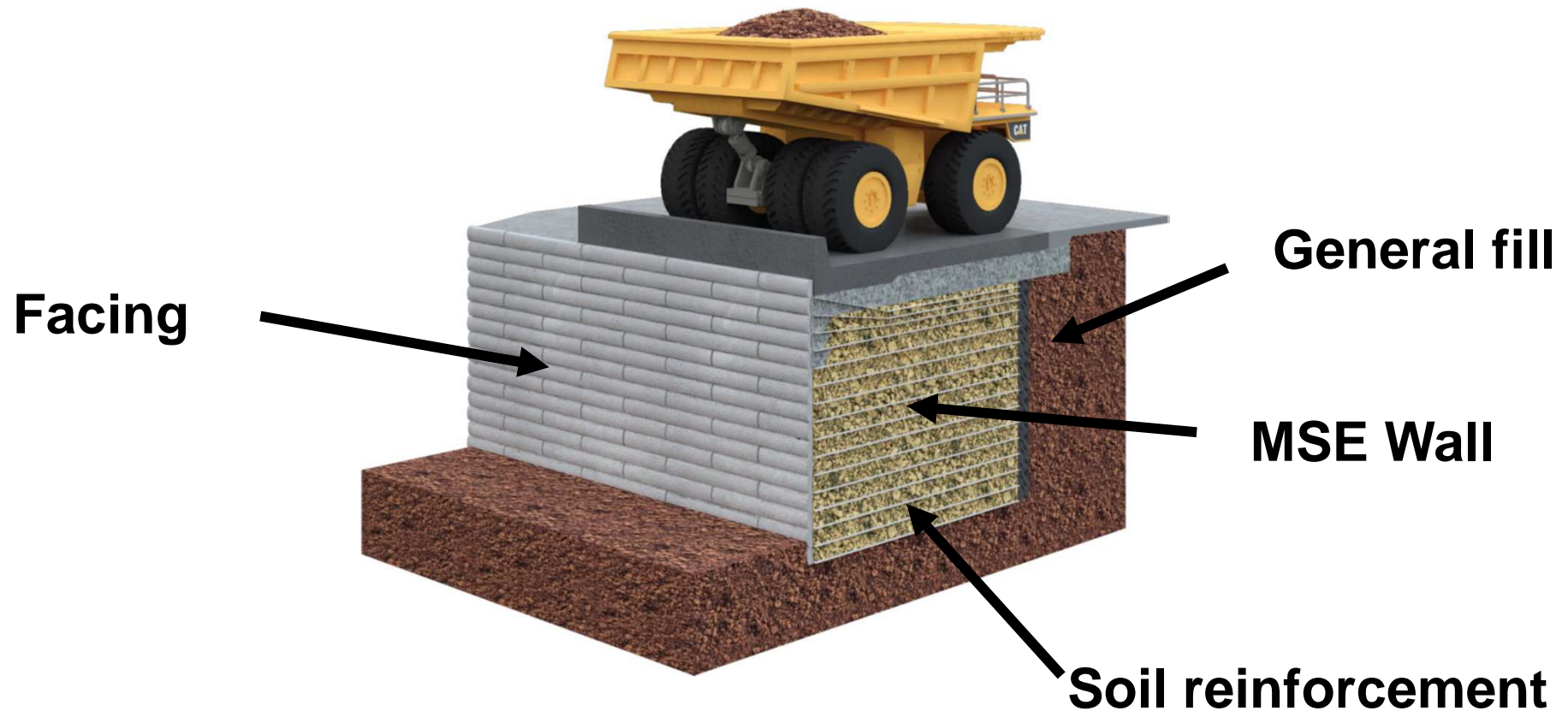




# Why MSE Walls?

- A composite material based on friction between backfill and reinforcement





# Strong

Muskeg froth tank - Canada



RoRo Ramp for 2,600T caissons - UK



Bridge launching gantry - USA

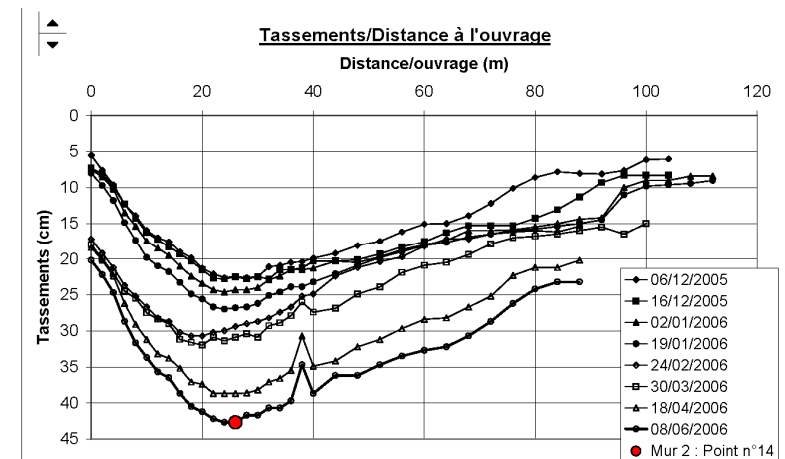
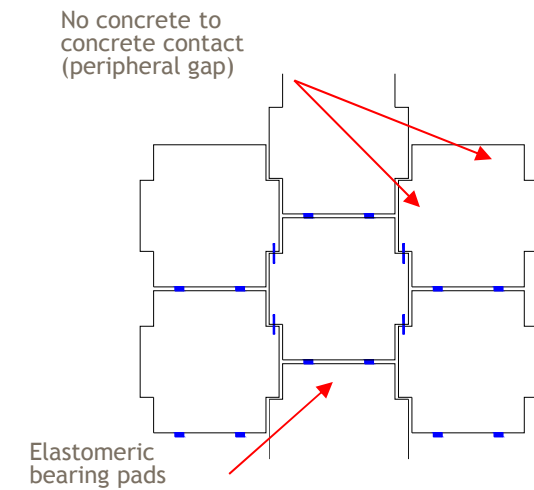


