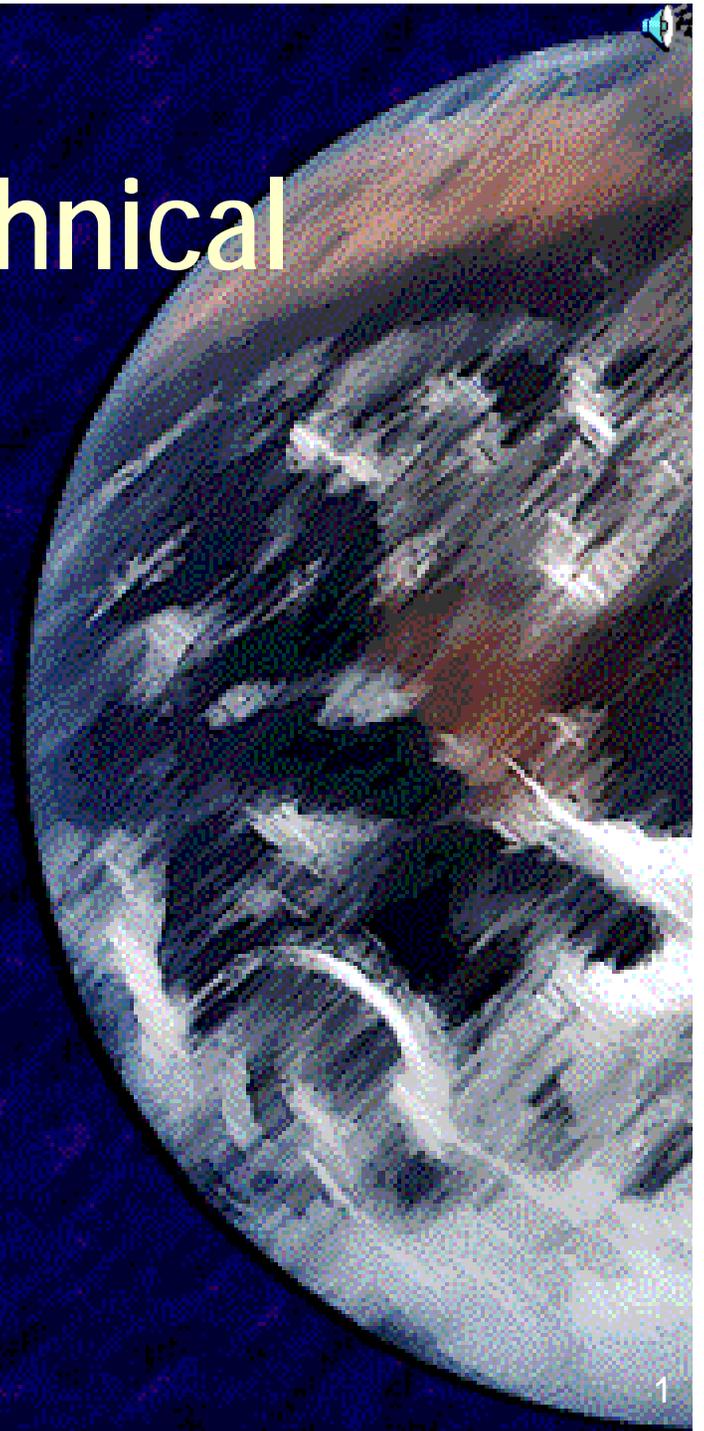


# Introduction to Geotechnical Engineering



ground



# Typical Geotechnical Project

**Soils Laboratory**  
~ for testing

soil properties

**Design Office**  
~ for design & analysis

