

STRUCTURAL ENGINEERING:
BACKBONE OF BUILT ENVIRONMENT

Future Proofing our Infrastructure

Antonino Clodoaldo S. Aligaen



The human race has evolved.



CAVE

PARTHENON

**ST. MICHAEL'S
HILDESHEIM**

**BARCELONA
CATHEDRAL**

**PHILADELPHIA
CITY HALL**

**EMPIRE STATE
BUILDING**

BURJ KHALIFA

9600 BCE

432 BCE

12TH CENTURY

1420

1901

1930

2010

(BEFORE COMMON ERA)

14 METERS

17 METERS

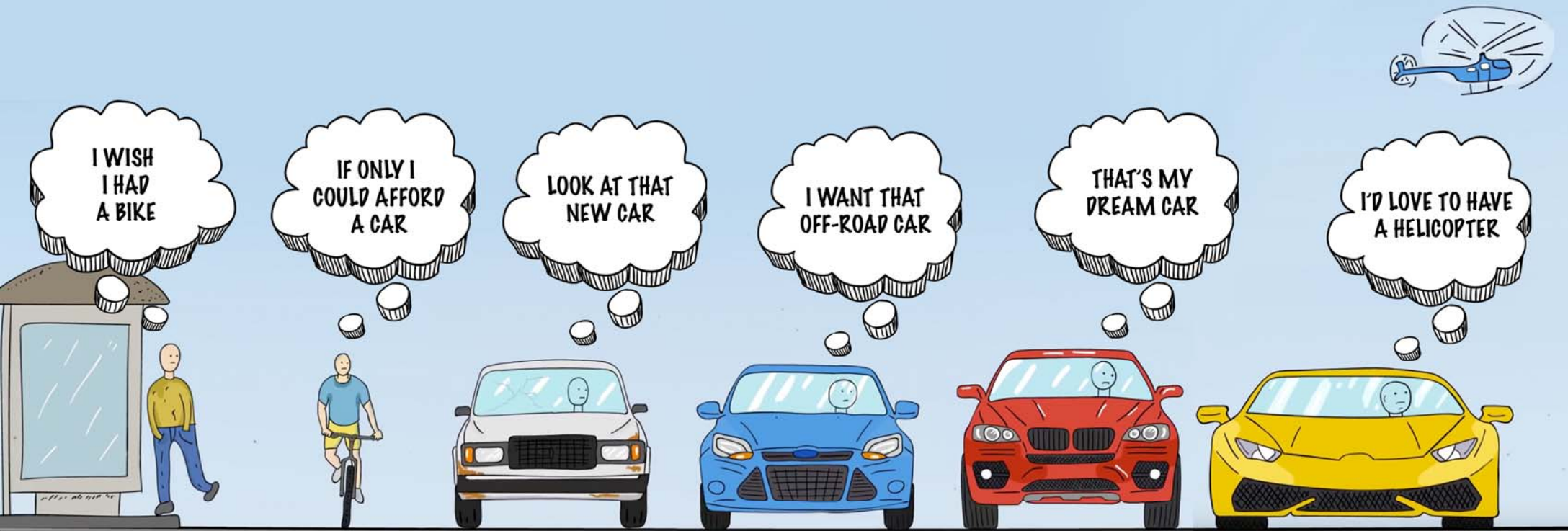
53 METERS

167 METERS

380 METERS

828 METERS

Evolution was spurred by the desire to improve the standard of living and the quality of life.