Heavy Rail - Australia



# Flexible

- Final settlements > 500mm : Morocco



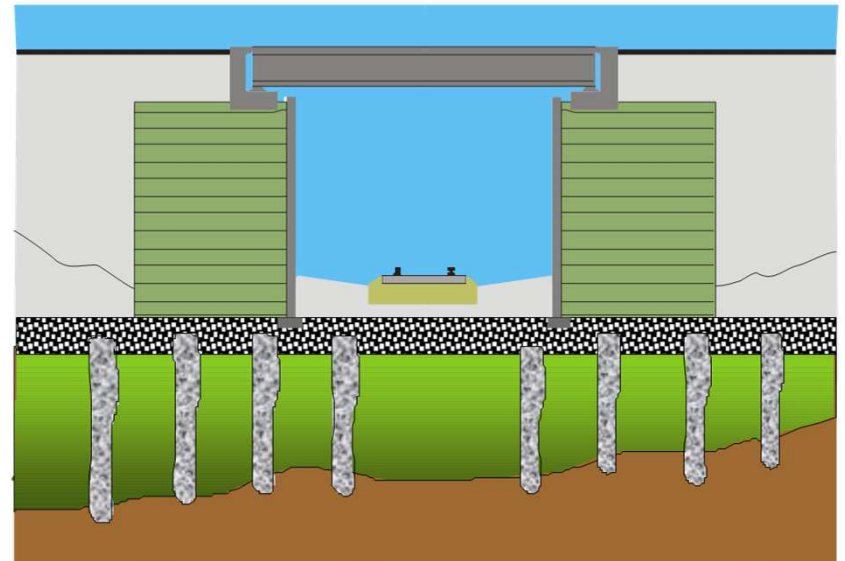


# Flexible

- Final settlements > 500mm : Morocco



## Combination with soil improvement



## Mullica River bridge (USA)



# Resilient

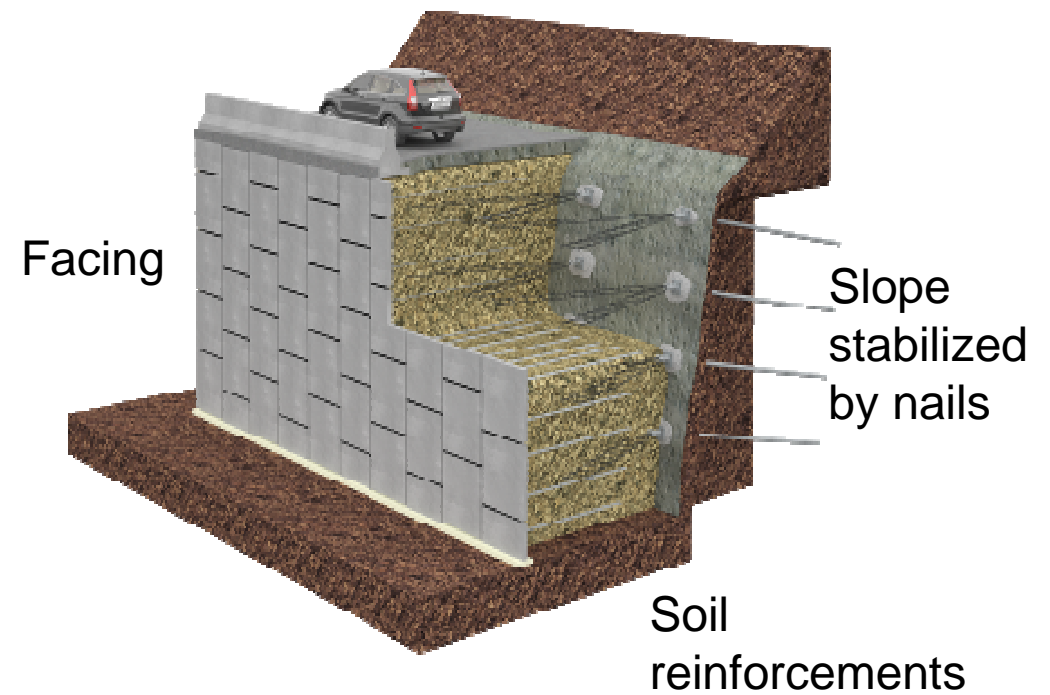
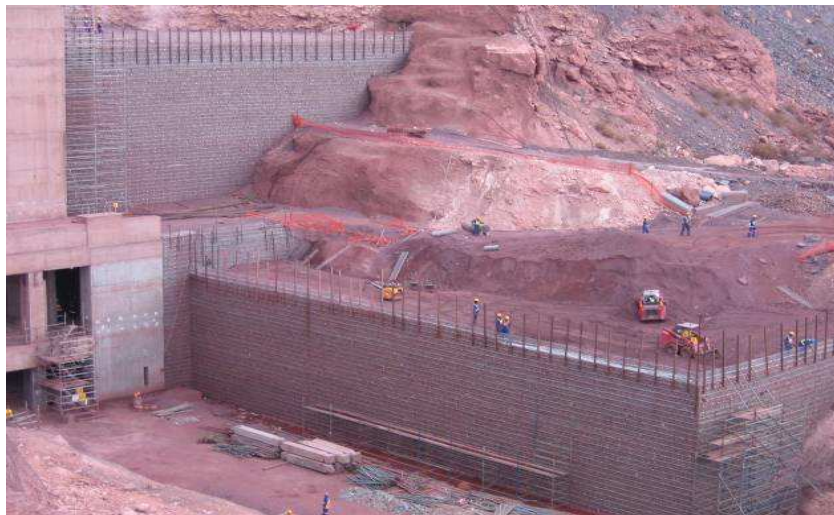
- **Effective absorption of dynamic loads from :**

- Earthquakes
- High speed and heavy trains
- **Industrial and mining equipment**
- Avalanches, rock falls, waves ...
- Explosions





# Adaptable





## Sishen Iron South Africa – Shored MSE Wall





# The MSE Wall Advantage

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## Strength

Load-bearing capacity

