



RECENT CIVIL ENGINEERING BREAKTHROUGHS AND INNOVATIONS

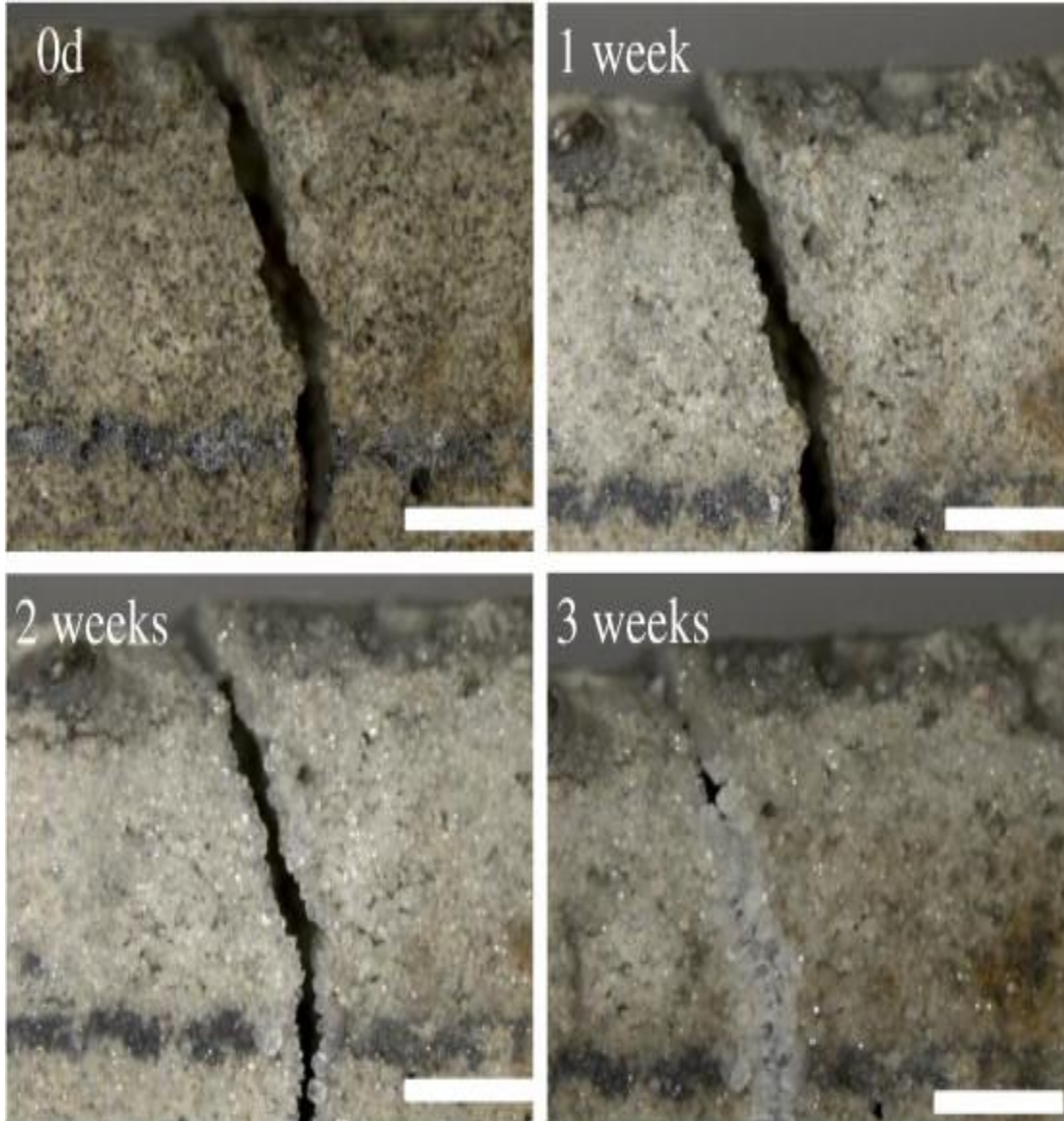
Unit-I

INNOVATIONS IN CIVIL ENGINEERING

- **Self-healing concrete**
 - **Thermal bridging**
 - **Photovoltaic glaze**
 - **Kinetic Footfall**
 - **Kinetic Roads**
 - **Predictive Software**
 - **3D Modeling**
- **Modular Construction**
- **Cloud Collaboration**
 - **Asset mapping**
 - **Plastic Road**
- **Green Roof Systems**