Standard of Living

Standard of Living



Standard of Living

Refers to:

- Level of wealth
- Comfort
- Material goods
- Necessities available to a certain socioeconomic class in a certain geographic area, usually a country

Includes:

- Income
- Quality and availability of employment, class disparity, poverty rate, quality and affordability of housing
- Hours of work required to purchase necessities
- Gross domestic product
- Inflation rate
- Amount of leisure time every year
- Affordable (or free) access to quality healthcare
- Quality and availability of education
- Life expectancy
- Incidence of disease
- Cost of goods and services
- **Infrastructure**
- National economic growth
- Economic and political stability
- Political and religious freedom
- Environmental quality, climate and safety

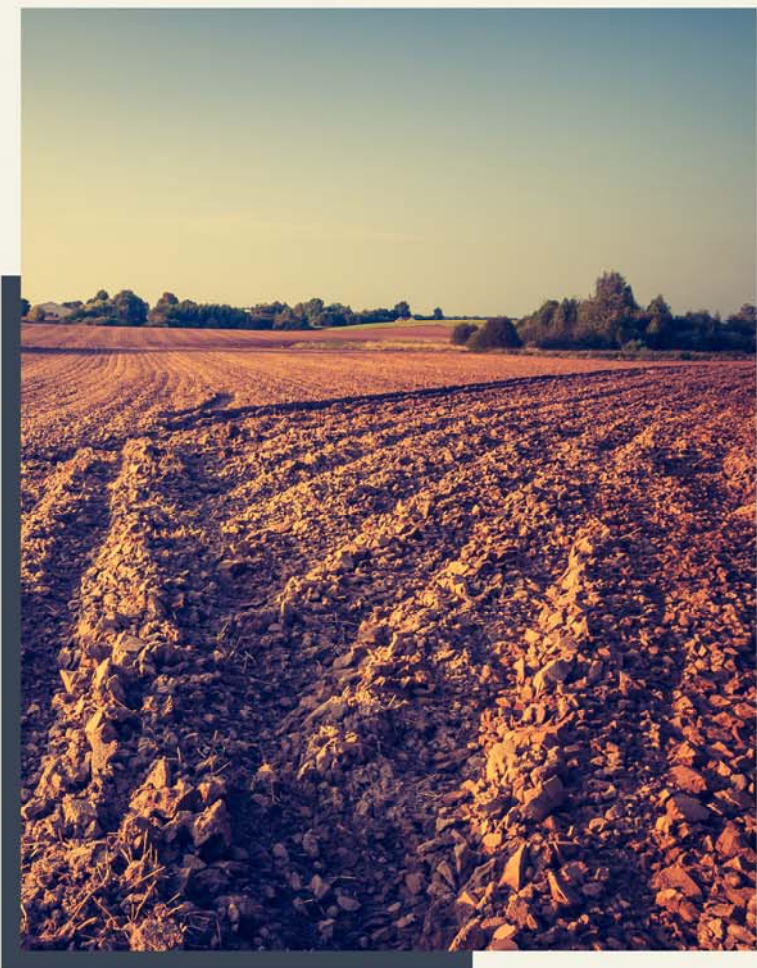
Standard of Living