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## Flexibility

Performance on poor foundations with differential settlement

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## Resilience

Response to Seismic Events

Absorption of vibrations from:

- Heavy rail
- High speed rail
- Explosions

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## Cost effective

Construction time

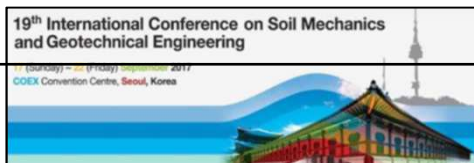
Materials cost

Life-cycle cost

---

## Functional

Facing, Fill and Reinforcement fit for the Application



# MSE Applications for Mining Infrastructure

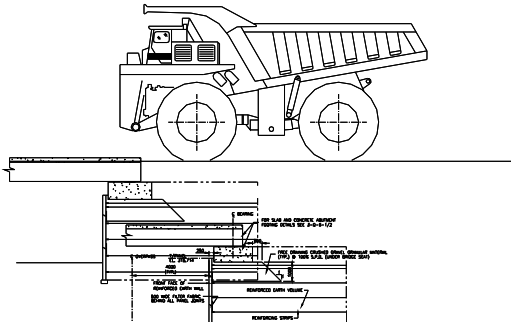
- Accessing
- Processing
- Transporting
- Storing
- Containing
- Exporting
- Upgrading