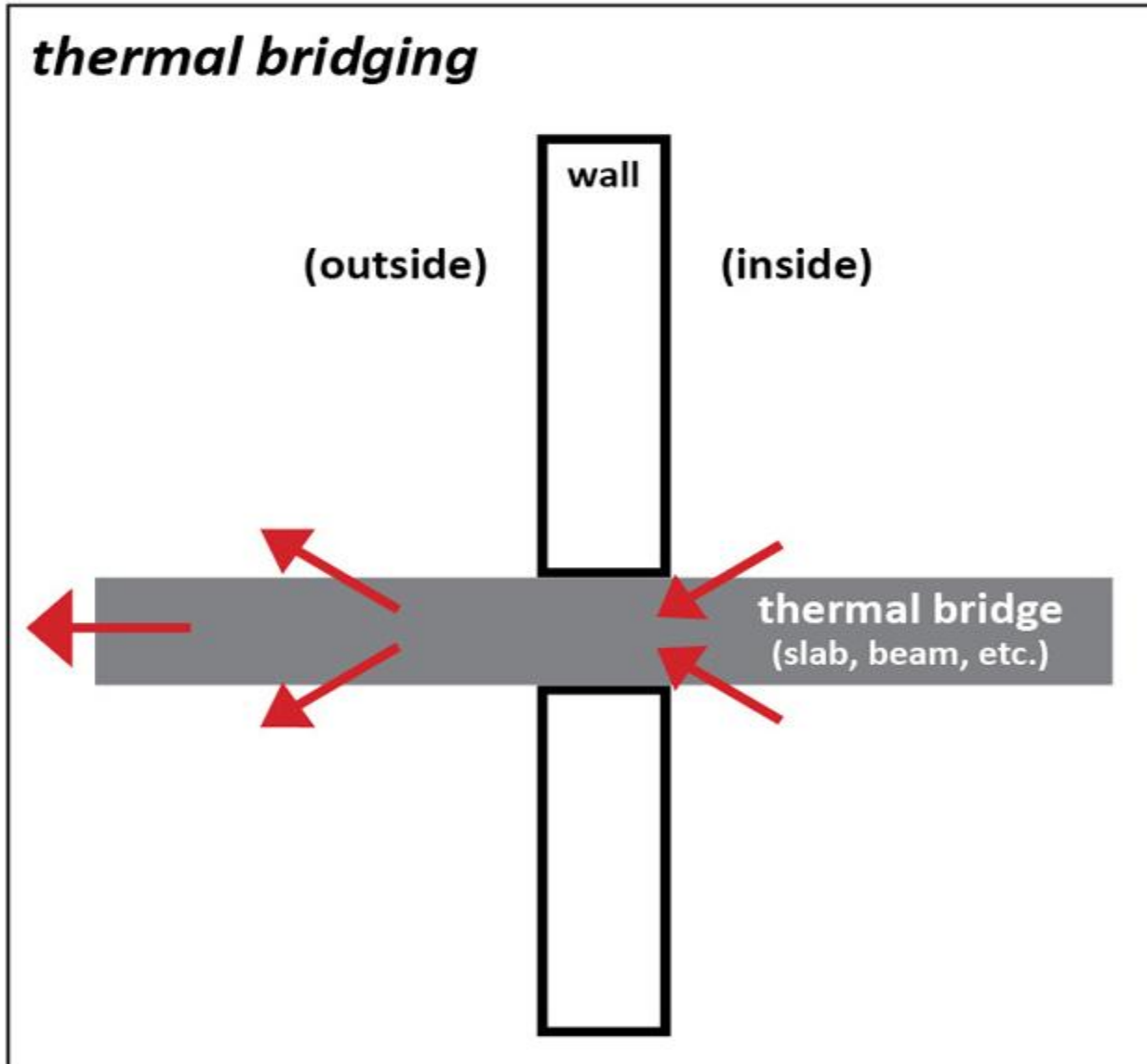
SELF-HEALING CONCRETE



Self-healing concrete, using a mix containing bacteria within microcapsules, which will aid building innovation by germinating when water enters a crack in the concrete to produce limestone, plugging the crack before water and oxygen has a chance to corrode the steel reinforcement.



