

A **STEAM** education and career in **Structural Engineering**

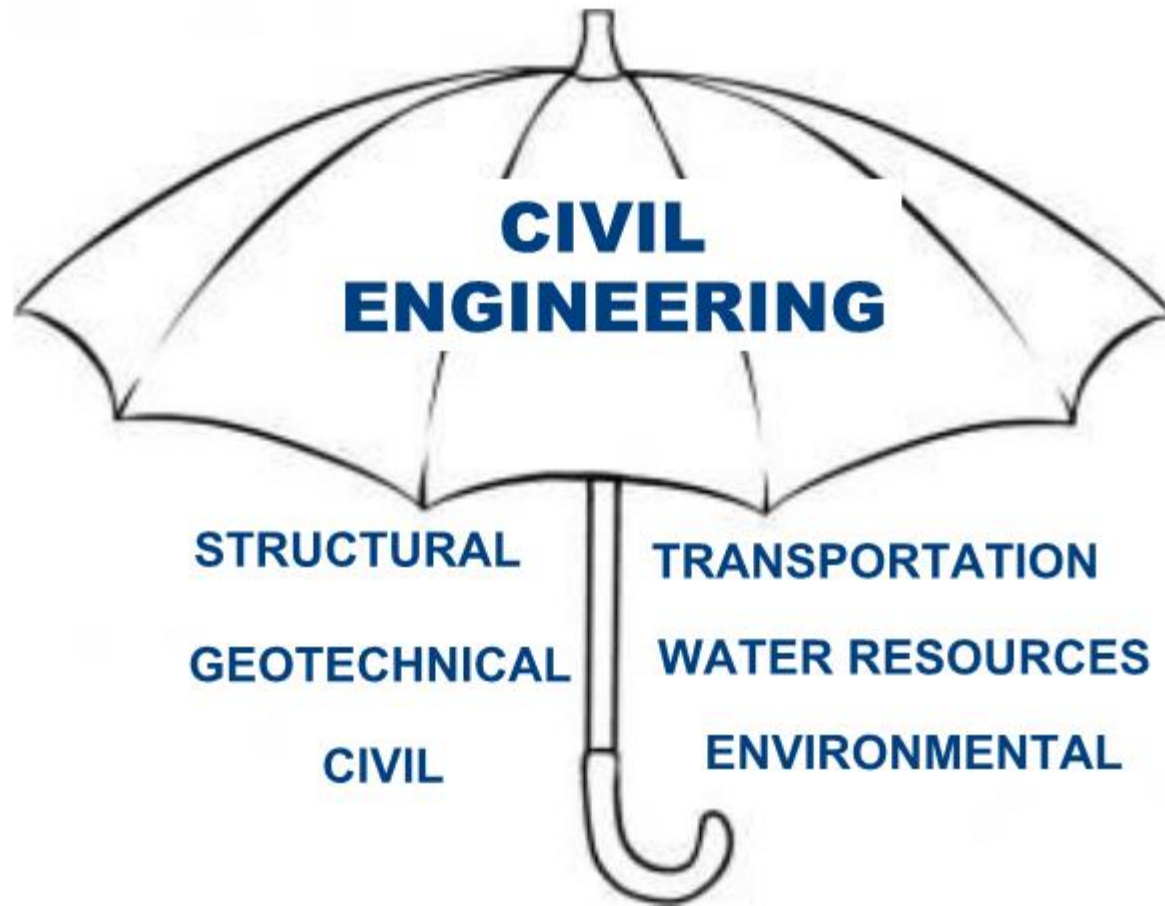
Michelle Dionisio, P.E.