soil samples

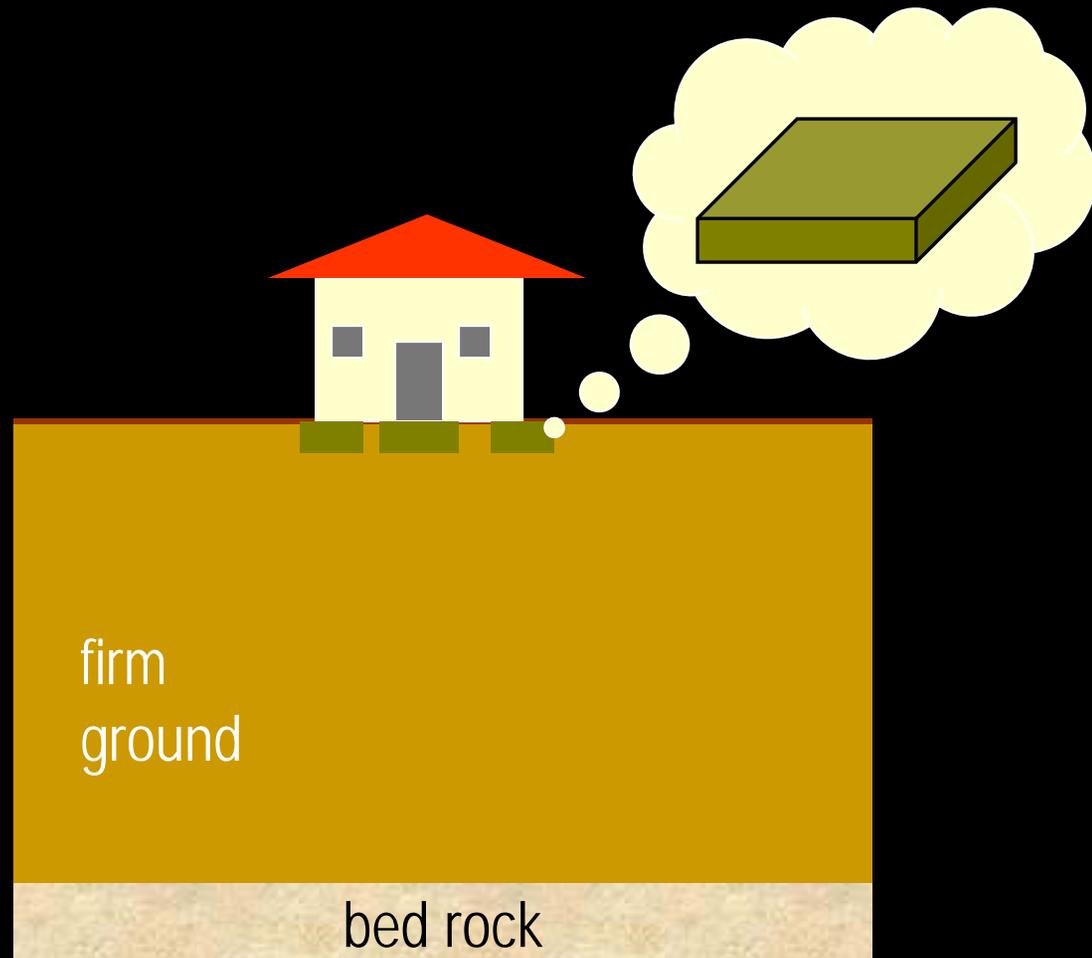
design details



# Geotechnical Applications

# Shallow Foundations

- ~ for transferring building loads to underlying ground
- ~ mostly for firm soils or light loads