THERMAL BRIDGING



Heat transmission through walls tends to be passed directly through the building.

Cryogenic insulation, is considered one of the most effective thermal insulation materials



PHOTOVOLTAIC GLAZE

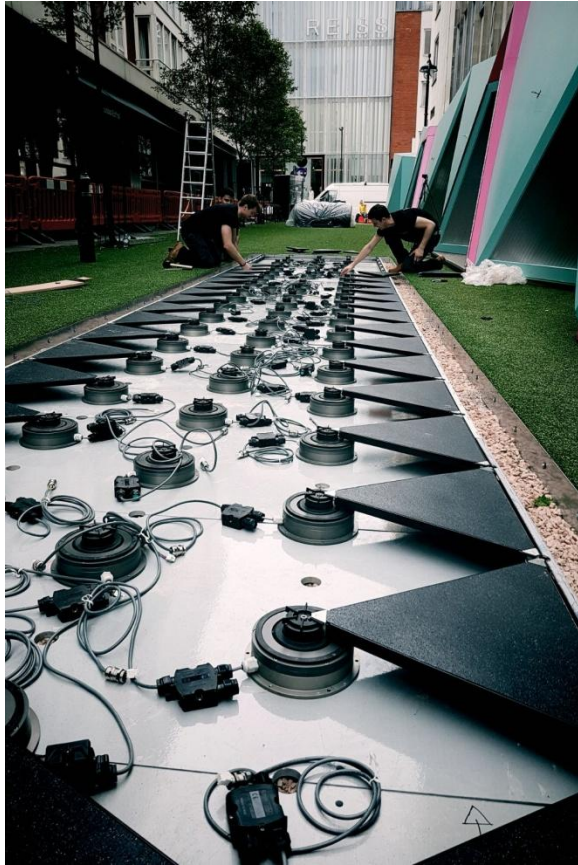


Photovoltaic glazing, which can help , by turning the whole building envelope into a solar panel.

As well as saving on energy bills and earning feed-in tariff revenues, its cost is only marginal over traditional glass

