# CONSTRUCTION ENGINEERING AND ETHICS

# Civil & Construction Engineering

Building the Physical Environment

Project areas include:
- Environmental
- Geotechnical
- Structural
- Transportation
- Water Resources

# Ethical Concerns for Public

- Health
- Safety
- Welfare
- Stewardship

# Engineering as a Social Experiment
(Martin & Schinzinger, 1989)

- Engineers are *researchers*
- Clients (humans) are *subjects*
- *Subjects* must be aware of risk exposure from *researchers*
- *Researchers* faced with many moral and ethical decisions

# Ethical Issues in Engineering
## (Koehn, 1993)

- Incompetence & Misrepresentation
- Conflict of Interests
- Discrimination/Favoritism/Harassment
- Misuse of Resources
- Failure to Protect Health, Safety, Welfare
- Improper Relations with Professionals

# Ethical Issues, cont.

- Improper Community/Political Involvement
- Mishandling Sensitive Information
- Failure to Deal with Employee Concerns
- Alcohol/Drug Abuse
- Failure to Protect Environment
- Poor Quality Control

## تعريف الأخلاقيات المهنية

- A set of principals or rules which members of a group agree to abide by.
- A set of values or a guiding philosophy of the estimator.

النشاط المتعلق بدراسة القيم الأخلاقية، تحليل الموضوعات الأخلاقية ، وتبرير الأحكام الأخلاقية المتصلة بممارسة المهنة .

القيم الأخلاقية تتخذ عدة أشكال ، تتضمن الالتزامات والمسئوليات ، المثل العليا، الخصائص المميزة ، السياسات الاجتماعية ، والعلاقات المهنية بين الأفراد والمؤسسات المشاركة فى التطوير التكنولوجى

## الأخلاقيات المهنية والممارسات الهندسية

☐ تتعلق أخلاقيات ممارسة مهنة الهندسة بالمسئولية المهنية للمهندسين

☐ تعتبر الأخلاقيات المهنية اساسا هاما لممارسة مهنة الهندسة في معظم الدول الصناعية الكبرى

# Theories for Ethical Decisions

Commonly Accepted Ethical Theories:
- Egoism
- Virtue Theory
- Utilitarianism
- Moral Rights

# Egoism - الأنانية

A person should do what is in their personal best interest.

Example: I will focus on my personal goals.

# Virtue Theory - نظرية الفضيلة

A person should do what their group considers to be good.

Example: I will be a responsible and law-abiding citizen of my community.

# Utilitarianism - النفعي

A person should do what is in the best interests of the community, greatest good for greatest number.

Example: I will consider how my actions affect the most people.

## Moral Rights – (الأخلاقية) الحقوق المعنوية

A person should have respect for other people's moral rights.

Example: I will not harm another person to gain benefits for me or others.

## Framework for Ethical Decisions: Code of Ethics

Vesilind (1987) suggests three objectives:

1. Enhance the image of the profession
2. Clarify rules of conduct in the profession
3. Promote the public good

# قواعد الأخلاقيات المهنية للمهندسين

## Code of Ethics for Engineers

**ABET Code of Ethics for Engineers
now housed by
American Association of Engineering Societies (AAES)**

**The Fundamental Cannons**

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**ABET Code of ethics for Engineers (now housed by American Association of Engineering Societies AAES)**

**The Fundamental Cannons**:

❑ Engineers shall hold paramount safety, health and welfare of the public in the performance of their professional duties.
المحافظة على سلامة وصحة الناس عند ممارسة المهنة

❑ Engineers shall perform services only in the area of their competence.
يقوم المهندس بالأعمال الهندسية في مجال تخصصه فقط

❑ Engineers shall issue public statements only in an objective and truthful manner.
أن يتوخى الموضوعية والصدق في اصدار البيانات أو التصريحات العامة

❑ Engineers shall act in professional matters for each employer or client as faithful agents or trustees, and shall avoid conflict of interest.
أن يتعامل بمهنية وإخلاص مع كل من صاحب العمل والعميل ، مع تفادي تضارب المصالح

**ABET** Code of ethics for Engineers (now housed by
**American Association of Engineering Societies AAES**)

**The Fundamental Cannons:** (continued)

❑ Engineers shall build their professional reputations on the merit of their services and shall not compete unfairly with others.