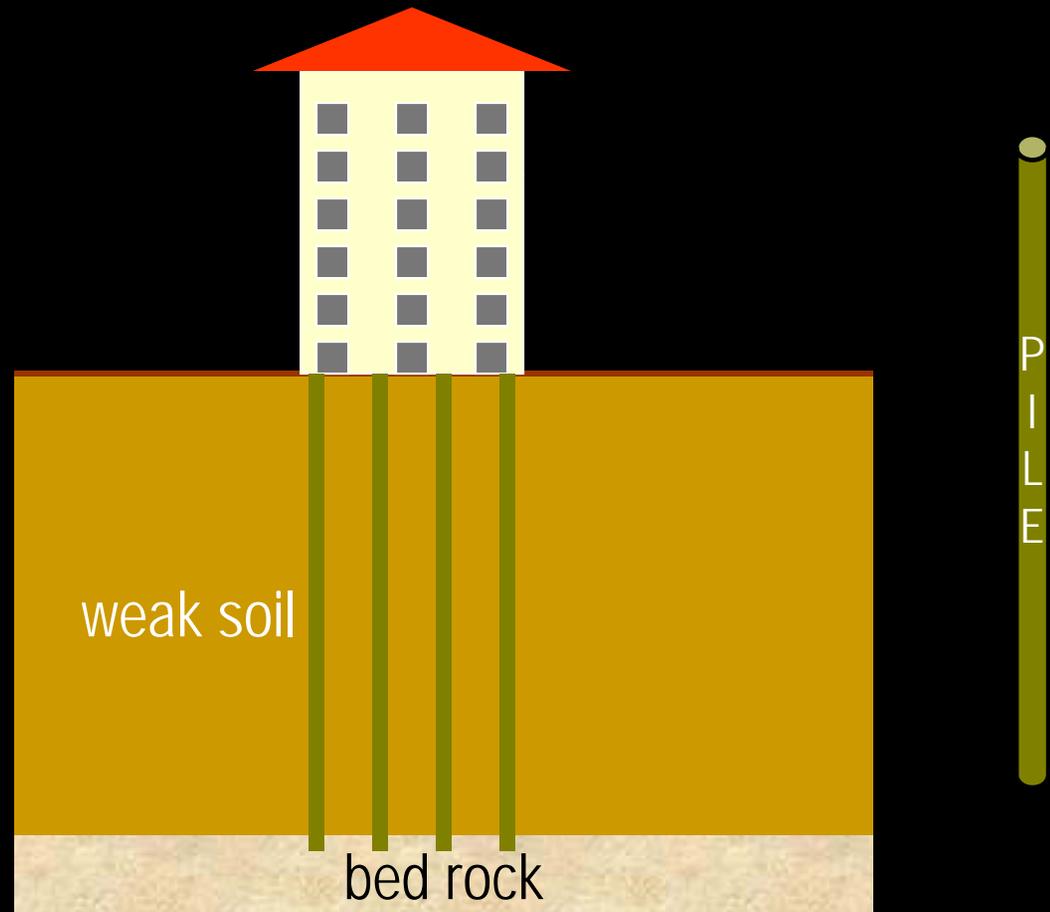


# Shallow Foundations



# Deep Foundations

- ~ for transferring building loads to underlying ground
- ~ mostly for weak soils or heavy loads