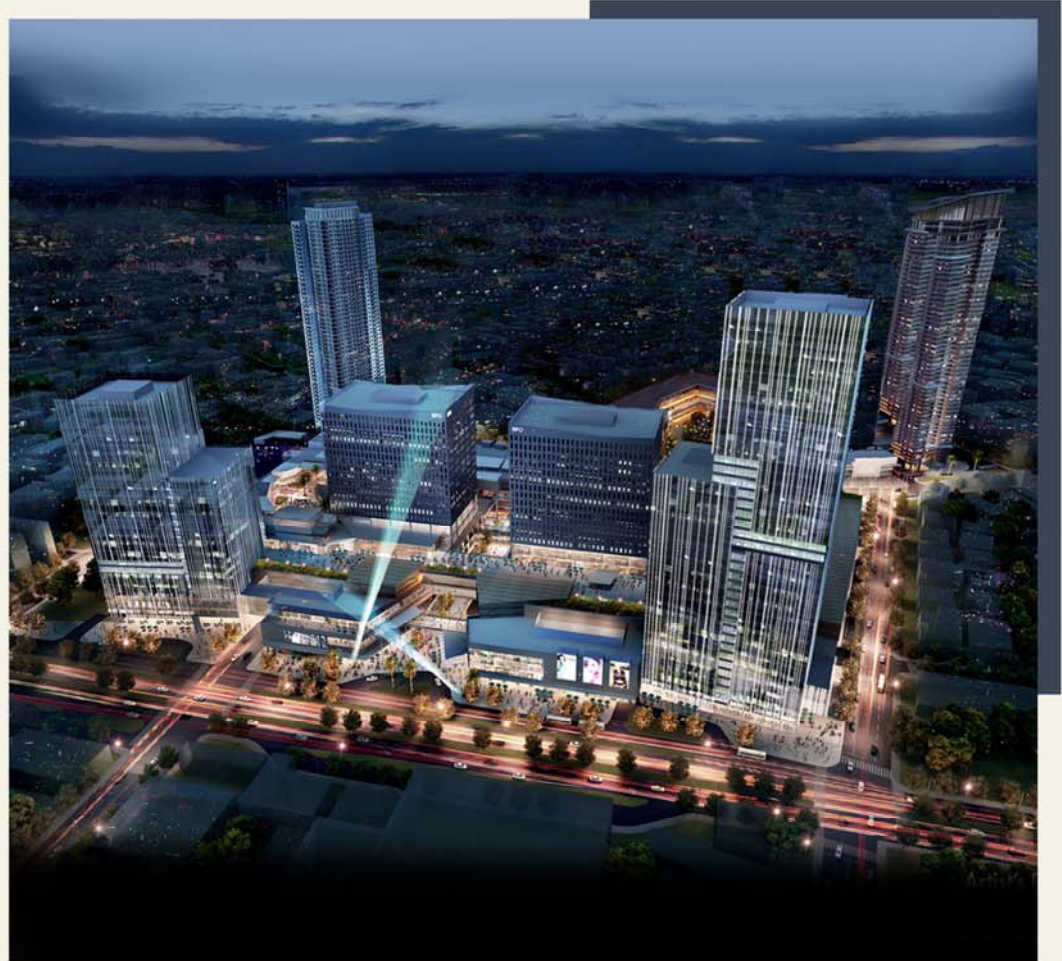
Quality of Life

Quality of Life

Quality of life is the **general well-being of individuals and societies, outlining negative and positive features of life.**



With this evolution,
the environment
and landscape of
the planet changed.

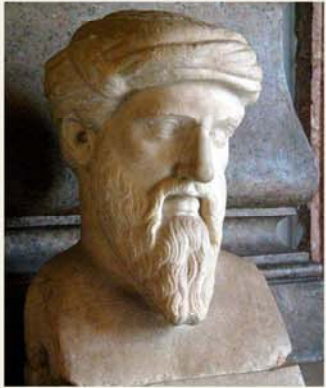


And **YES**, the structural engineer has, is, and will continue to play a vital role in the redevelopment of the environment and the landscape of this planet.

BUT, don't rest
on your laurels.

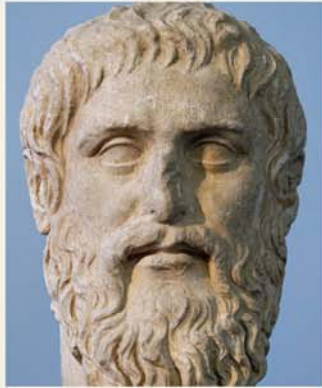


You owe it to humanity to
evolve your practice...



PYTHAGORAS

570-495 BCE



PLATO

428-348 BCE



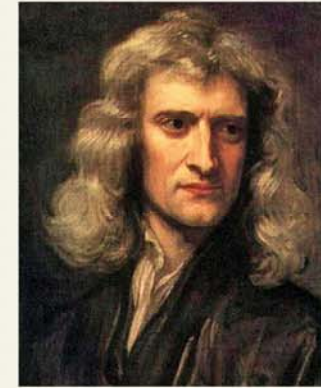
FIBONACCI

1170-1250



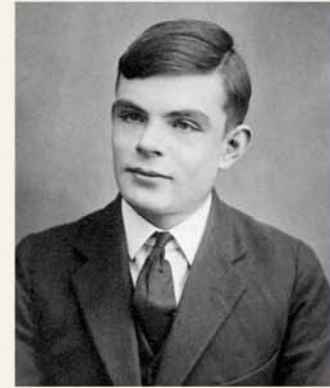
RENÉ DESCARTES

1596-1650



ISAAC NEWTON

1643-1727



ALAN TURING

1912-1954

to ensure...