<div dir="rtl">بناء السمعة المهنية على الكفاءة ، وعدم التنافس الغير عادل مع الغير</div>

❑ Engineers shall act in such a manner as to uphold and enhance the honor, integrity and dignity of the profession.

<div dir="rtl">التمسك بمبادئ الشرف والنزاهة عند ممارسة المهنة</div>

❑ Engineers shall continue their professional development, throughout their career, and shall provide opportunities for professional development of those engineers under their supervision.

<div dir="rtl">الاستمرارية في تطوير الكفاءة المهنية ، وتوفير الفرص لمرؤوسيه من المهندسين لتطوير كفاءاتهم المهنية</div>

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# Civil Engineering Code of Ethics

American Society of Civil Engineers
Code of Ethics
(www.asce.org/professional/ethics/)

# Case Study

What:      Hyatt Regency Walkway Collapse

Where:    Kansas City, Missouri

When:     July 17, 1981
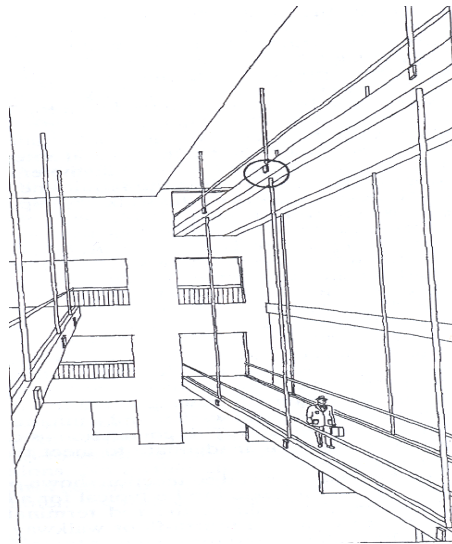
Why:      Negligence

How Much:   114 Deaths

                200+ Injured

                Numerous Lawsuits

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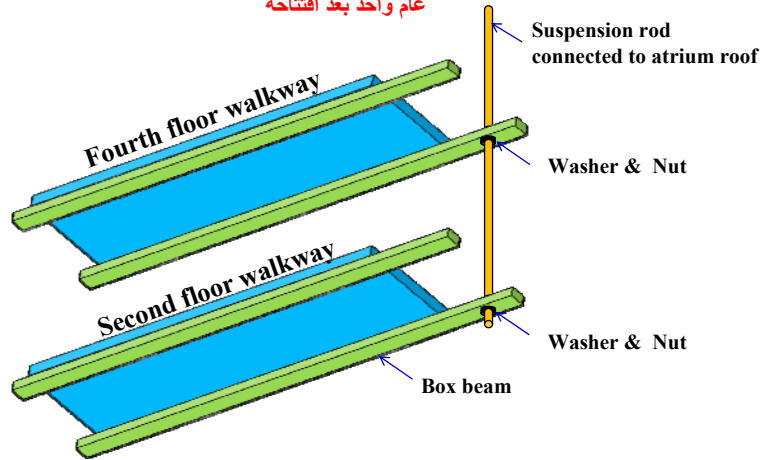**دراسة حالة – Case Study**

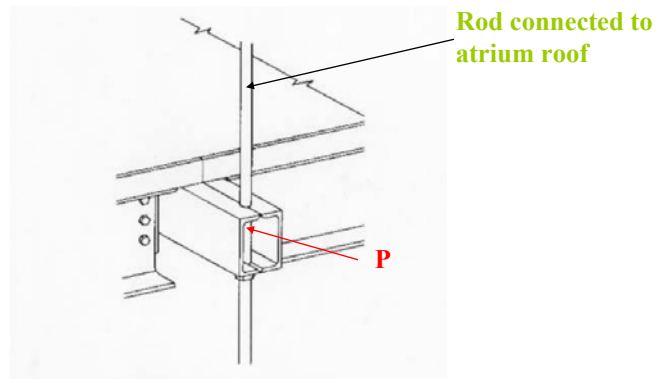**أخطاء في مرحلة الإنشاء**

**انهيار الممر العلوي لفندق هايات ريجنسي في كنساس سيتي  -  1981**

**عام واحد بعد افتتاحه**

دراسة حالة – Case Study

أخطاء في مرحلة الإنشاء

انهيار الممر العلوي لفندق هايات ريجنسي في كنساس سيتي  - 1981
عام واحد بعد افتتاحه