# Accessing – roads, railways, conveyors

- Bridge abutments, overpasses, underpasses



Coal & Allied - Australia



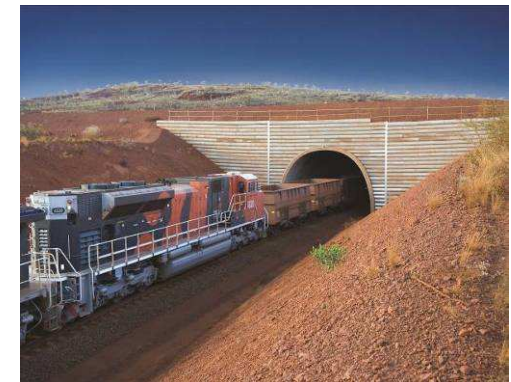
Syncrude - Canada



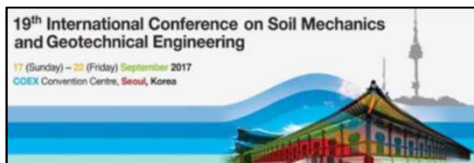
Morenci - USA



Syncrude - Canada



BHP Billiton, mining area C - Australia





## Accessing - heavy duty bridge abutments

- Suncor (Canada) bridge crossing for mining shovel 1,354 T
- 500 kPa surcharge





# Accessing – ramps, steep slopes and walls

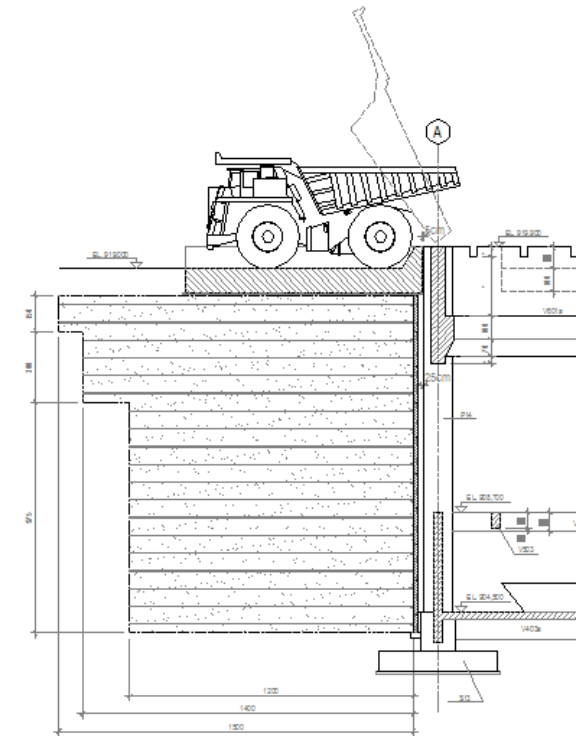
- **Antamina Copper - Peru**





# Processing - crusher walls

- **Escondida Copper, Gold, Silver - Chile**



Escondida - Chile



# Processing - crusher walls

Moatize Coal - Mozambique



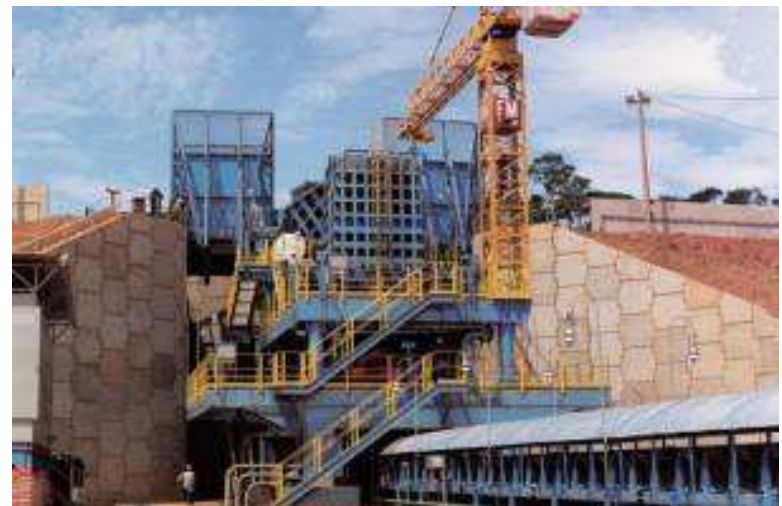
Energy Resources LLC coal mine - Mongolia