Safety

Safety

Especially given the complex and huge structures that are being produced.



1906 San Francisco Earthquake San Francisco Earthquake of 1906: After the earthquake. (circa April 1906).

Picture courtesy of the National Archives and Records Administration.



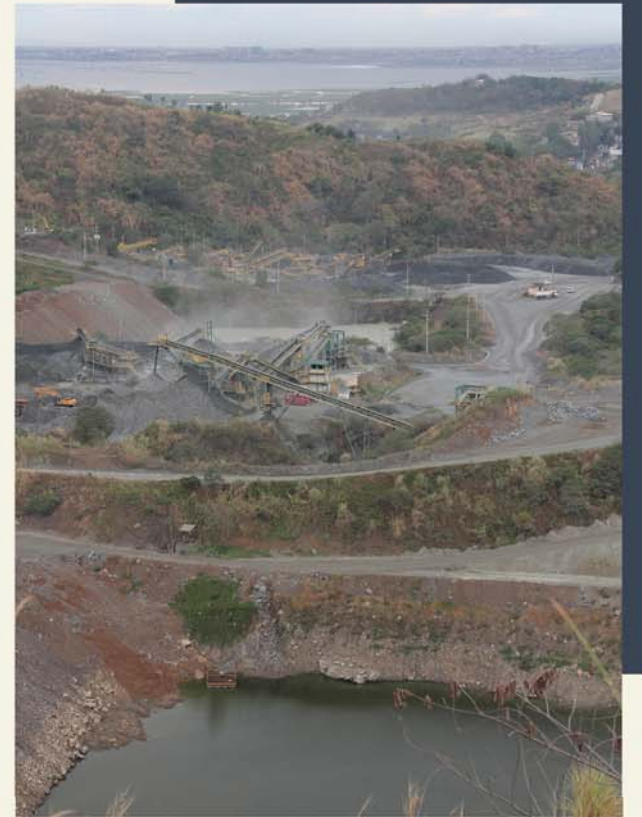
Damaged portion of the Golden State Freeway at Gavin Canyon.

By Robert A. Eplett - This image is from the FEMA Photo Library., Public Domain,
<https://commons.wikimedia.org/w/index.php?curid=8063087>

Sustainability

Sustainability

Given the demand for resources and the change of the physical landscape that structures bring about.



