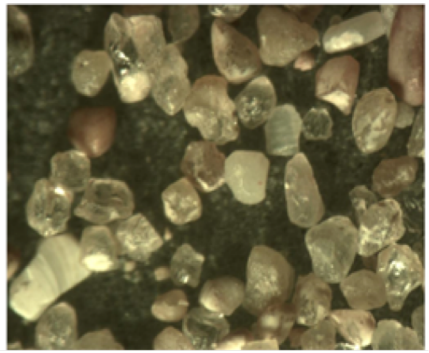
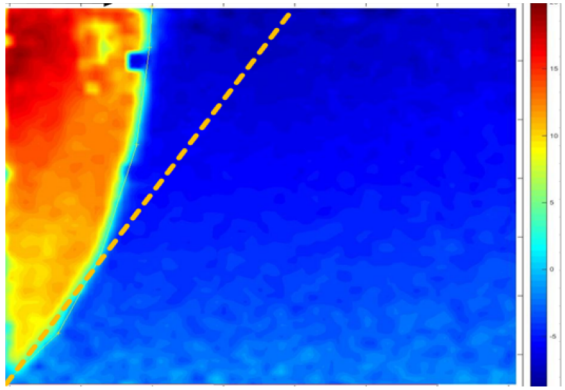
Research at BU – Civil Engineering

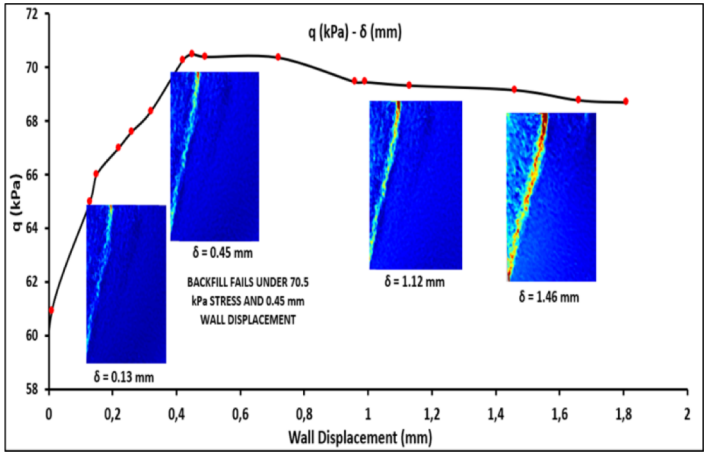
Research in Geotechnical Engineering

Laterally Loaded GeoStructures and Evolution of Granular Resistance

- Evolution of lateral resistance in granular bodies is investigated for retaining structures and piles:
  - Stress state and density are collectively defined using peak dilatancy
  - Peak dilatancy is quantified as a function of stress state, density and particle shape
  - Influence of dilatancy on shear banding is investigated