# Deep Foundations



Driven timber piles, Pacific Motorway, Australia

# Pier Foundations for Bridges



## Millau Viaduct in France (2005)

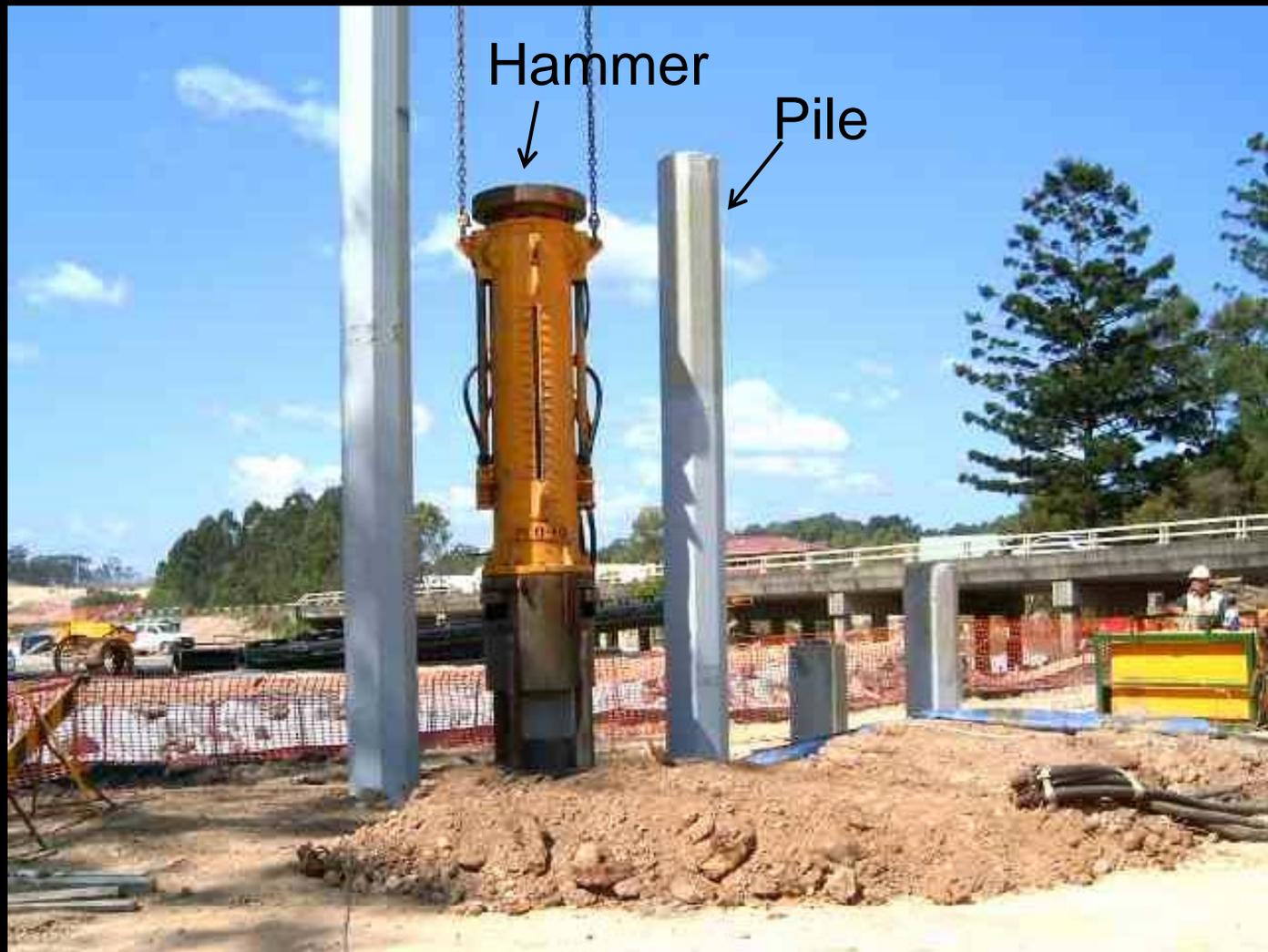
- Cable-stayed bridge
- Supported on 7 piers, 342 m apart
- Longest pier (336) in the world

# Pier Foundations for Bridges



Millau Viaduct in France (2005)