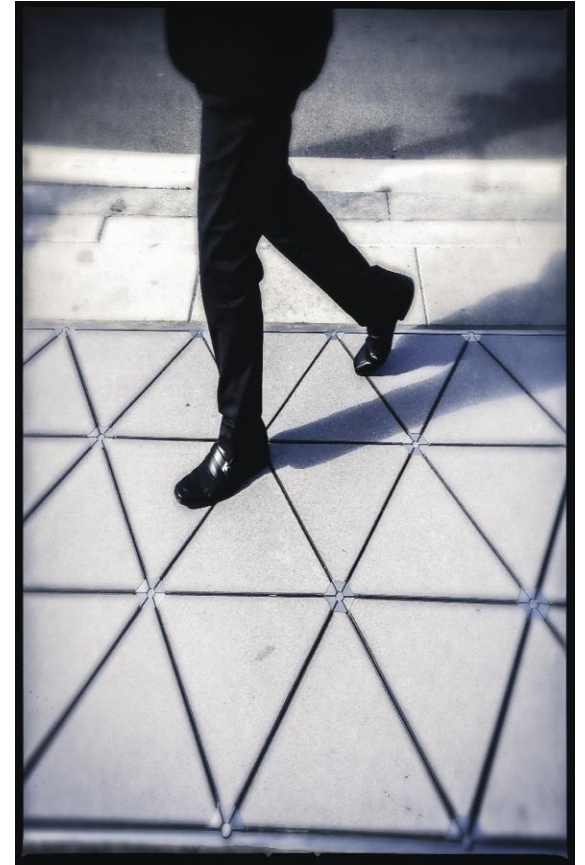


KINETIC FOOTFALL

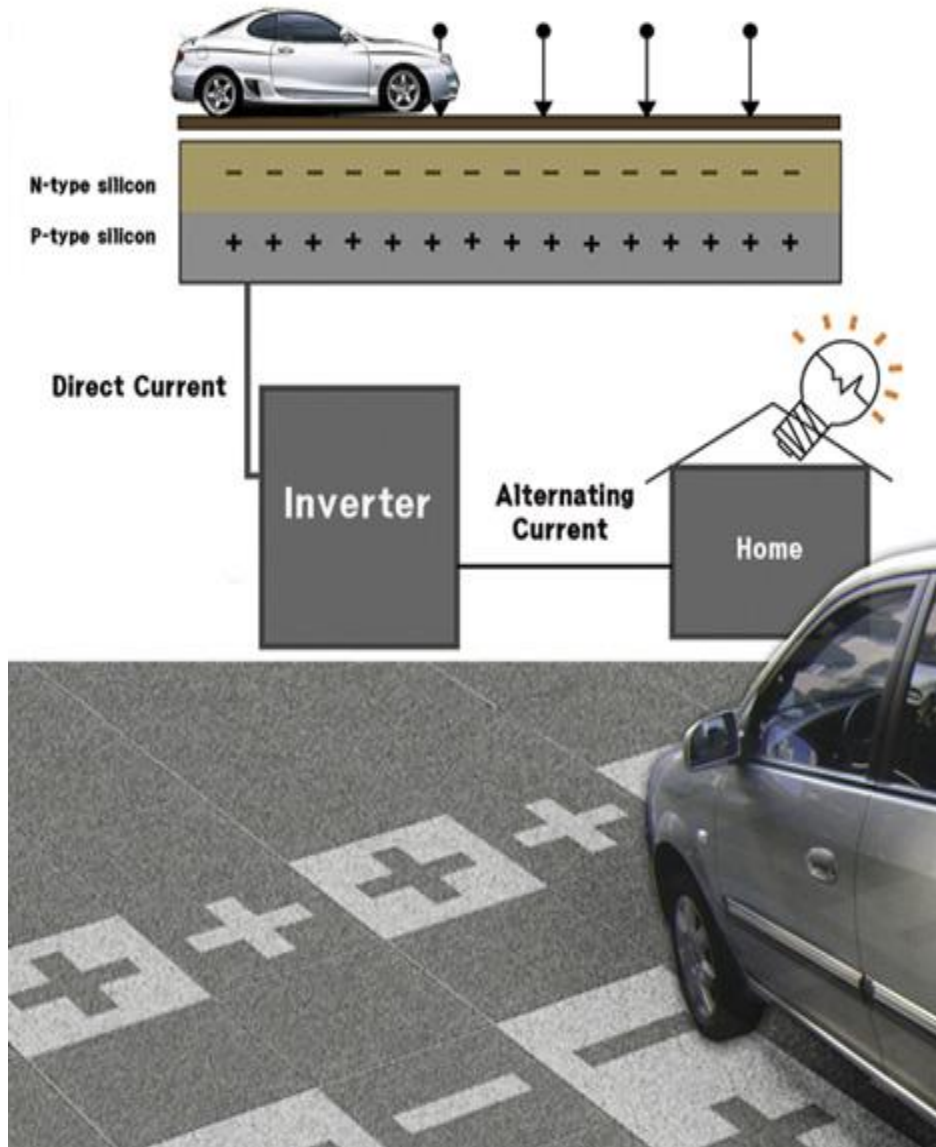


A technology that enables flooring to harness the energy of footsteps.

It can be used indoors or outdoors in high traffic areas to produce electricity using an electromagnetic induction process



KINETIC ROADS



A technology called Lybra, a tyre-like rubber paving that converts the kinetic energy produced by moving vehicles into electrical energy.

In addition to improving road safety, the device upgrades and promotes sustainability of road traffic.



PREDICTIVE SOFTWARE

Predictive software can help ensure even the most innovative structures in civil engineering are safe and efficient, by simulating how they will behave.



3D MODELING

CyberCity3D (CC3D) is a geospatial-modeling innovator specializing in the production of smart 3D building models.