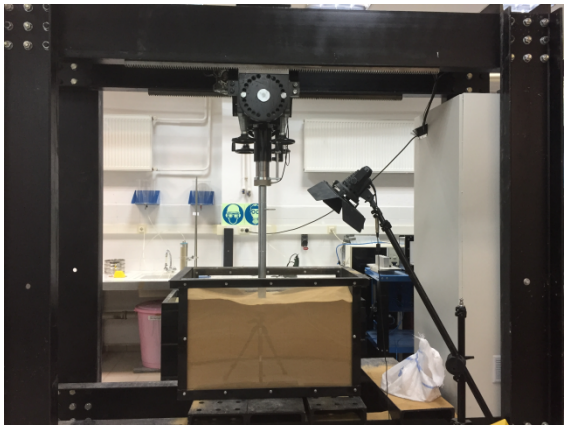


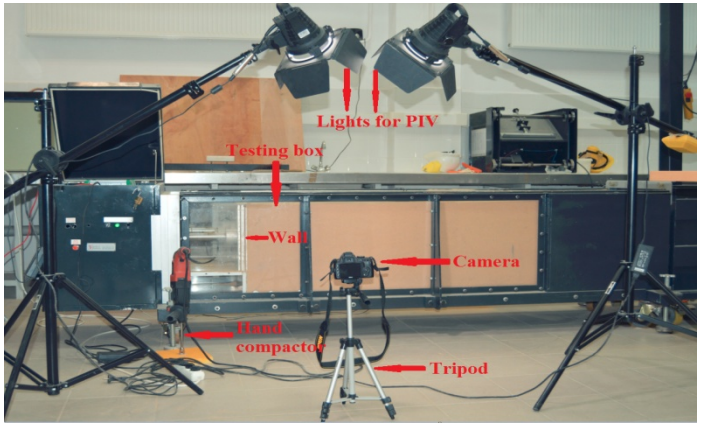


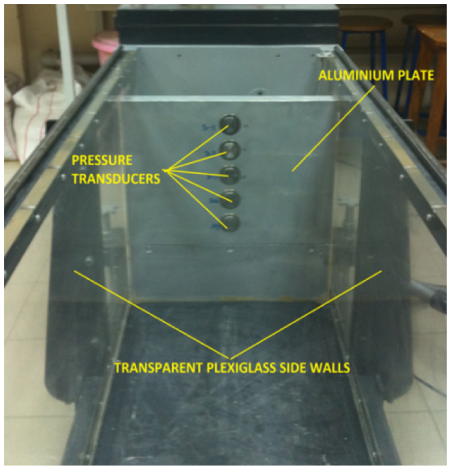


Laterally loaded piles and retaining structures

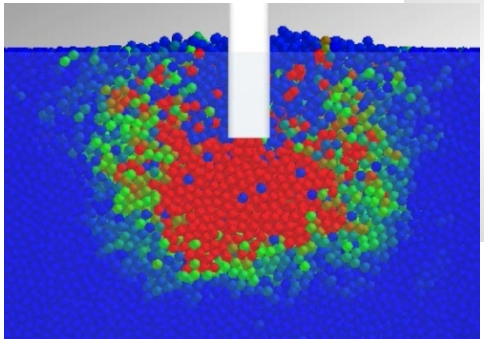
- **Physical modeling**

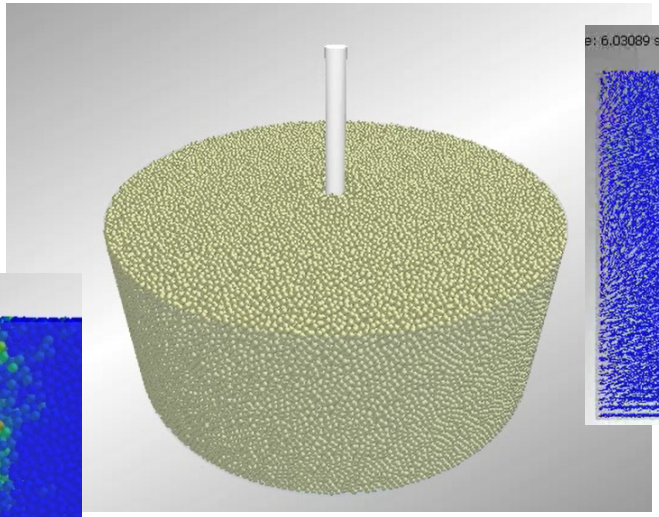


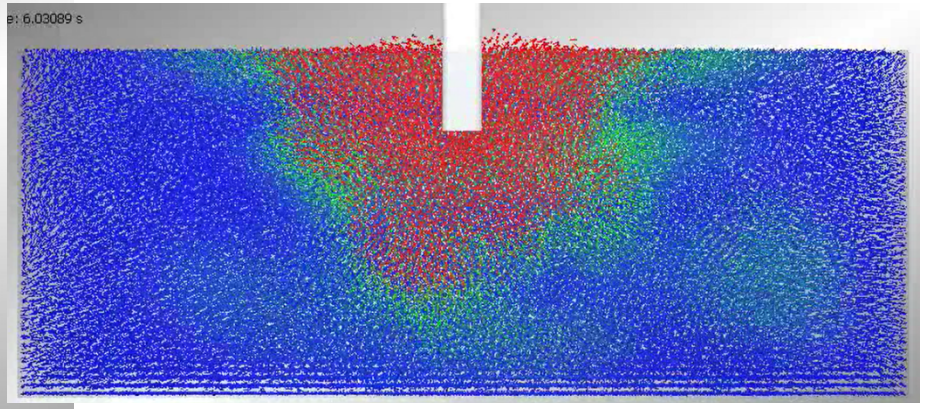




- **Discrete Element Modelling (evaluation of pile construction effects)**

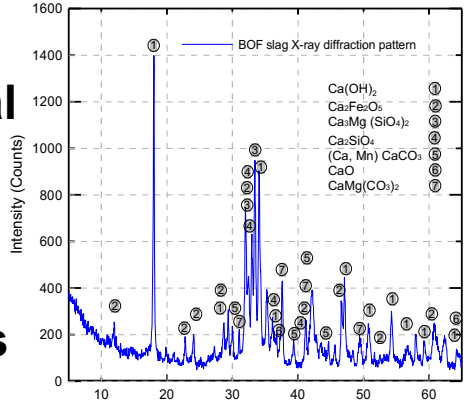


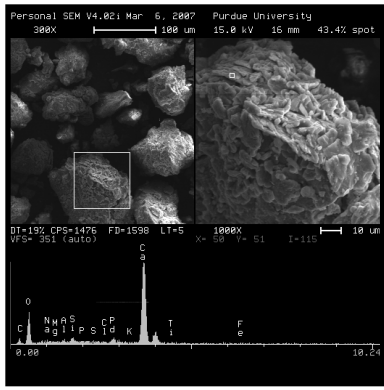




Sustainable Geotechnics

- **Recyclable Geo-materials:**
  - **Identifying industrial by-products (e.g., steel slag, fly-ash) and recyclable geo-materials (e.g., tire shreds)**
  - **Laboratory testing to determine material characteristics & mechanical properties**
  - **Developing new geo-mixtures**
  - **Determining sustainable applications**
  - **Field implementation & monitoring**





