OVERVIEW

- Basic Principals
- Autonomous Vehicles
- Quick Hits - Case Studies
- Citigroup Center Case
THE HYATT REGENCY WALKWAY COLLAPSE

As Built

Original Detail

July 17, 1981
114 People Died
200+ Injured
HYATT REGENCY ETHICAL ISSUES

- Who is ultimately responsible for the fatal design flaw?
- What is the responsibility of a licensed professional engineer who affixes his/her seal to fabrication drawings?
- In terms of meeting building codes, what are the responsibilities of the engineer? The fabricator? The owner?
Why might a questionable change be approved?

- saving time;
- saving money;
- avoiding a call for re-analysis, thereby raising the issue of a request to recheck all connector designs;
- following immediate supervisor's orders;
- looking good professionally by simplifying the design;
- misunderstanding the consequences of actions;
- any combination of the above.
WHAT IS ETHICS?

- Law vs. Ethics
- The gray areas
- Can it be illegal to behave ethically?
SOURCES OF ETHICS

○ ORC / OAC

○ Professional Societies
  ○ ASCE
  ○ NSPE
  ○ Others - IEEE, ABET...
Chapter 4733: PROFESSIONAL ENGINEERS AND PROFESSIONAL SURVEYORS

...  

4733.07 Administrative rules.  
... The board may include among the rules adopted governing the standards of practice of engineering, requirements regarding financial responsibility and professional liability insurance.

...

4733.151 Continuing professional development credit required beginning in 2008.  
... (2) Beginning with registrations expiring on or after the last day of December 2017, a person registered as a professional engineer or professional surveyor shall complete at least two of the thirty hours required under division (A) of this section on professional ethics or rules relevant to the practices of engineering or surveying. ...
Chapter 4733-35 Code of Ethics for Engineers and Surveyors

- **Integrity.** act with complete integrity in professional matters for each client or employer as a faithful agent; be honest and impartial, and serve the public, client and employer with devotion.

- **Responsibility to the public.**
  - (A) Protect the safety, health and welfare of the public in the performance of professional duties. Withdraw, Refuse, Notify
  - (B) qualified by training and experience
  - (C) objective in any professional report, statement or testimony and shall include all relevant and pertinent information in the report, statement or testimony when the result of omission would, or reasonably could, lead to a fallacious conclusion;
  - (D) Express official opinion only with knowledge of the facts, background of technical competence in the subject matter, and upon honest conviction.
Chapter 4733-35 Code of Ethics for Engineers and Surveyors

-04 Public statements and certifications.
-05 Conflict of interest.
-06 Solicitation of employment.
-07 Improper conduct.
-08 Other jurisdiction.
-09 Records.
NSPE Code of Ethics for Engineers

I. Fundamental Canons

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

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

Engineers uphold and advance the integrity, honor and dignity of the engineering profession by:

1. using their knowledge and skill for the enhancement of human welfare and the environment;
2. being honest and impartial and serving with fidelity the public, their employers and clients;
3. striving to increase the competence and prestige of the engineering profession; and
4. supporting the professional and technical societies of their disciplines.
**Fundamental Canons**

1. safety, health and welfare of the public and shall strive to comply with the principles of sustainable development in the performance of their professional duties.

2. perform services only in areas of their competence.

3. issue public statements only in an objective and truthful manner.

4. act in professional matters for each employer or client as faithful agents or trustees, and shall avoid conflicts of interest.

5. build their professional reputation on the merit of their services and shall not compete unfairly with others.

6. act in such a manner as to uphold and enhance the honor, integrity, and dignity of the engineering profession and shall act with zero-tolerance for bribery, fraud, and corruption.

7. continue their professional development throughout their careers, and shall provide opportunities for the professional development of those engineers under their supervision.