It creates smart 3D buildings to help the architectural, engineering and construction sector visualize and communicate design.



MODULAR CONSTRUCTION



Modular construction is one of the most popular developments in civil engineering where a building is constructed off-site using the same materials and designed to the same standards as conventional on-site construction.



CLOUD COLLABORATION

A cloud collaboration tool called basestone which is a system allowing the remote sharing of data on a construction site in real time.

It is predominantly a review tool for civil engineers and architects which digitizes the drawing review process on construction projects, and allows for better collaboration.



ASSET MAPPING

Asset mapping focuses on operational equipment, including heating and air conditioning, lighting and security systems.

The process includes collecting data from serial numbers, firmware, engineering notes of when it was installed and by whom, and combines all the data in one place.



PLASTIC ROAD

Waste plastic being used as a construction material.

It involves converting waste plastics into small balls that, when combined with asphalt or other common road components, create a strong, permeable surface that features hollow spaces that allow storm-water to seep through the road and more effectively recharge groundwater.



GREEN ROOF SYSTEMS

Green roofs reduces the overall heat conducted by the buildings, enhance biodiversity, reduce runoff quantity and control pollution.




Thank you!



THE ANCIENT AND MODERN MARVELS AND WONDERS IN THE FIELD OF CIVIL ENGINEERING

Chapter 1 & Topic 2

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- Mankind has gone from strength to strength since our early days.
 - The following are a selection of engineering marvels throughout recorded history.
 - To make a level playing field, we split them into the ancient world, medieval period and modern world.

Ancient World

□ The Great Pyramid of Giza, Egypt - 2560 BC




- This Great Pyramid (or the Pyramid of Khufu) gained notoriety worldwide by being one of the oldest and largest pyramids.
- Laborers harvested 2.3 million limestone blocks, lifting them with little mechanical assistance.
- The blocks traveled 500 miles away.
- It took nearly 20 years to build the Great Pyramid, finally getting finished in 2560 BC.



Stonehenge - 3000-1500 BC



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- Standing proud in the idyllic rolling hills of Wiltshire, Stonehenge is an incredible testament to the ancients.
 - Some of the larger stones weigh in, on average, 50 tones.
 - It is also a worthy member of mankind's greatest engineering marvels