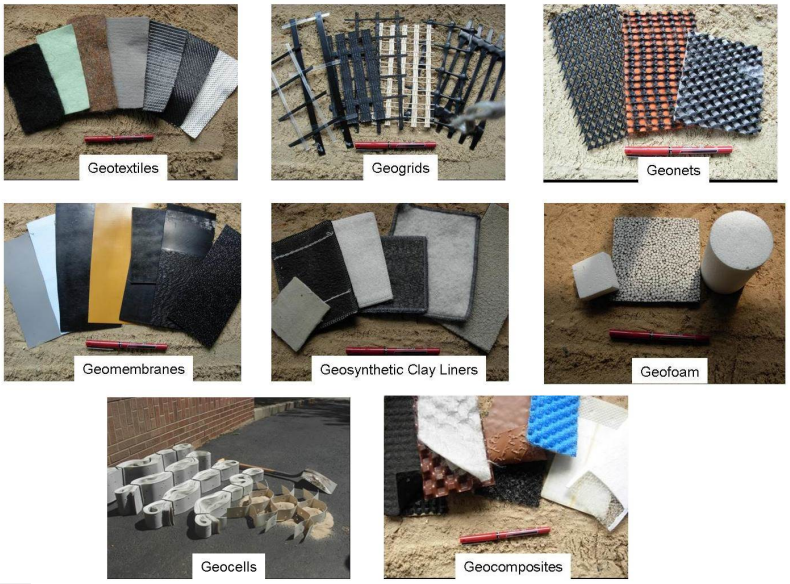
Particle mineralogy & morphology

Implementation

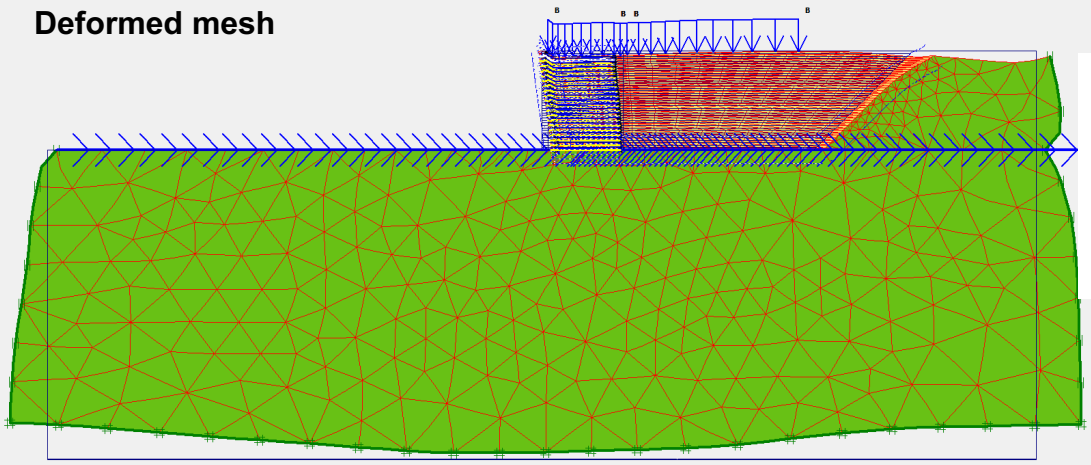
Mechanical behavior

Designing with Geosynthetics

- **Geosynthetics:**
  - **Laboratory testing of geosynthetics and geocomposites to evaluate their engineering properties and long-term performance**
  - **Model tests on GRS (Geosynthetic Reinforced Soil Wall) Systems**

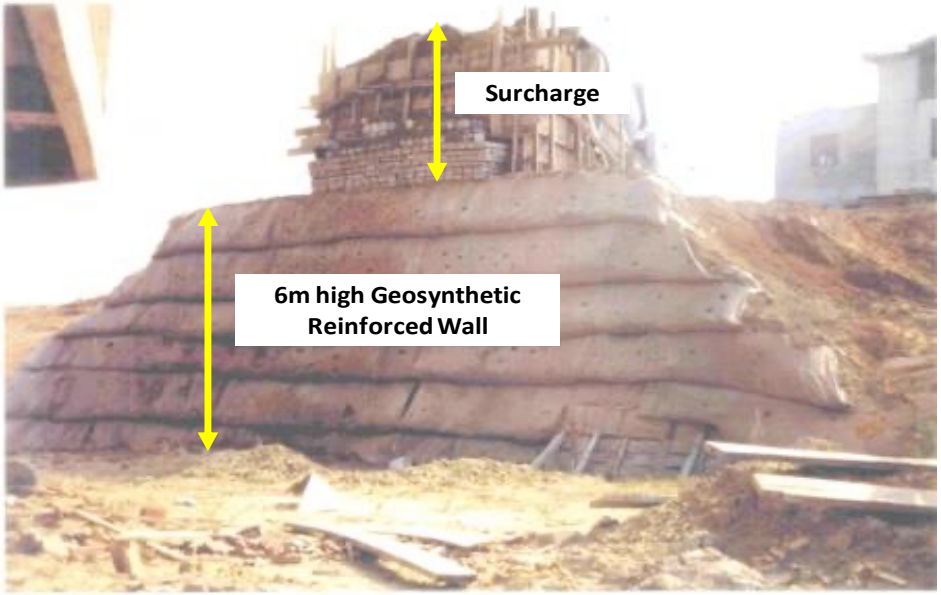


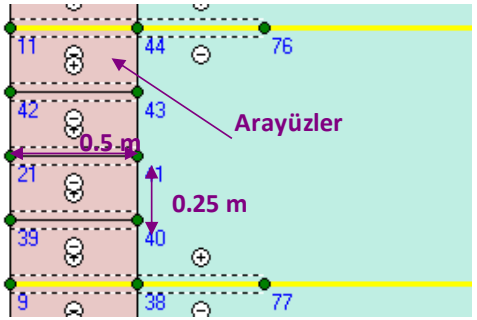
(Shukla et al. 2006)