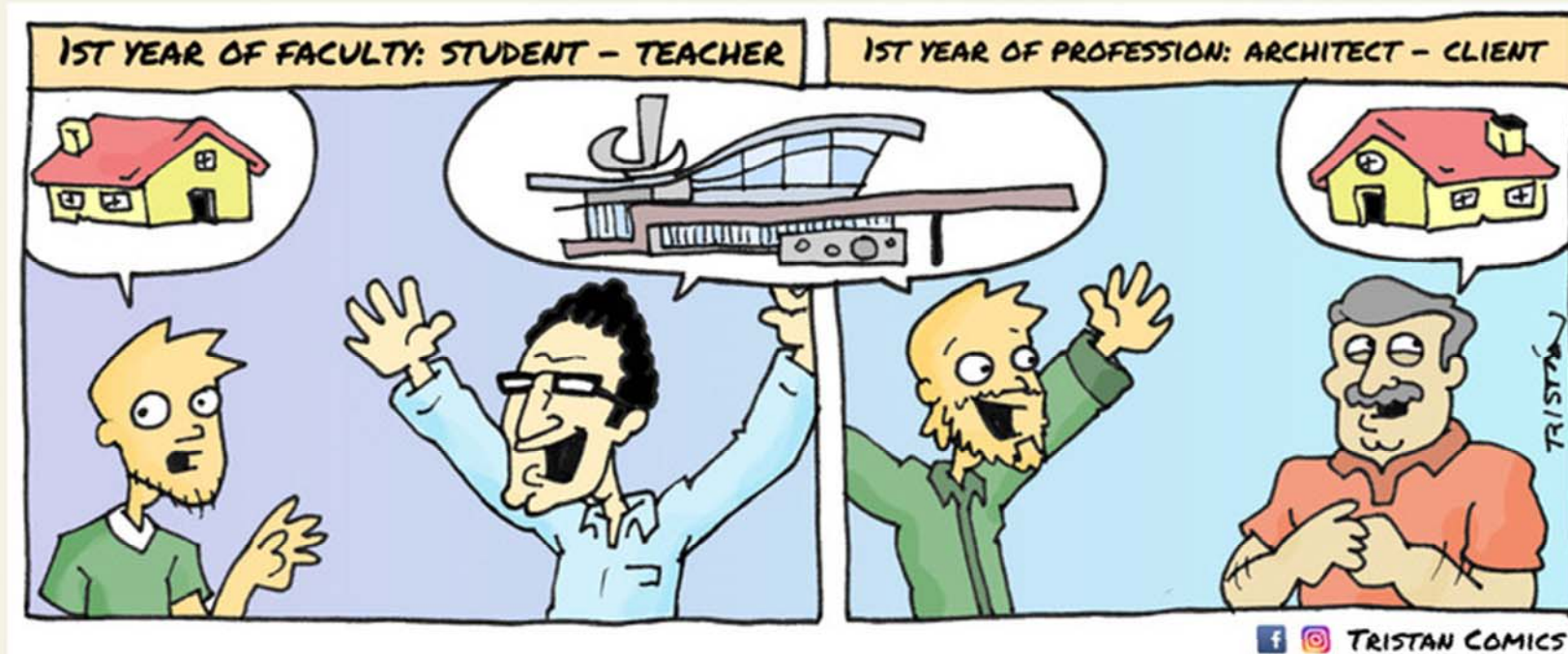
Value for Money

Value for Money

Which further spurs growth and evolution.

Value for Money

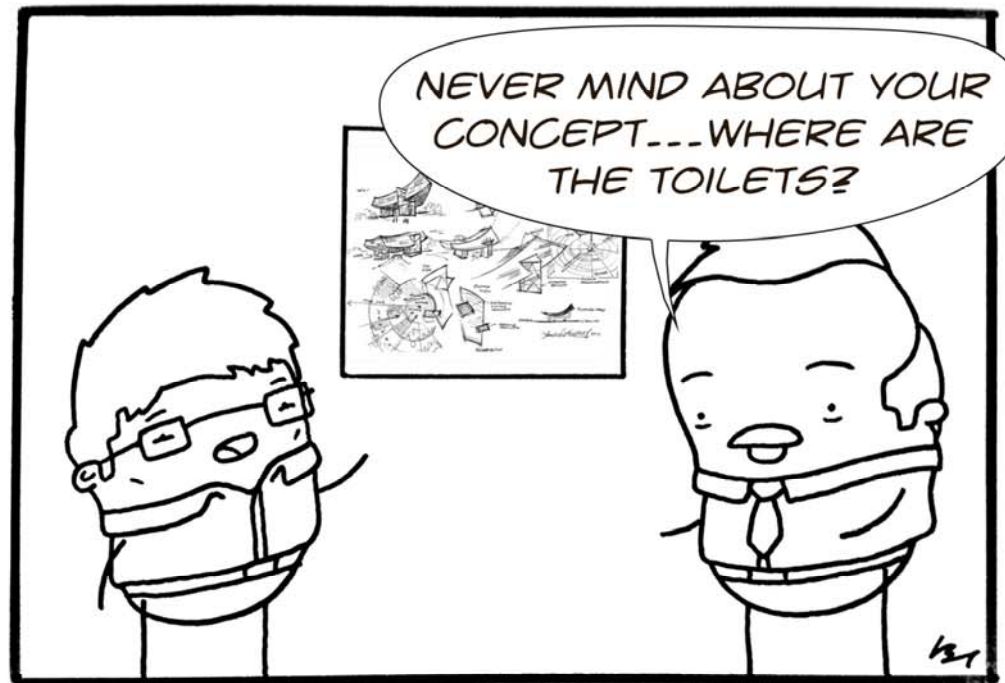
Which further spurs growth and evolution.



