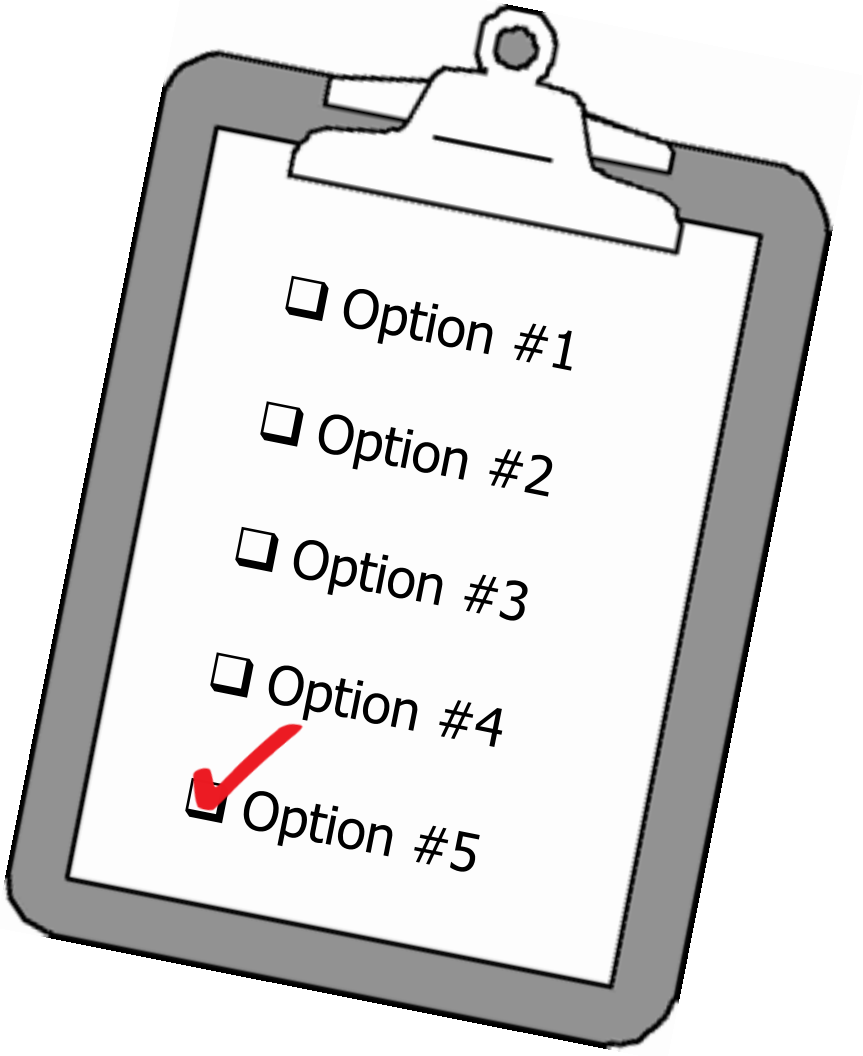


Option #5

Discuss non-disclosure concern with Panther
Suggest only sharing testing methods without divulging test results



The Decision



Question:

Is Option #5 best – or is it rationalizing behavior that others might see as violating the non-disclosure agreement?

Question:

Is it rational to believe the engineer can lead the team to better answers without divulging information gained through previous employer?

Other Questions:

- Why didn't engineer clarify job responsibilities and project timeline during interview?
- Did Panther interviewers avoid disclosing their project schedule to suggest that engineer should use Dynamic's test results?

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Binary Service to Same Client

To give real service you must add something which cannot be bought or measured with money and that is sincerity and integrity – Douglas Adams

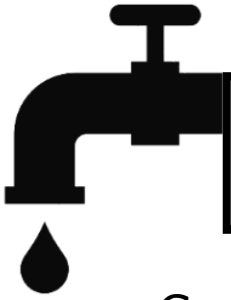
Facts

Engineer Services

engineering consulting firm

Water Services

corporation



Client: Rural Water District

General management services

- meter reading
- billing
- maintenance/repair recommendations
- **recommendations for additions and improvements to water system**

References

- Code of Ethics – Section 1 – "The Engineer will be guided in all his professional relations by the highest standards of integrity, and will act in professional matters for each client or employer as a faithful agent or trustee."
- Section 1(g) – "He will avoid any act tending to promote his own interest at the expense of the dignity and integrity of the profession.
- Section 8 – "The Engineer will endeavor to avoid a conflict of interest with his employer or client, but when unavoidable, the Engineer shall fully disclose the circumstances to his employer or client."
- Section 8(a) – "The Engineer will inform his client or employer of any business connections, interests, or circumstances which may be deemed as influencing his judgment or the quality of his services to his client or employer."
- Section 8(b) – "When in public service as a member, advisor, or employee of a governmental body or department, an Engineer shall not participate in considerations or actions with respect to services provided by him or his organization in private engineering practice."