Ravensworth Coal - Australia



Trombetas Bauxite - Brazil





# Processing - crusher walls

Ravensthorpe Nickel - Australia



Nuova Cives - Italy



Sepon Gold - Laos



Freeport Copper, Gold - Indonesia



Yandi Iron - Australia





# Processing – crusher walls

Veladero Gold - Argentina



Etruscan Diamonds - South Africa



Cerro Verde Copper - Peru



North Rochelle Coal mine - USA





# Processing - ROM walls

- Alberta oil sands experience



Syncrude APS 3 - Canada



Jackpine - Canada



Canadian Natural Resources - Canada



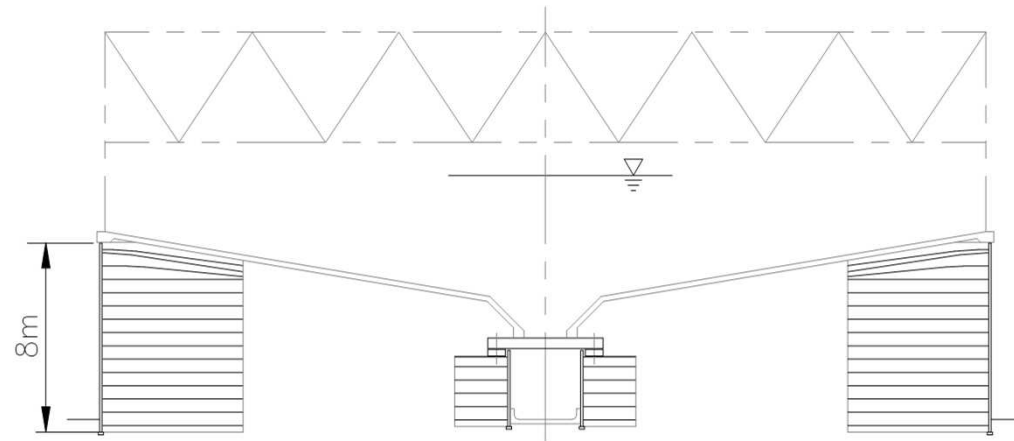
Suncor Steepbank mine - Canada





# Processing - support structures

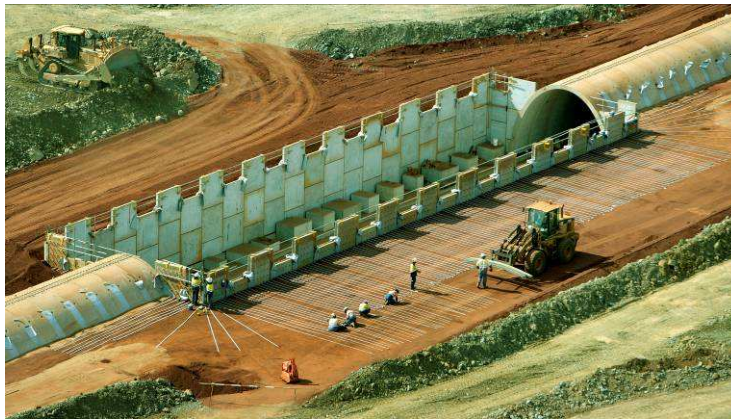
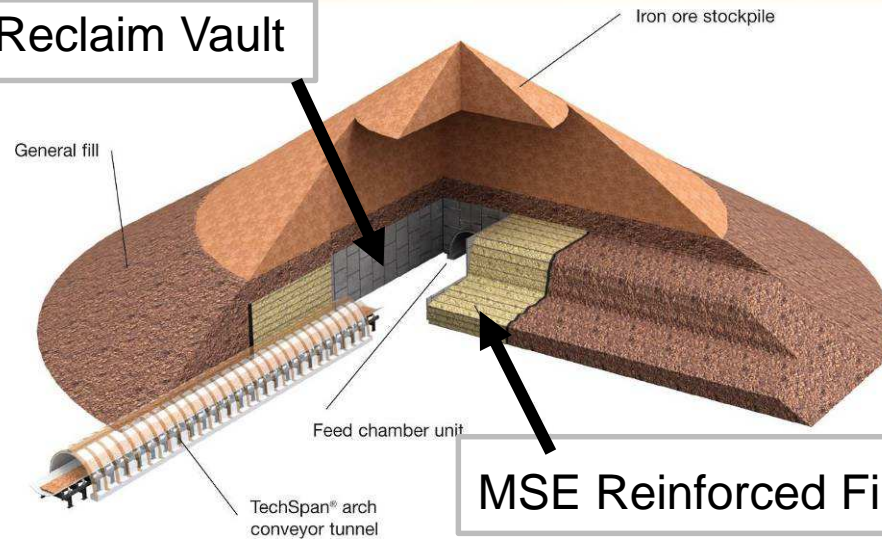
- Muskeg froth settler tanks - Alberta oil sands (Canada)





# Transporting – MSE reclaim vault

Reclaim Vault



Yandi - Australia



Yandi - Australia

19<sup>th</sup> International Conference on Soil Mechanics  
and Geotechnical Engineering