Colosseum - 70-80 AD



Colosseum - 70-80 AD

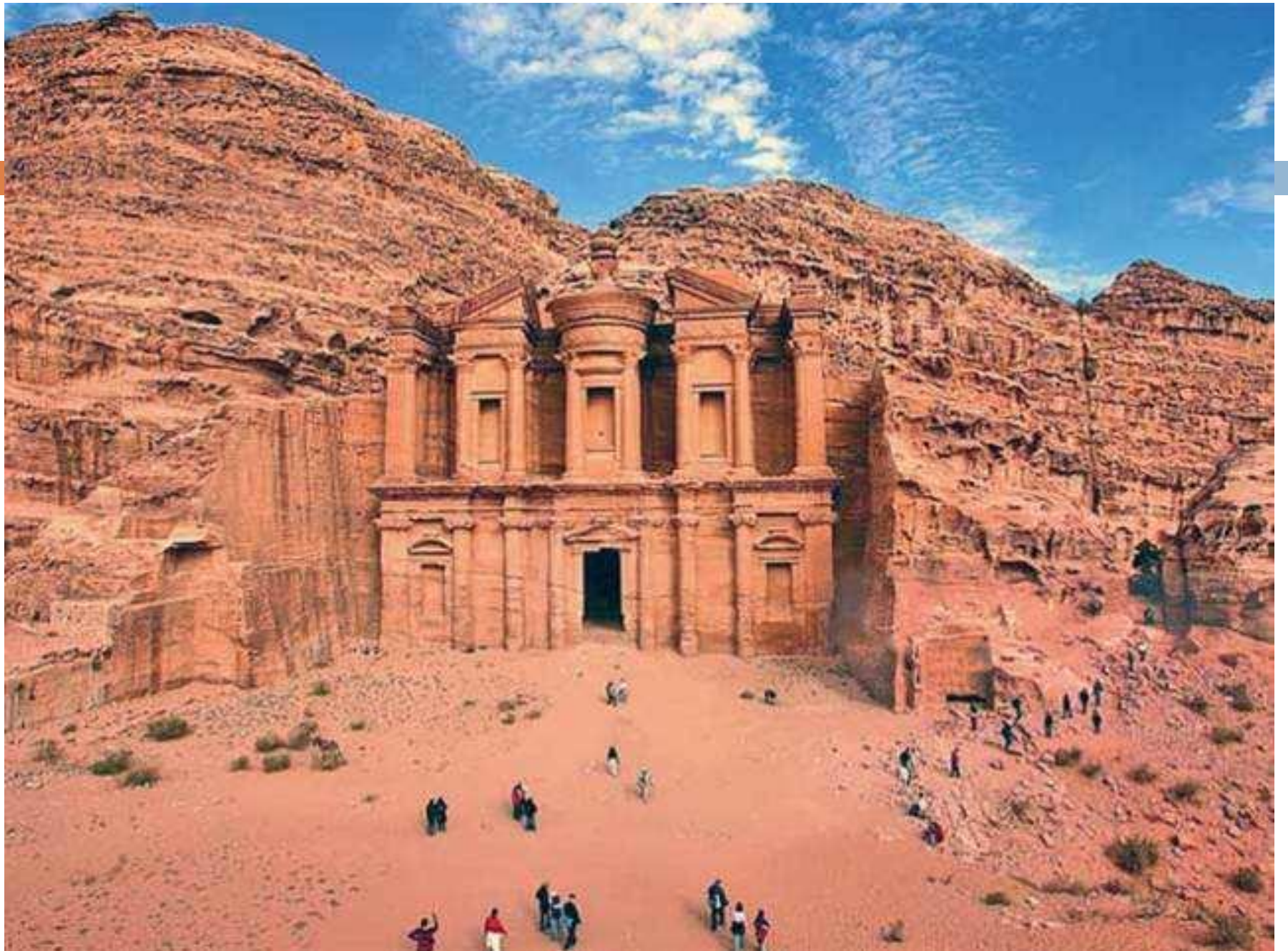
- The most iconic Roman structure that we know of today.
- Built of concrete and sand with a seating capacity of 50,000 spectators.
- It was an open-air venue used for entertainment, performances, and sports.
- The Flavian Amphitheatre is a real testament to the ingenuity of the Romans and mankind in general.





Petra 9000 BC

- is a historical and archaeological city in southern Jordan.
- Petra lies on the slope in a basin among the mountains.





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Middle Ages 500AD-1500AD

Taj Mahal - 1648



- Construction of the mausoleum was essentially completed in 1643 but work continued on other phases of the project for another 10 years.
- Cost estimated at the time to be around 32 million rupees.
- . It is a large, white marble structure standing on a **square plinth** and consists of a symmetrical building with an arch-shaped doorway topped by a large dome which is nearly 35 meters (115 ft) high



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Leaning Tower of Pisa – 1399

- Construction of the tower occurred in three stages over 199 years.
- At least four strong earthquakes hit the region since 1280, but the apparently vulnerable Tower survived.
- The same soft soil that caused the leaning and brought the Tower to the verge of collapse helped it survive.



The Great Wall of China - 7th Century BCE – 1644



- It took more than 2,500 years to finish the construction of the Great Wall.
- The total length of the Great Wall of China built in different dynasties is 21,196.18 kilometers.
- The Great Wall here was built by the mountains with soil and stones.
- more than 1,000, 000 laborers had been used, including civilians, soldiers, and convicts.



Modern Age 1500-Present

Millau Viaduct (Millau, France)



- The Millau Viaduct in the South of France is the world record holder for the tallest bridge in the world reaching 343 meters tall.
- The project required about 1 27,000 cubic meters of concrete, 19,000 tones of steel for the reinforced concrete.
- Was built by the construction company Eiffage, the same company that built the Eiffel tower.