# Pile driving



At Ross River Dam, Townsville, Australia

# Pile group for bridge abutment

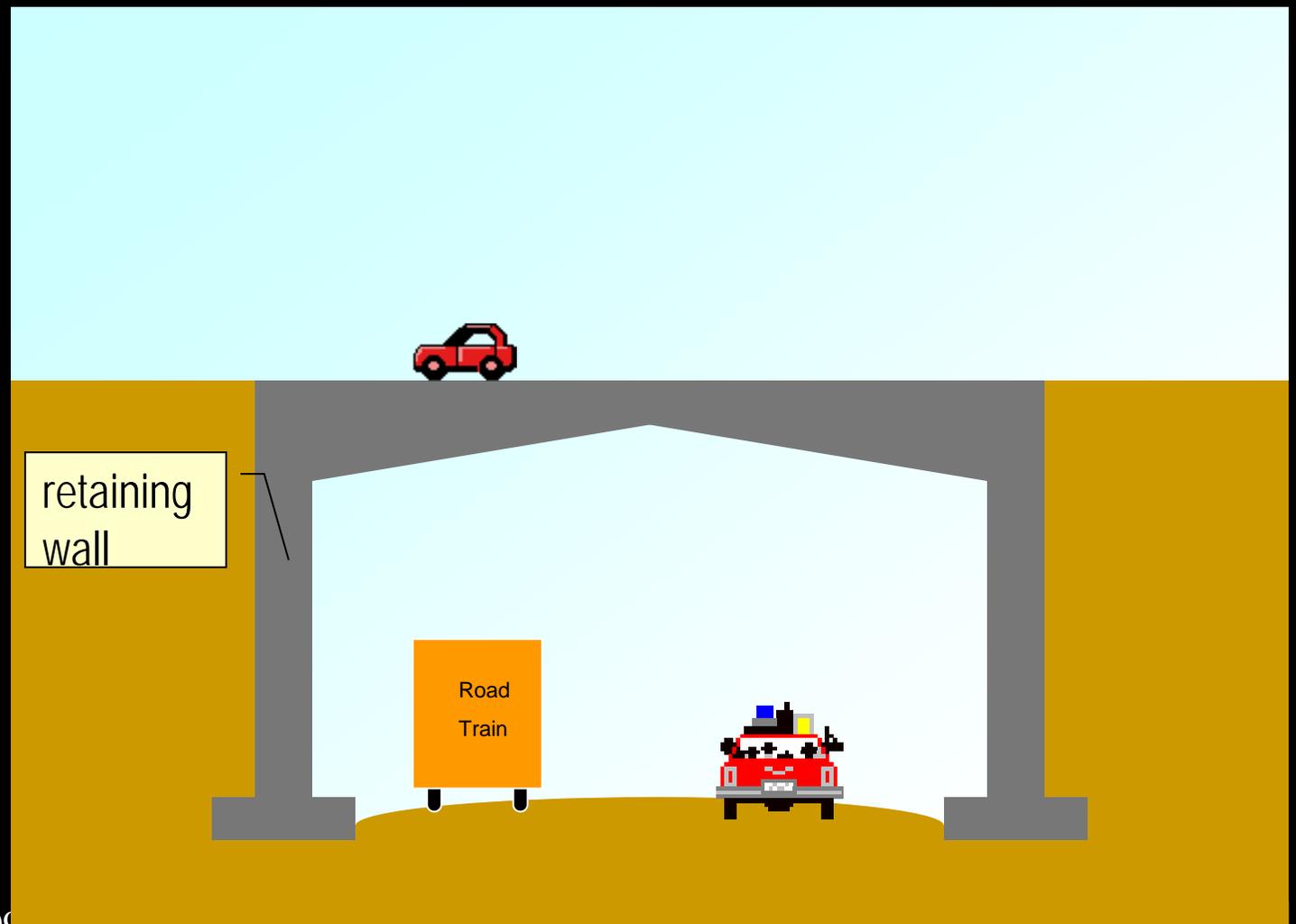


# Pile Load Test



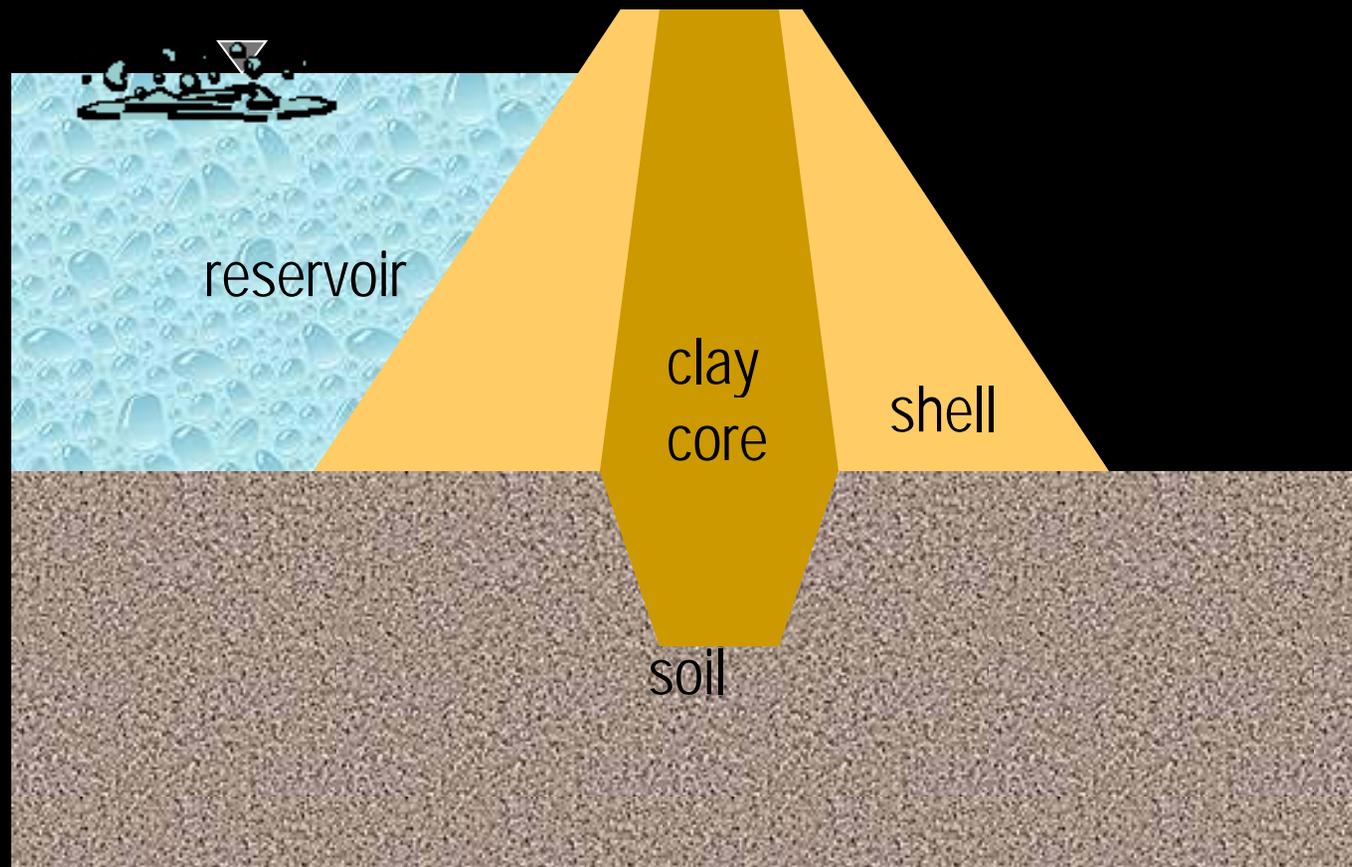
# Retaining Walls

~ for retaining soils from spreading laterally