17 (Sunday) – 22 (Friday) September 2017  
COEX Convention Centre, Seoul, Korea





# Transporting - reclaim tunnels, portals and drifts



Mount Tom Price Iron- Australia



Georgia Pacific Gypsum - Canada



Kestrel Coal portal - Australia



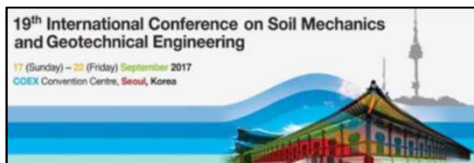
Cloudbreak Iron - Australia



Freeport Copper Doz Portal - Indonesia



Texas lime - USA





# Storing - bulk materials

- Slot storage bunkers, glory holes



Dorstfontein - South Africa



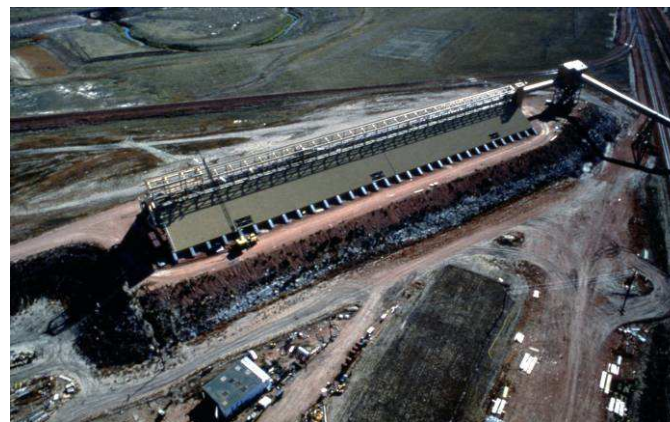
Kwagga North - South Africa



Dorstfontein - South Africa



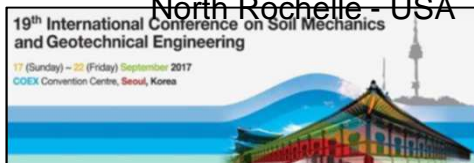
North Rochelle - USA



Cordero mine - USA

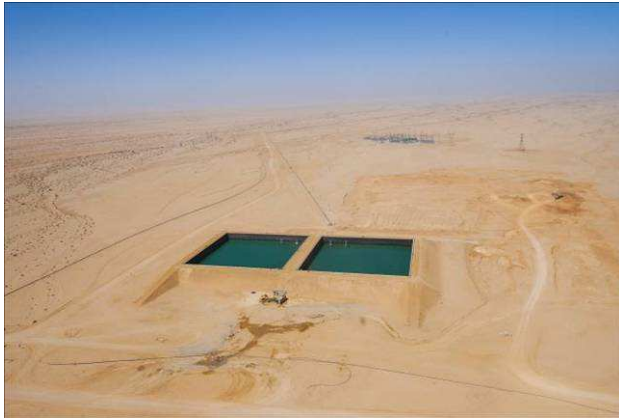


Obed Marsh - Canada





# Storing - liquids



Fresh water reservoirs, Trekkopje - Namibia