Suspension rod connected to atrium roof

Fourth floor walkway

Washer &  Nut

Second floor walkway

Washer &  Nut

Box beam



دراسة حالة – Case Study

أخطاء في مرحلة الإنشاء

انهيار الممر العلوي لفندق هايات ريجنسي في كنساس سيتي  - 1981
عام واحد بعد افتتاحه

Rod connected to atrium roof

P

ORIGINAL DESIGN
Connector supports the weight of one walkway

دراسة حالة – **Case Study**

**أخطاء في مرحلة الإنشاء**

**انهيار الممر العلوي لفندق هايات ريجنسي في كنساس سيتي - 1981
عام واحد بعد افتتاحه**
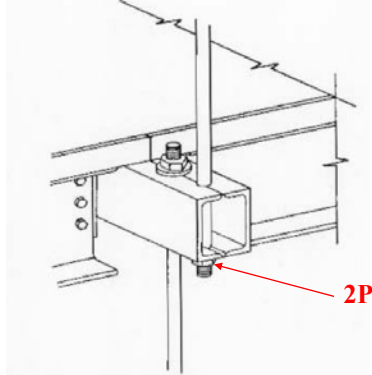
Design modification by the
Manufacturer

Replaced one-rod system
by two-rods system
**Motivation:**
**1- facilitate assembly**
**2- avoid threading the entire rod**

**2P**

**Investigation**
Design modification
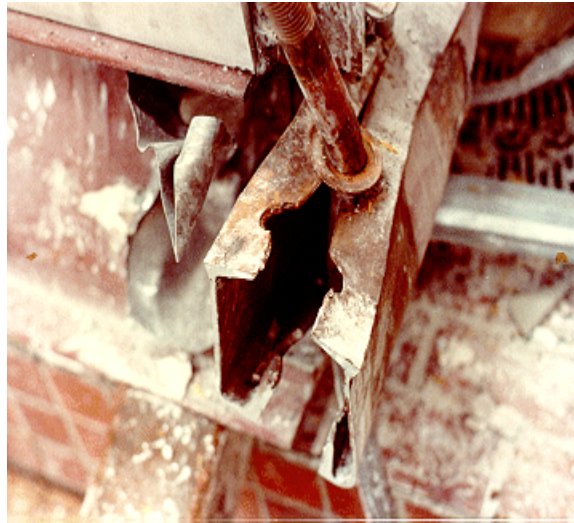were stamped
**APPROVED** without
being checked.

**DESIGN, AS BUILT**
Connector supports the weight of two
walkways

# The Result…



www.ethics.tamu.edu

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# The Culprit…



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# What Happened…

1. Engineer designed continuous rod support
2. Contractor requested double-rod support
3. Engineer approved, but did not re-analyze revised design
4. Fourth floor box beam carried the load of two floors (2$^{nd}$ and 4$^{th}$)
5. Collapse
6. Two engineers at the design firm had their licenses revoked

# Ethically Speaking…

"It wasn't a matter of doing something wrong, they just never did it at all.  Nobody ever did any calculations to figure out whether or not the particular connection that held the skywalks up would work.  It got built without anybody ever figuring out if it would be strong enough.  It just slipped through the cracks."

Patrick McLarney
Attorney for Missouri Licensing Board
(Levy and Salvadori, 2002)

# Ethical Theory Applications

- Egoism

"If I had checked the design, I would still have my license."

- Virtue Theory

"If I had checked the design, then I would not have reflected poorly on the engineering community."

## Ethical Theory Applications, cont.

- Utilitarianism

  "If I had checked the design, then all of those people would not have been killed."

- Moral Rights

  "I must always check the design because everyone who enters the building has the right to health, safety, and welfare."

# Questions