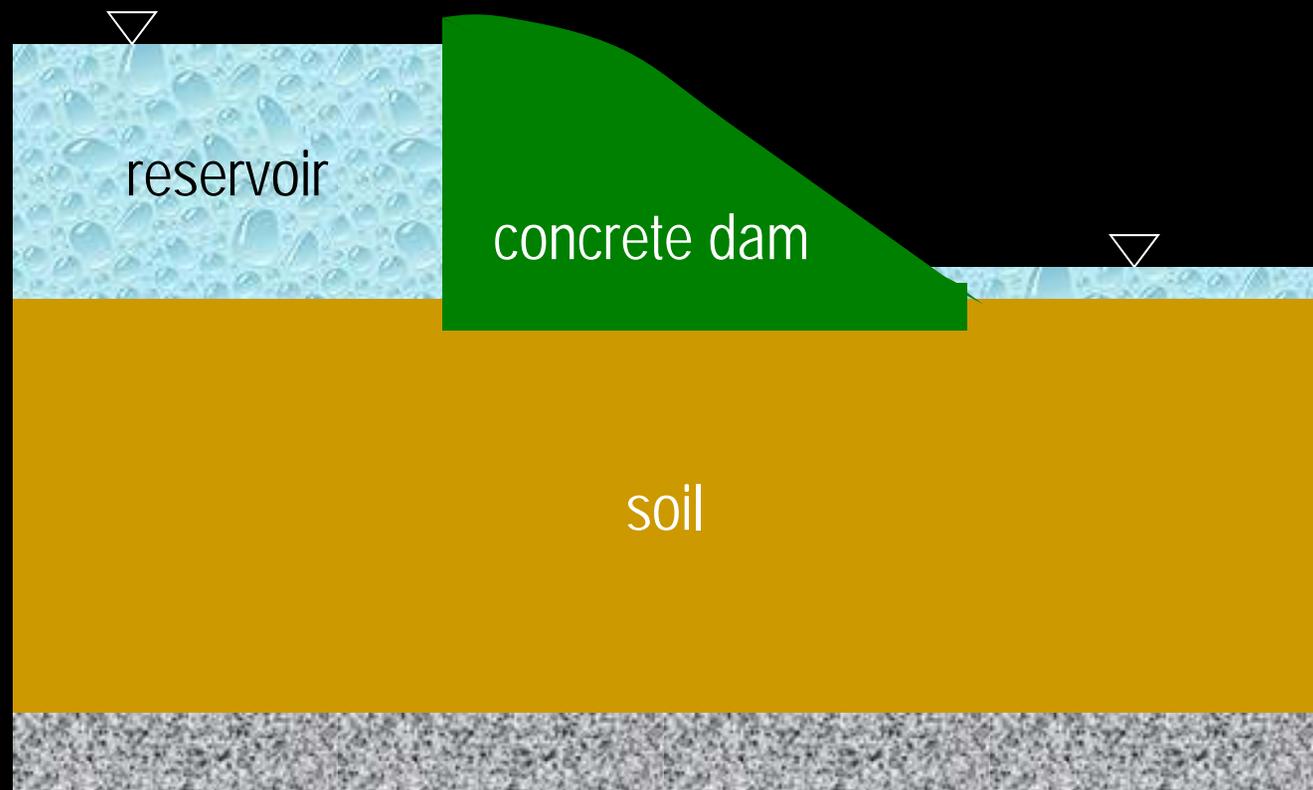


# Earth Dams

~ for impounding water



# Concrete Dams



# Concrete Dams



Three Gorges Dam, Hong Kong

# Concrete Dams

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# Earthworks

~ preparing the ground prior to construction



Roadwork, Pacific Motorway

# Geofabrics

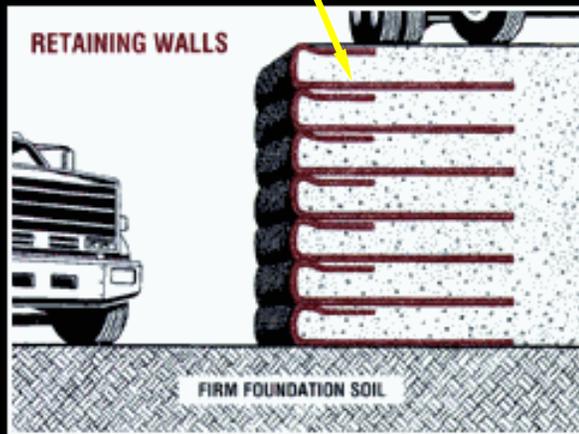
~ used for reinforcement, separation, filtration and drainage in roads, retaining walls, embankments...