Sedimentation basin, Alloy - USA



# Containing - risk mitigation

- **Pollution containment**



Shongweni landfill - South Africa

+



Inner waterproofing



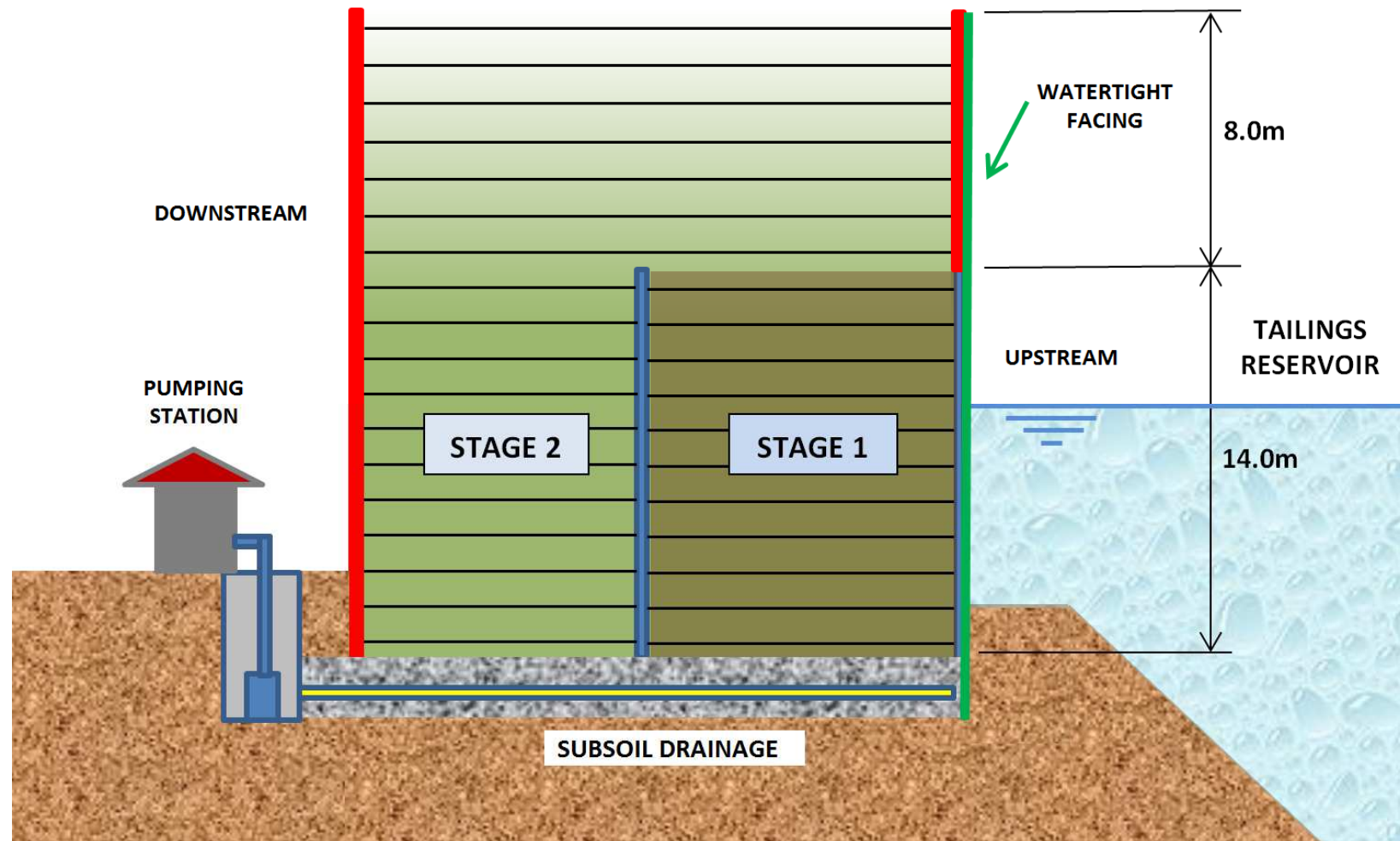
Tailing dams

- **Las Tortolas tailings dam 14m (+8m) high - Chile**





# Las Tortolas Tailings Dam: planned for expansion



# Exporting - railways & ports facilities



Tavistock coal mine - South Africa



Burlington railway - USA



Air Tawar wharf - Indonesia



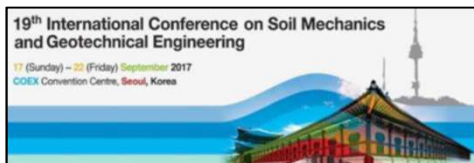
Owensboro - USA



Chiba bulk terminal - Japan



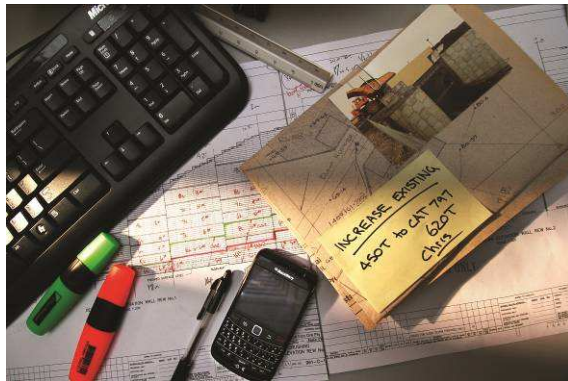
Dunkirk coal storage - France



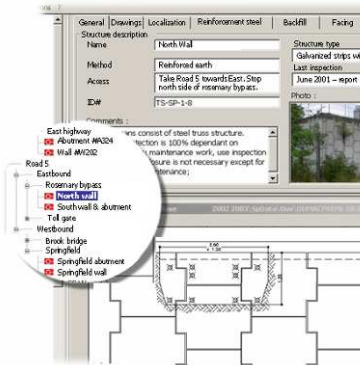


# Upgrading - Asset management

- Service life extension
- Increased loads (larger trucks ...)