Question:

Was it ethical for the two engineers to accept and perform professional engineering assignments for the water district which stem from recommendations made by Water Services?

Conclusion

- It was ethical for the engineers to accept and perform engineering assignments for the water district which stemmed from the recommendations submitted by Water Services.
- Major assumption – the water board made an independent judgement to accept their recommendation.
- A member of the review board provided a dissenting opinion.
- Presumed that a rural water board is administered by a voluntary group of lay people and that their recommendation carried the force of authority.

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William LeMessurier
The 59-Story Crisis

A Lesson in Professional Behavior

The Big Picture

- Evaluating previously overlooked hazards to public safety
- Marshalling resources to remedy them

LeMessurier

- William J. LeMessurier
  - BA math, Harvard (1947)
  - Studied architecture at Harvard Graduate School of Design
  - MA structural engineering, MIT (1953)
- One of country's most distinguished structural engineers
  - Boston's State Street Bank Building
  - Boston's Federal Reserve Building
- Design and construction consultant for Citicorp tower in New York, 1977

Citicorp Tower, NY

- Church - partial owner of block where Citicorp tower planned
- Citicorp agrees to build new, free standing church on corner to replace current church
- In return, church grants Citicorp air rights above its part of the block
- To make room for church, tower sits on 9-story high stilts
- Stilts positioned in middle of each wall: unprecedented

Citicorp Center from Ground

Author: Trxr4kds
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Building Background

- Designed with diagonal braces
- Braces to be joined with full-penetration welds
- First tower to use mechanical means to combat wind sway
  - Tuned mass damper installed at top of building
    - 400-ton concrete block
    - floats on pressurized oil bearings

London Millennium Bridge
Mass Dampener
(Floats on Springs)

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A Discovery

- During consultation for a building in Pittsburgh, WLM learns of contractor's substitution of bolts for welds
- As distant consultant, no reason for WLM to have been previously informed
- Finds out bolts for welds substituted in Citicorp too
- WLM determines substitution
  - Does not pose safety hazard
  - Reasonable from engineering perspective

Structural bolt DIN 6914 with UNI 5587 nut
Anders Lageras
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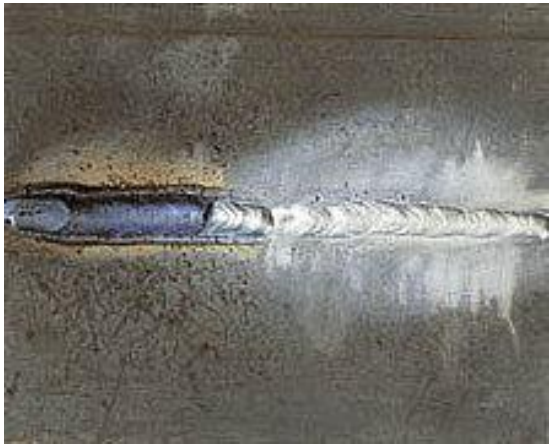

Elektroden-Schweißnaht vor und nach der Bearbeitung mit Schlackenhammer und Drahtbürste (von links)
Author: Osborndw
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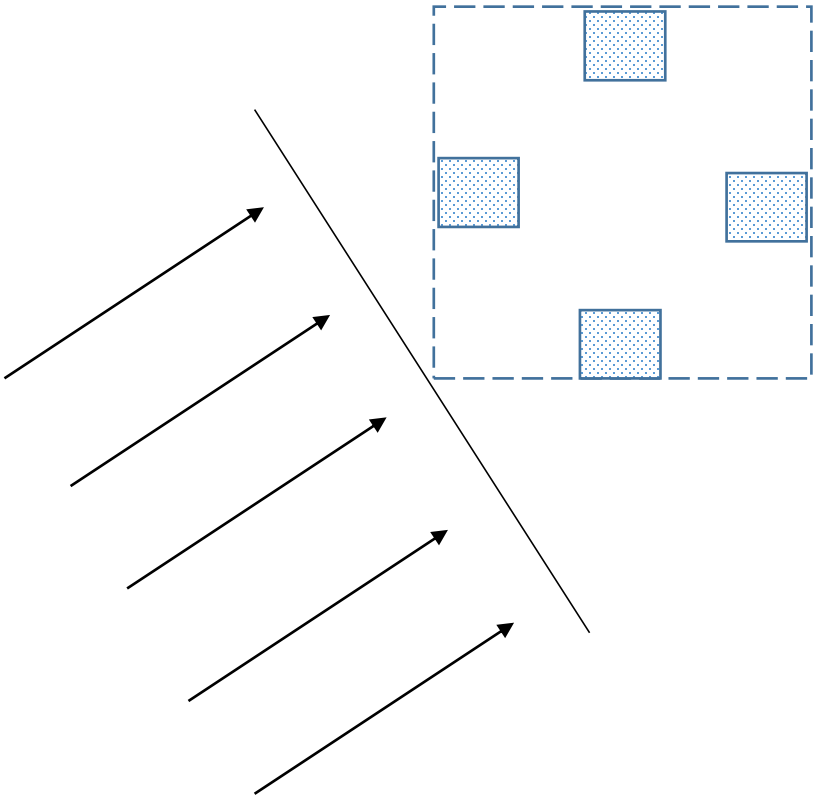
Hartley