Geofabrics used on Pacific Motorway

# Reinforced Earth Walls

~ using **geofabrics** to strengthen the soil



# Tunneling

MSE (Mechanically stabilised Earth) wall



Chile (2006)

# Tunneling



# Soil Nailing

~ steel rods placed into holes drilled into the walls and grouted



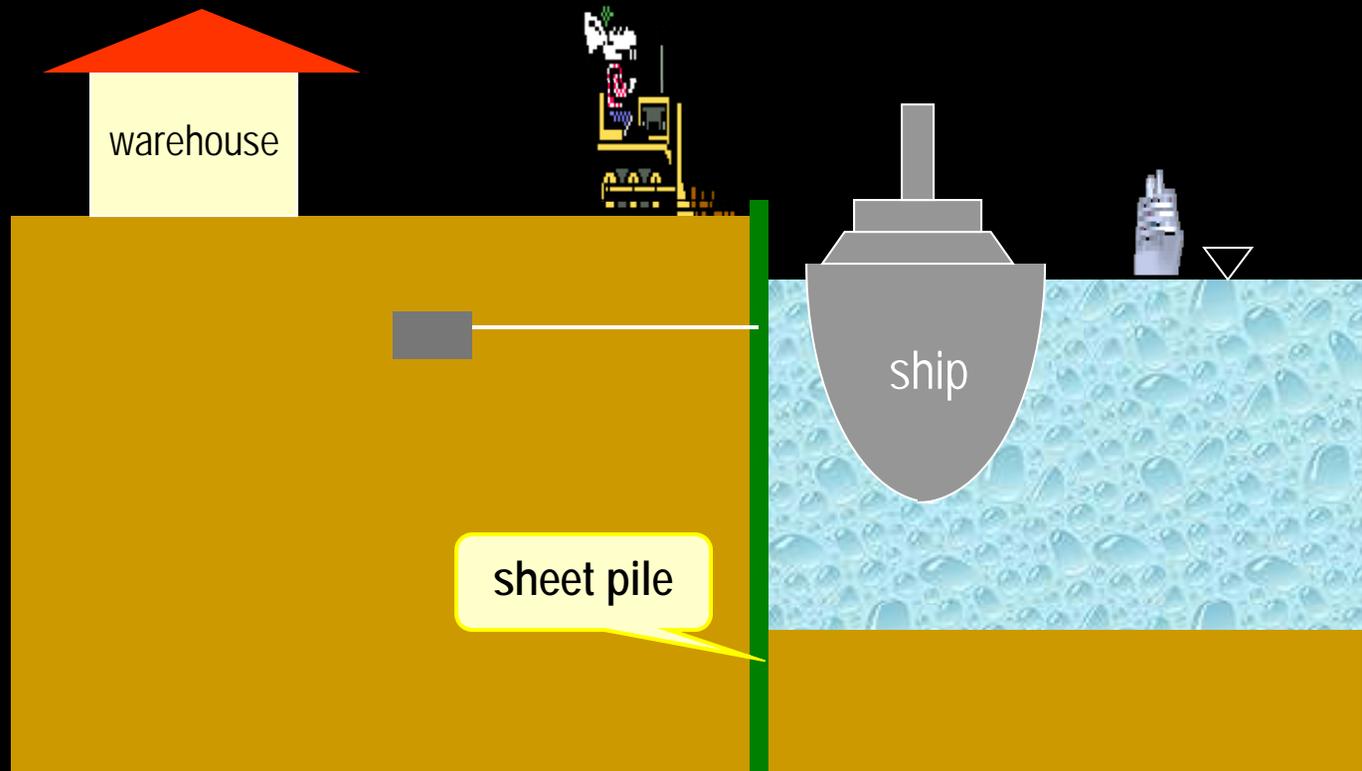
# Retaining Walls



Rock anchors to support the vertical walls

# Sheet Piles

~ sheets of interlocking steel or timber driven into the ground, forming a continuous sheet



# Sheet Piles

- ~ resist lateral earth pressures
- ~ used in excavations, waterfront structures, ..



# Sheet Piles

~ used in temporary works



# Sheet Piles

~ interlocking sections



# Sheet piles



..in Townsville, Australia

# Cofferdam

~ sheet pile walls enclosing an area, to prevent water seeping in



# Cofferdam

~ sheet pile walls enclosing an area, to prevent water seeping in



# Slope Stability



# Shoring

propping and supporting the exposed walls to resist lateral earth pressures



# Excavations



Chile (2006)