Associate

March 20, 2019

Thornton **Tomasetti**





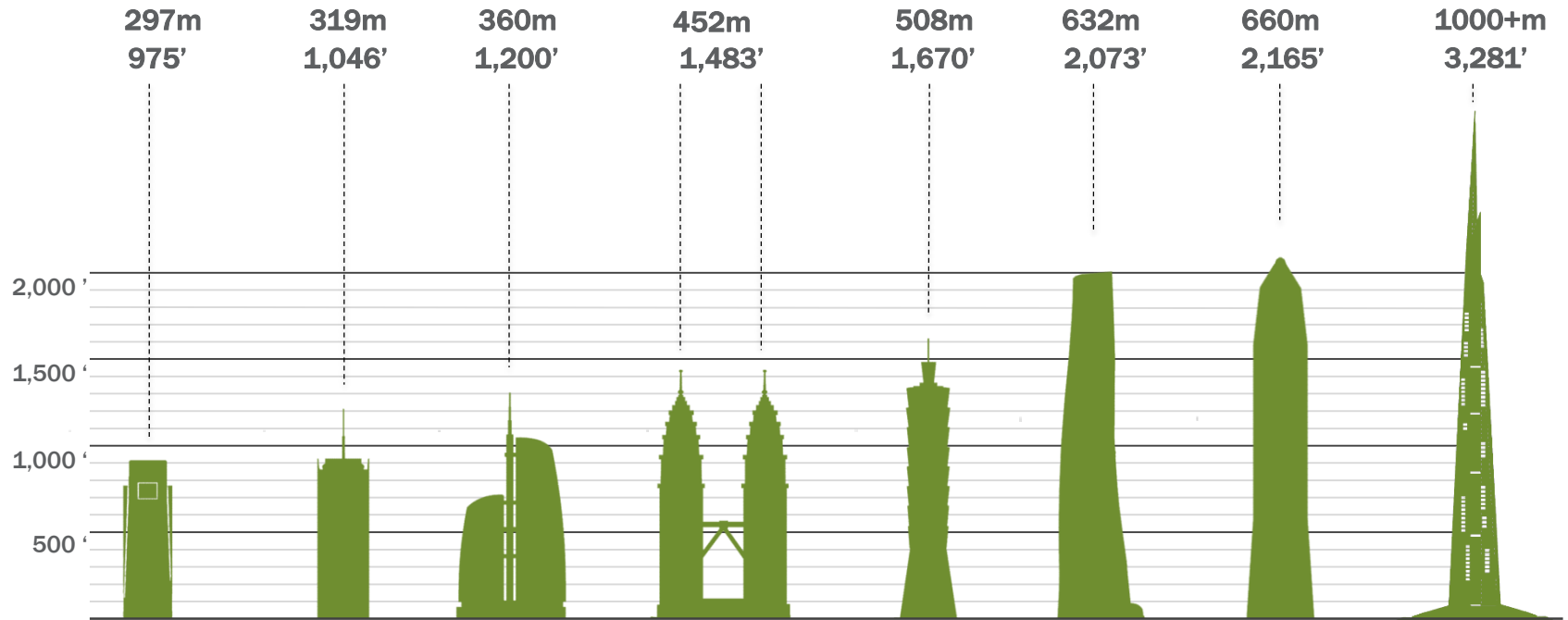
Structural engineering — a specialty within the field of civil engineering — focuses on the framework of structures, and on designing those structures to withstand the stresses and pressures of their environment and remain safe, stable and secure throughout their use.

(<https://www.livescience.com/47816-structural-engineering.html>)



Reshaping the world around us

Thornton Tomasetti



Comcast Center

Philadelphia
Pennsylvania

Completion
2008

The New York Times Building

New York
New York

Completion
2007

Federation Tower

Moscow
Russia

Completion
2016

Petronas Towers

Kuala Lumpur
Malaysia

Completion
1998

Taipei 101

Taipei
Taiwan

Completion
2004

Shanghai Tower

Shanghai
China

Completion
2016

Ping An International Finance Center

Shenzhen
China

Completion
2015

Jeddah Tower

Jeddah
Saudi Arabia

Completion
2019



A *Team* collaboration:

A Building Is Born



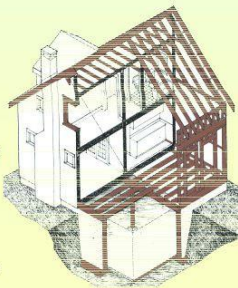
BODY

ARCHITECTURAL
Architect



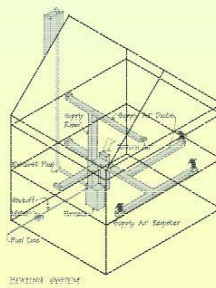
FRAME

STRUCTURAL
Engineer



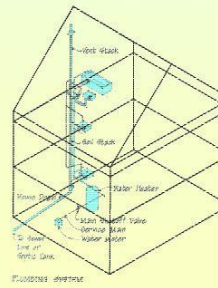
TEMPERATURE

MECHANICAL
Engineer



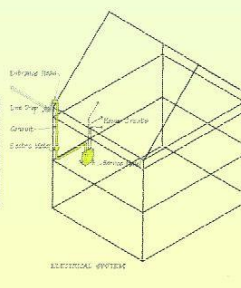
CIRCULATION

PLUMBING
Engineer



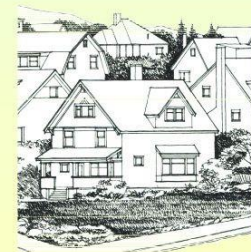
NERVOUS SYSTEM

ELECTRICAL
Engineer



PEOPLE

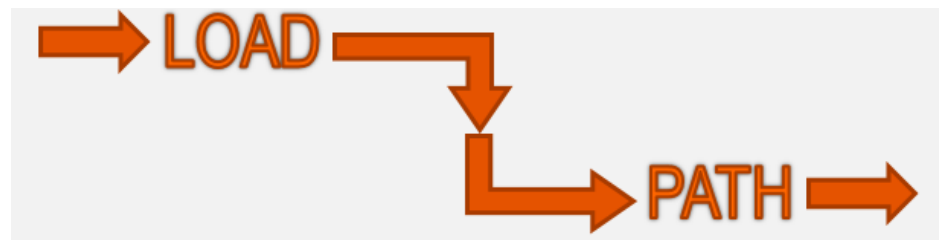
PLANNING
Planner/Architect



Considerations in *Designing a Building*



MATERIALS



Design Considerations



Safety



Environment



Economy



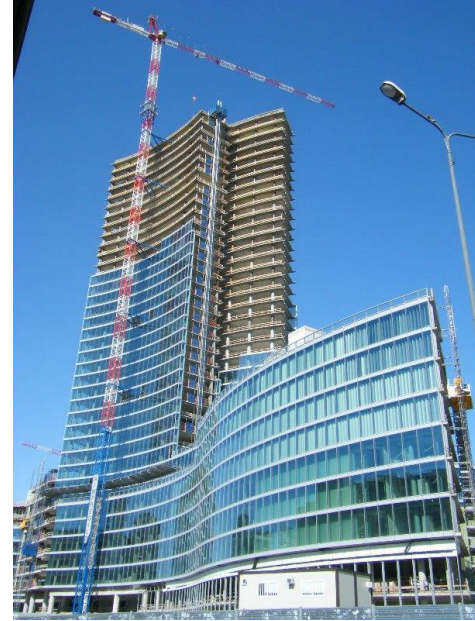