- Diane Hartley
  - Engineering student, Princeton University
  - Writing undergraduate thesis about Citicorp tower in 1978
  - Studies plans and engineering calculations for tower
  - Performs her own calculations – questions if tower design could withstand quartering (diagonal winds)
  - Junior engineer at LeMessurier's firm explains reason for design and assures Hartley tower is efficient



Quartering Wind Calculations

- Phone call from Hartley prompts WLM to revisit wind calculations
- NY code requirement was only for perpendicular wind
- WLM found that quartering winds increase member stresses by 40%
  - Are bolts strong enough to carry imposed forces?
  - Were enough bolts used during construction?
  - Did contractor account for quartering wind?

More Investigation

- WLM confers with consultant who performed wind tunnel tests
  - Finds 70mph quartering wind would topple building
  - Wind-induced shaking could cause all structural members to vibrate synchronously
  - Tuned mass damper not designed to keep building from blowing down in major storm if power lost
  - Tower vulnerable to total structural failure
  - Hurricane season approaching

Options

- Silence
- Suicide
- Disclosure

Disclosure Risks

- Lawsuits
- Bankruptcy
- Insurance cancellation
- Damaged reputation
- End of career

The Solution – Nuts & Bolts

- Rip away flooring and walls to expose each bolted joint (around 200)
- Weld 2" x 6' gusset plates to bolted connections
- Cover work areas with plywood housing
- Work at night to minimize disruption
- Finish before hurricane season

The Solution – Casting a Wide Net

- Alert Citicorp to gravity of situation
- Ensure continuous operation of damper
  - Manufacturer supplies 24-hour service
  - Emergency generators installed for back up power supply
- Retain weather experts for advance storm warnings
- Prepare emergency evacuation plan
  - For Citicorp tower and 10-block diameter
  - 2,000 Red Cross emergency workers
- Coordinate with city regarding compliance to building code and evacuation plan
- How to handle the press?
  - General, facts-only press release: building being retrofitted to withstand higher winds
  - City-wide strike offered relief from scrutiny

The Residual

- The Tower
  - Repairs made tower stronger than originally specified
  - Damper failure could not harm building

- The Settlement
  - Repair estimate: $4MM to $8MM
  - Insurance company offers $2MM
  - Citicorp
    - Accepts insurance payment
    - Finds no fault
    - Closes the matter

The Residual (continued)

- The Insurance Company
  - Understands WLM prevented one of the worst insurance disasters of all time
  - Realizes WLM behaved in a competent, upfront manner to immediately and appropriately solve the problem
  - Lowers WLM's liability premium

Solution - Addendum

- 20 years later in a speech, WLM explained importance of presenting a solution alongside the disclosure:

"I had a scheme which I thought of before I opened my mouth. That's terribly important. You don't just cause havoc without having a solution."

Hindsight

- WLM never considered any other option but disclosure
- WLM believed "selfish worries were not enough to overcome his social obligation."

"If you've got a license from the State and a certification from the University first and now you're gonna [sic] use the license to hold yourself out as a professional, you have a responsibility beyond yourself, if you see something that is a social risk...good heavens this thing would kill thousands! You must do something. You must do something."

Questions

- Whose interests are at stake?
- What, if any, were the constraints on the actions of each?
- Was anything wrong/undesirable or especially praiseworthy in the situation or the reasoning of any of the actors?
- Could anyone have behaved better?
- What are the obligations and responsibilities of a junior structural engineer working on an innovative design?
- A senior structural engineer?

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Conclusion (Almost)

I believe that God has put talents and ability on the inside of every one of us. When you develop that and you believe in yourself and you believe you are a person of influence and a person of purpose, I believe you can rise up out of any situation. – Joel Osteen

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One More Thing

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