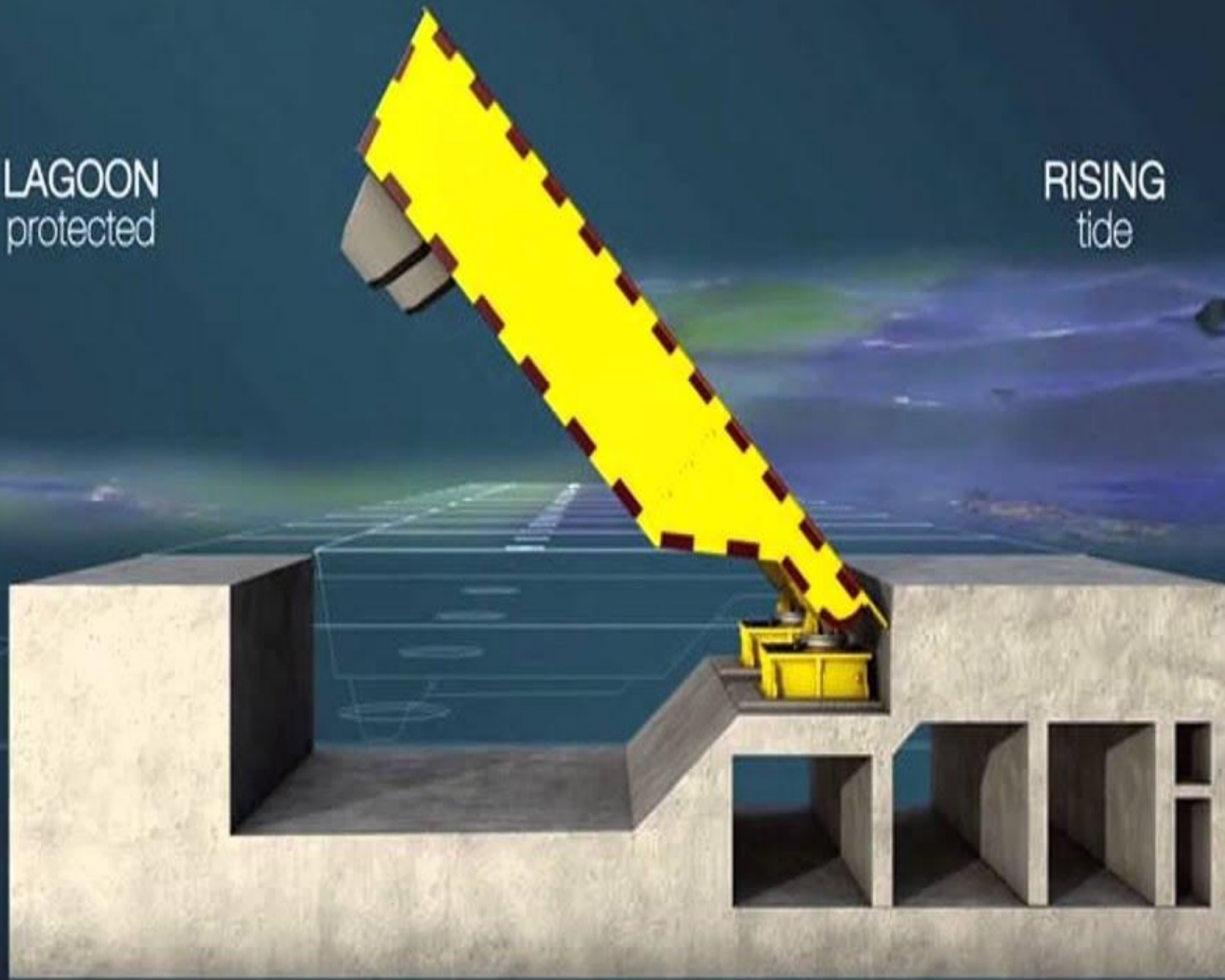
Venice Tide Barrier Project (2015)