Aesthetics



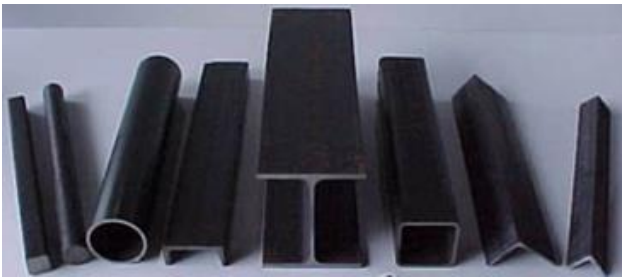
Serviceability

Building Materials

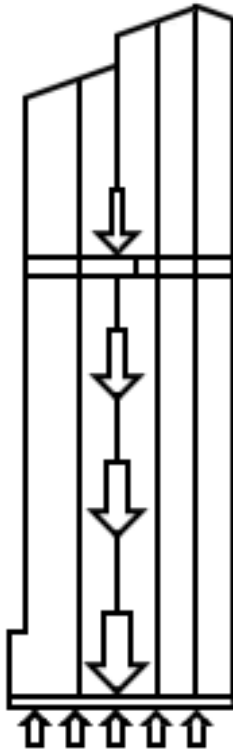
Concrete



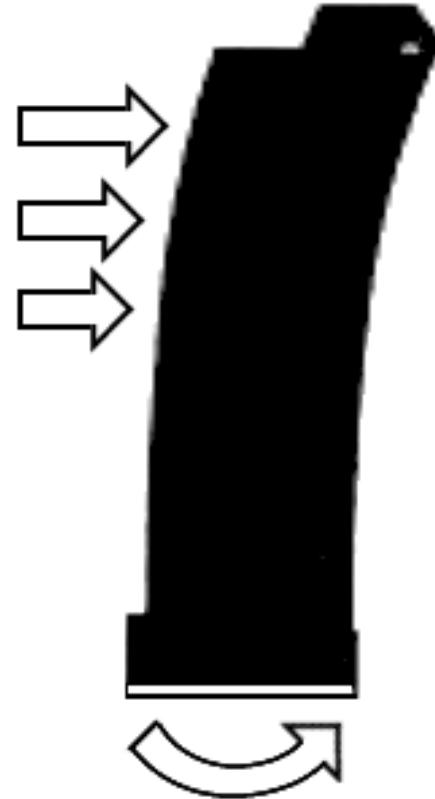
Steel



Loading Criteria



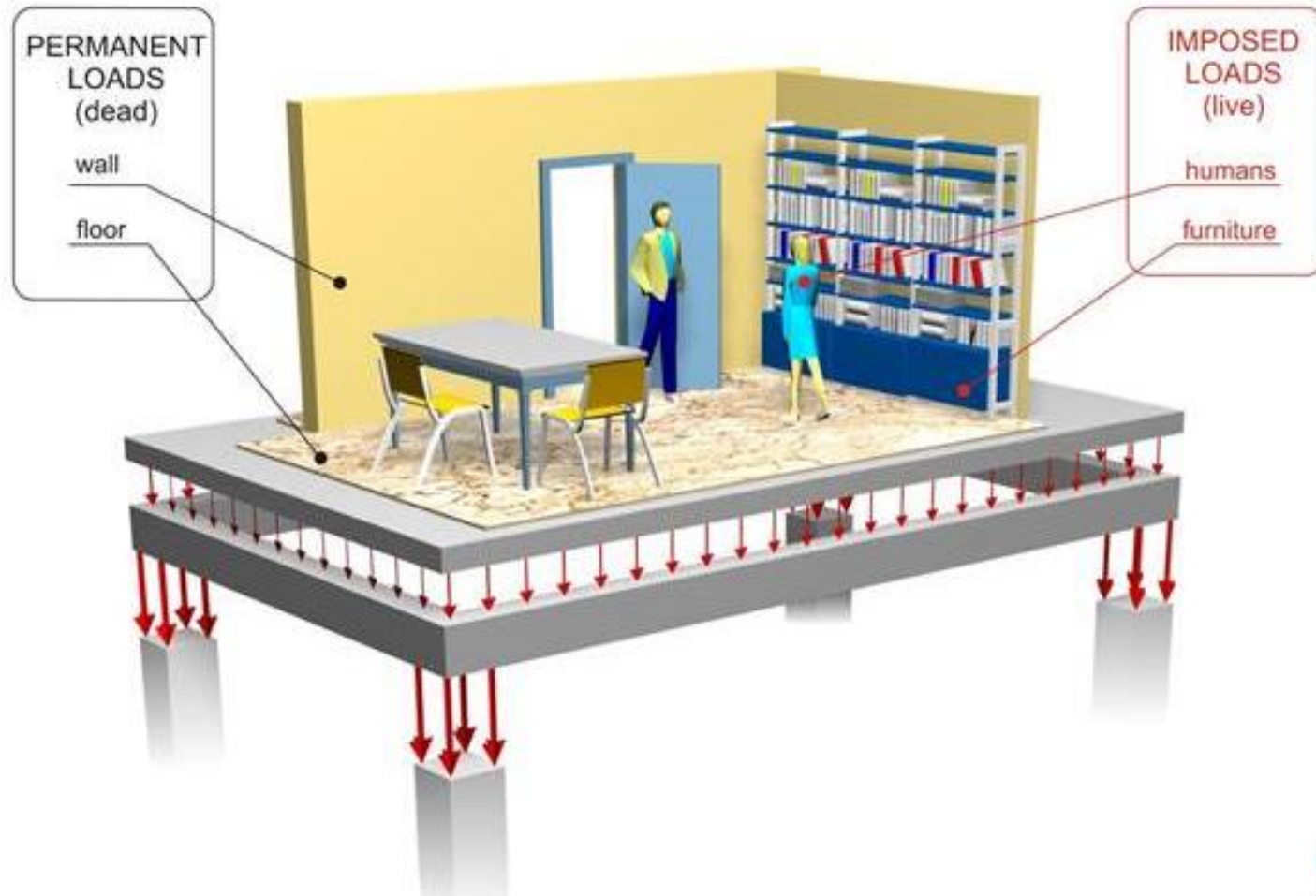
GRAVITY LOADS



LATERAL LOADS

Gravity Loads