Value for Money

Which further spurs growth and evolution.

ARCHIBEANS #19 THAT TUTOR



WRITTEN BY THE ANGRY ARCHITECT / ILLUSTRATED BY EVILHAIRDAY

To evolve the practice of Structural Engineering, you have to...

Develop

Talent

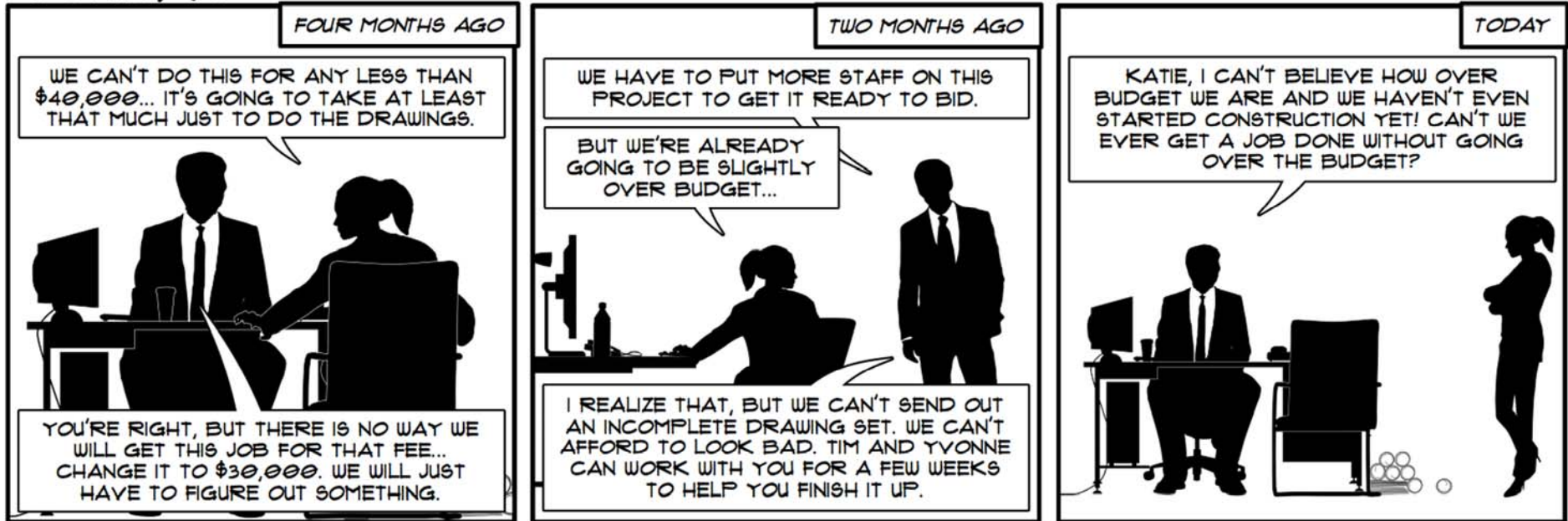




Train the next generation of structural engineers – not only in the technical know-how but in attitude and spirit as well.

Budget

ARCHITEXTS



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**IF YOU PAY PEANUTS,
YOU GET MONKEYS**




Design



Image credits: Katerina Kamprani

Time



For a civil engineer, there's no such thing as a "little mistake."

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Improve

Be open to new innovative ideas, review of one's work, positive criticism.











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THANK YOU

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