8. treat all persons fairly and encourage equitable participation without regard to gender or gender identity, race, national origin, ethnicity, religion, age, sexual orientation, disability, political affiliation, or family, marital, or economic status.
GENERAL PRINCIPALS / COMMON THEMES

- Honor, Integrity, Dignity
- Professional Competence
- Duty to the Public
- Agency / Conflict of Interest
VARIOUS INTERESTS

- Employer
- Client
- Other Professionals
- The Public
ETHICS OF AUTONOMOUS VEHICLES

Jack L. Noble P.E.
NHTSA STAGES OF AUTOMATION

No automation
- Lane departure warning
- Blind spot detection
- Collision warning

✓

Function-specific automation
- Cruise control
- Autonomous emergency braking
- Lane change assist

✓

Combined function automation
- Adaptive cruise control
- Lane keeping assist

✓

Limited self-driving automation
- Platooning
- Highway pilot
- Construction zone assist

~2020

Full self-driving automation
- Fully automated driving – highway, rural roads, city

>2025
THE TROLLEY PROBLEM

Who should survive?
EARLY ISSUES

- Ethical vs. Legal decisions
- How to address potential hacking
- Data Collection
- Human Factors - Tendency to trust the equipment
- Machine Learning
EARLY ISSUES - CONTINUED

- When do we start to change the infrastructure?
- Self Preservation
THE CHALLENGER DISASTER
Engineer in charge of booster joints wrote repeated memos and reports detailing O-ring issues and warning of potential problems.

“Take off your engineering hat and put on your management hat.”

“My God, Thiokol, when do you want me to launch, next April?”

Treatment of Whistleblowers

Informed Consent?
DECISION MAKING AND ANALYSIS

- “Important” events do not come labeled “PARTICULARLY IMPORTANT: PAY ATTENTION”
- “What did they know at the time?,”
- “Is it reasonable to expect that they should have seen the significance of this or that fact?,”
- “If I were in their position and knew only what they knew, what would I have done?”

Errors of Interpretation
- Myth of Perfect Engineering
- Retrospective Fallacy

Neglecting Secondary Effects
CITIGROUP TOWER CASE STUDY

Jack L. Noble P.E.
CITIGROUP TOWER

- 915 feet tall
- Base is 114’ above ground
- Completed in 1977
- Estimated Cost $195 million
- Includes a tuned Mass Damper to reduce sway
- Structural Engineer: William LeMessurier
CITIGROUP TOWER
CITIGROUP TOWER TIMELINE

- Completion 1977
- May 1978 - Bidders raise bolt vs. Weld issue
- June 1978 - Diane Hartley Questions Design
- July 1978 - LeMessurier reviews Design
  - Determines 70mph quartering winds would lead to failure
- Aug. 1 - Meeting with Architect/ Insurer & Attorneys
- Aug. 2 - Meeting with Citicorp
- Aug. 7 - Drawings complete - Meetings with City
- Aug. 8 - New York Times Inquiry
- Aug. 30 - Hurricane Ella
ATLANTIC HURRICANE TRACKS

Hurricane Irma
Tracks of all September
Category 3-4 and 5 Hurricanes
Within 2 degrees of Irma
Between 1851 and 2018

Storm Category

<table>
<thead>
<tr>
<th>Category</th>
<th>Tropical Depression</th>
<th>Tropical Storm</th>
<th>Category 1</th>
<th>Category 2</th>
<th>Category 3</th>
<th>Category 4</th>
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<td></td>
<td>&lt; 39 mph</td>
<td>39-73 mph</td>
<td>74.95 mph</td>
<td>96-110 mph</td>
<td>111-130 mph</td>
<td>131-155 mph</td>
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Map showing the hurricane tracks with the color-coded categories for storm intensity.
HURRICANE ELLA

Major Hurricane Ella

Dates: 10/14 - 10/23 1962
Maximum Wind Speed: 115 mph
Minimum Pressure: - mb
US Landfall Category: No US Landfall
Deaths: 2
US Damage (Millions US $): 0

Storm Category

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Weather Underground
CITIGROUP TOWER

- Work was Completed Late October 1978
- The Building is now able to withstand 700 year storm without the tuned mass damper.
- Repair cost never disclosed - $4-8million.
o Hold paramount the safety, health and welfare of the public.

o Issue public statements only in an objective and truthful manner.

o Act for each employer or client as faithful agents or trustees.

o Avoid deceptive acts.

o Conduct themselves honorably, responsibly, ethically and lawfully so as to enhance the honor, reputation and usefulness of the profession.
WRAP UP

Jack L. Noble P.E.
LESSONS LEARNED

- Question your decisions and designs. Accept criticism.
- Review Changes.
- Present Solutions along with Problems.
CONCLUSION

- Responsibility of a profession - specialized knowledge
  - Competence
  - How to push the boundaries - risk management

- Recognize responsibilities to different parties and conflicts of interest
  - Disclosure

- What are we trying to accomplish? Don’t define too narrowly

- Integrate these concepts into method of thinking and problem solving