Dead Loads Vs Live Loads

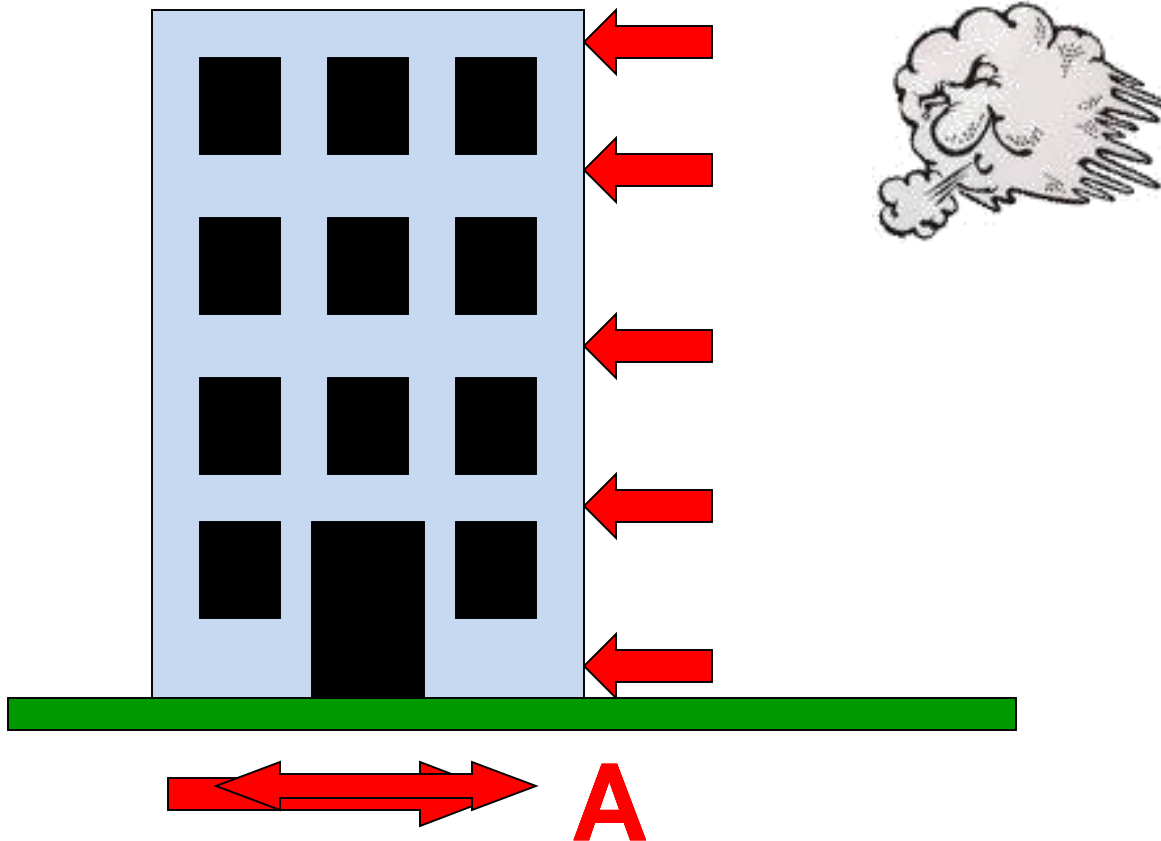


Lateral Loads

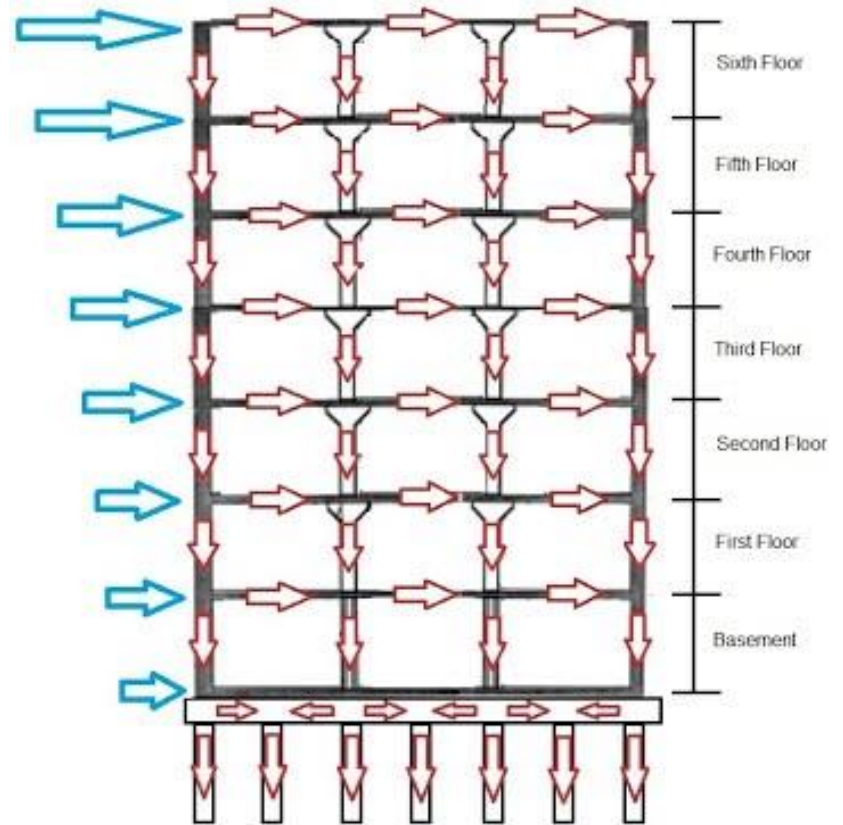
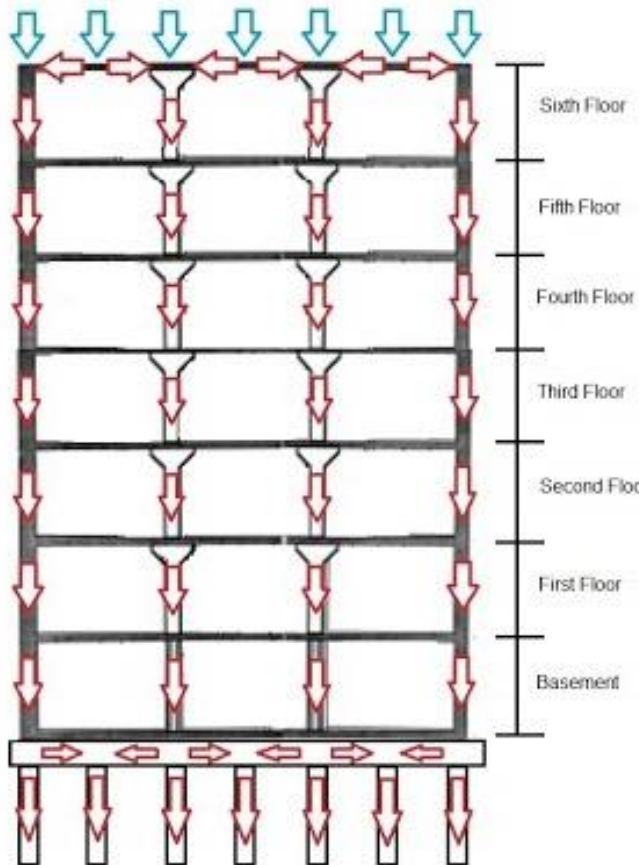
Where do lateral loads *come* from?

Wind

Earthquakes

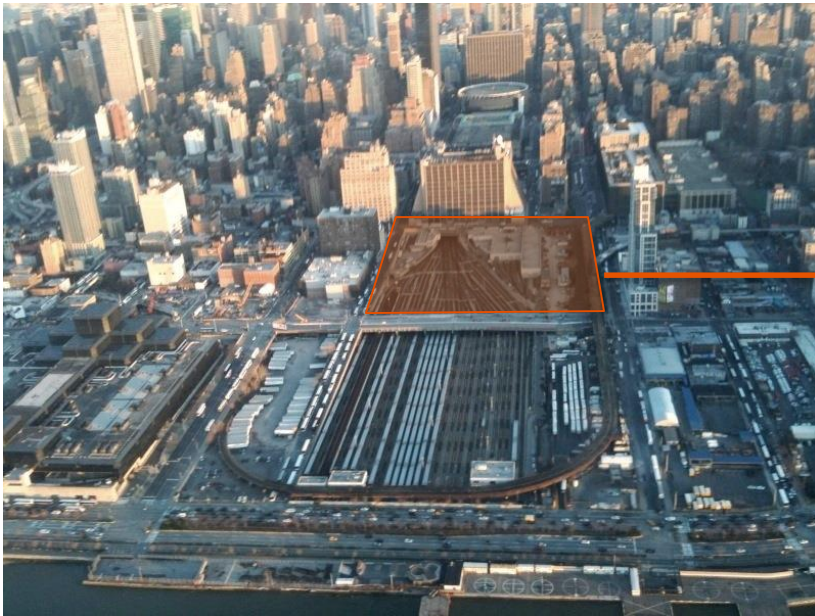


Load Path



Above All, *Engineers* are...

Problem Solvers!