Design



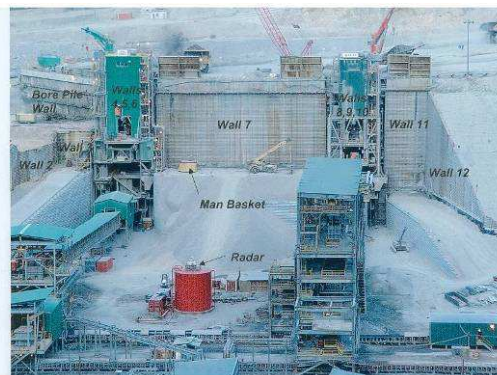
Inventory



Visual inspection



Sampling

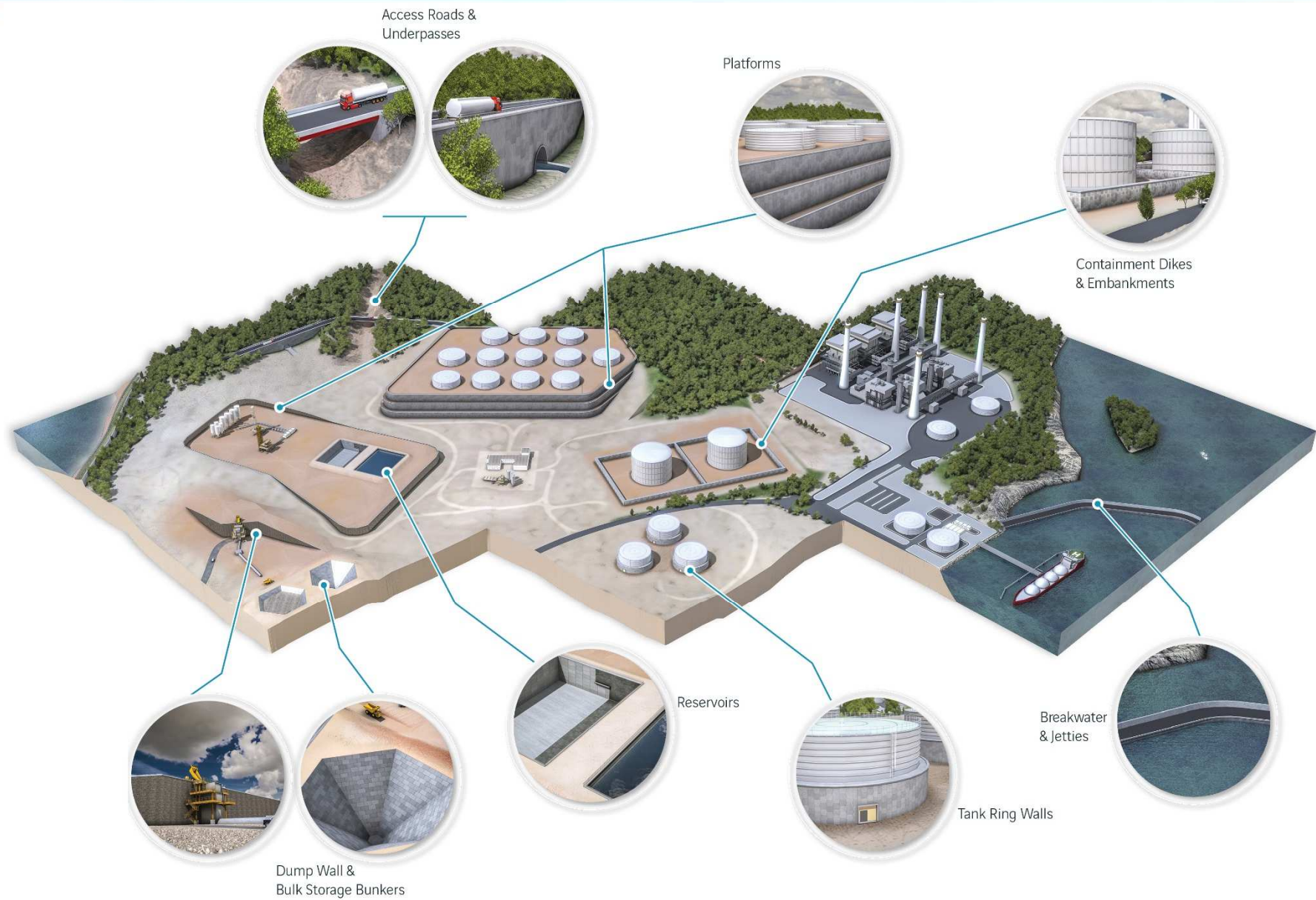


Instrumentation and monitoring



Strengthening

# MSE Walls « fit for purpose »





# Thank you for your attention

There is hardly anything in the world that some man cannot make a little worse and sell a little cheaper, and the people who consider price only are this man's lawful prey.

John Ruskin