If the water rises "too high" THE GATES ARE RAISED

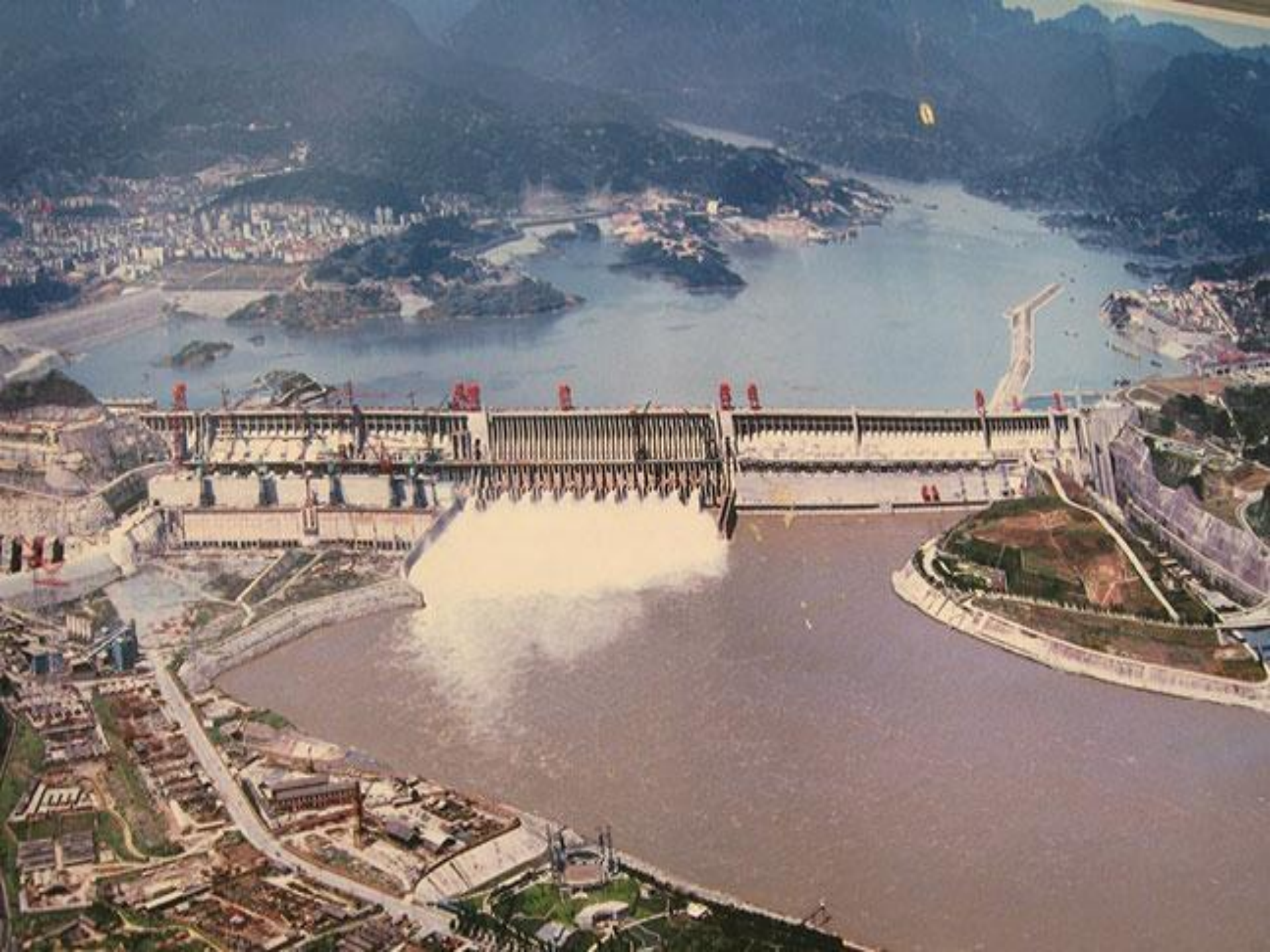
LAGOON
protected

RISING
tide



Three Gorges Dam (2003)





- The world's largest dam, as well as largest hydroelectric power plant, stands tall at **185 m**.
- The hydroelectric plant is built inside the walls of the structure, producing a total of **4.7 billion kWh each year**.
- During construction, builders used 27.2 million cubic metres of concrete. That's enough concrete to fill 10,200 Olympic sized swimming pools.



THANK YOU FOR WATCHING

❧ THE END ❧