West Side Rail Yards, NYC



Hudson Yards

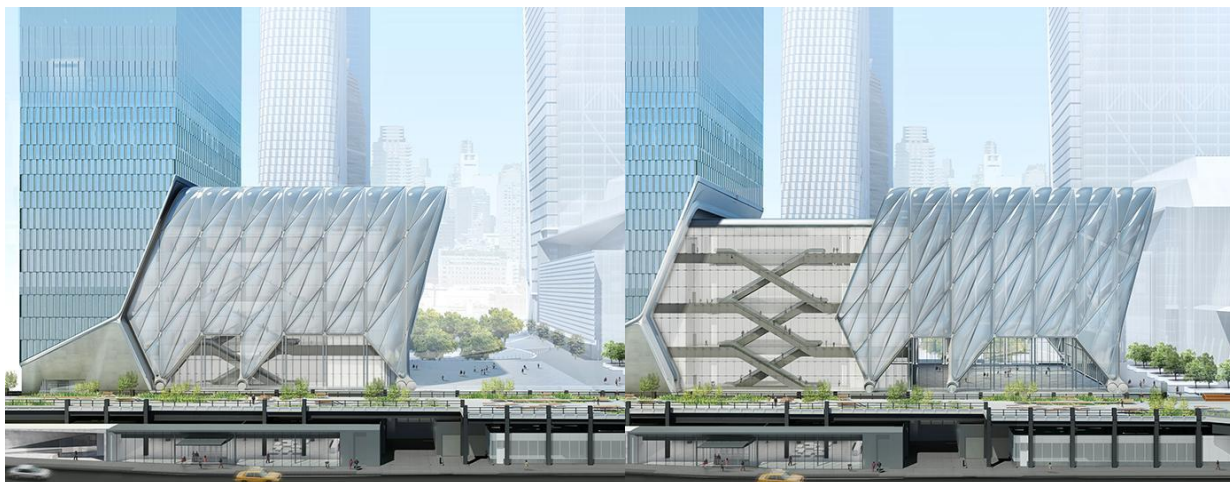
Challenges @ Hudson Yard



The Vessel, Retail, Platform

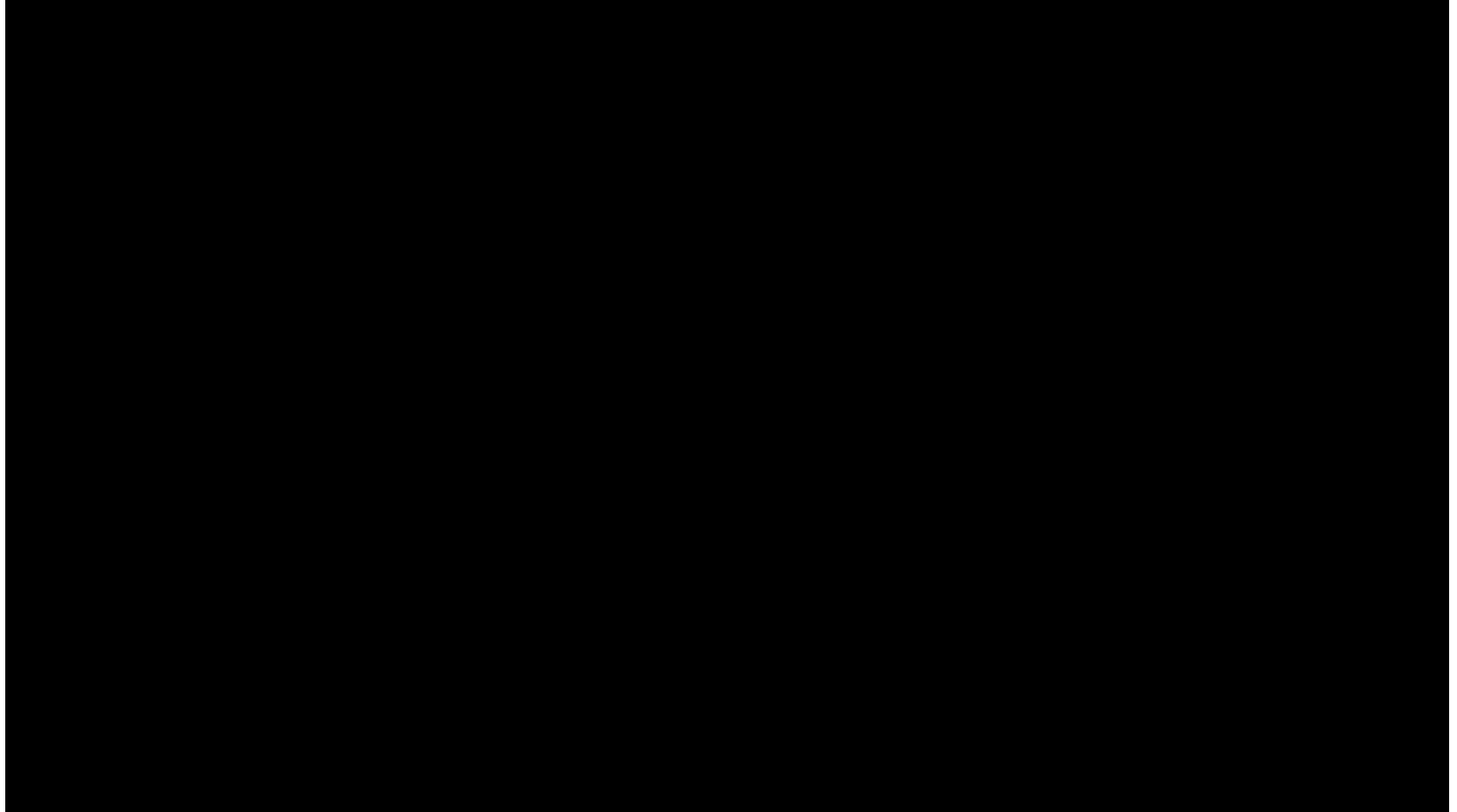


30 Hudson, The Edge Observation Deck



The Shed, Hudson Yards

Reshaping the *world* around us



Why I Love Being a Structural Engineer...

...The Cool Projects!

My **Background:**

- ***Garden City High School Class of 1999***
 - The term 'STEM' did not exist (not until 2001)
 - Interests & Strengths in Math and Science
 - Technical Director, Masquers
 - Engineering in my blood!



My **Background:**

B.S. Civil Engineering – Villanova University (2003)

M.S. Civil Engineering – Villanova University (2004)

- Great Engineering program
- Other Options
- Supportive Environment
- Relatively small department
- Notable amount of females in the program
- Opportunity for Service



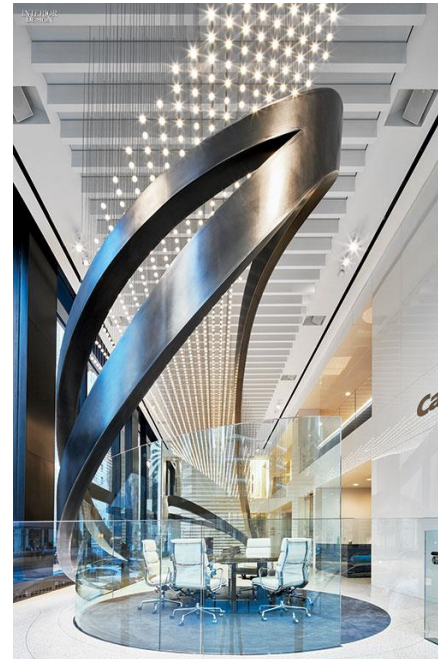
My *Career* at Thornton Tomasetti

15 years of Experience - Large, Medium & Small Projects

Residences at
the Ritz Carlton,
Philadelphia, PA



High-
Performance
Computing
Research Center,
Princeton, NJ



Capital One
Lobby, New
York, NY



My *Career* at Thornton Tomasetti



The Centre at St. Paul's, Garden City, NY



Feasibility Study, 1111 Franklin Ave, Garden City, NY

My *Career* at Thornton Tomasetti

New Phase: Work and Family – What works for me?

- Working Remotely
- Pros – Flexibility
- Cons – Limited projects
- Technology narrows the gap



What Have I **Learned** and why **STEAM**?

- **Work Hard and Stay Focused**
- **Be Patient**
- **Listen and learn from those around you!**
- **The '4 C's in a STEAM education:**
 - **Creativity**
 - **Critical thinking**
 - **Communication**
 - **Collaboration**

“STEM education indeed may be one of the answers to turning around our educational system and workforce” - Dr. Diana Wehrello-Grabowski

Thank you... Want More?

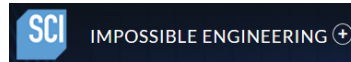
Thornton Tomasetti www.thorntontomasetti.com



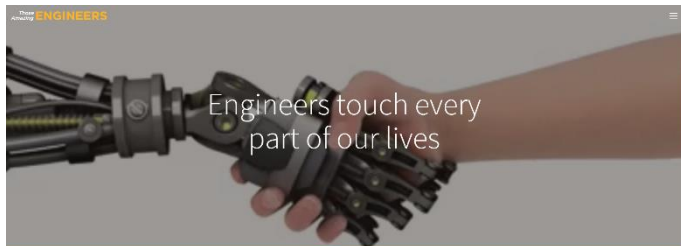
ACE MENTOR PROGRAM

www.acementor.org

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