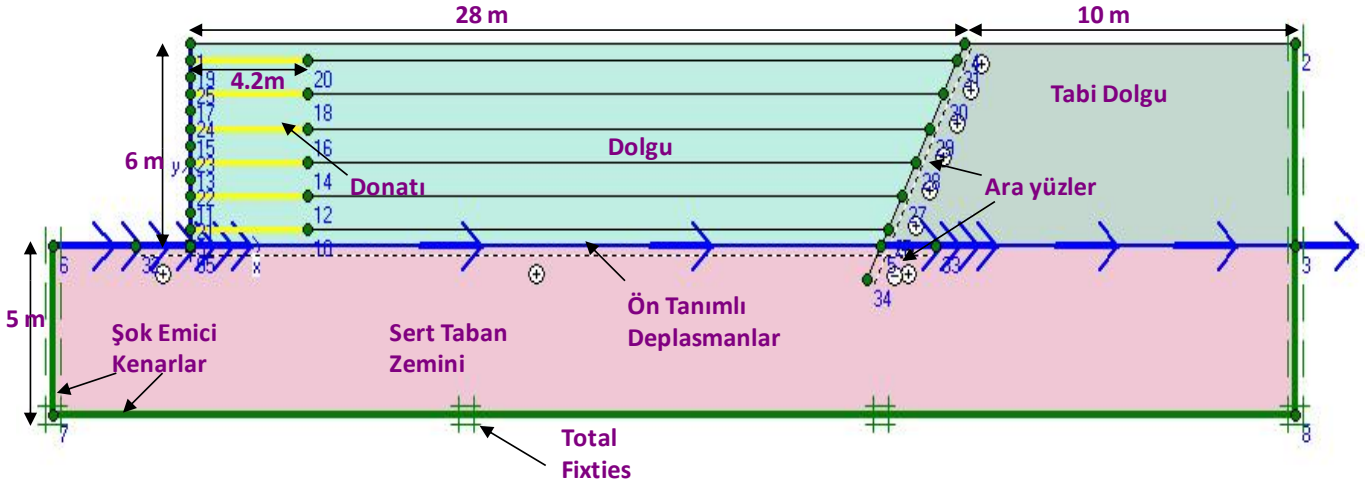
- **Numerical Modelling of Geosynthetic Reinforced Soil Wall (GRS) Systems**
  - **Seismic response of GRS wall systems using Plaxis (2D) Software**

Large-Scale Field Testing and FE Modeling of Geosynthetic Reinforced Walls

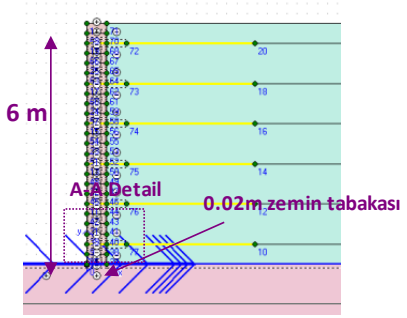




A-A Cross Section



FE Model used in the analyses

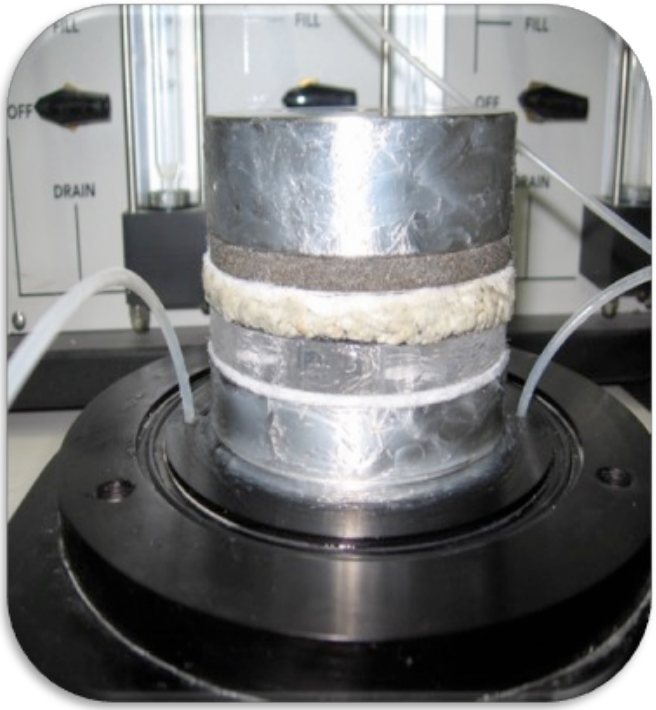


Moduler Facing Blocks

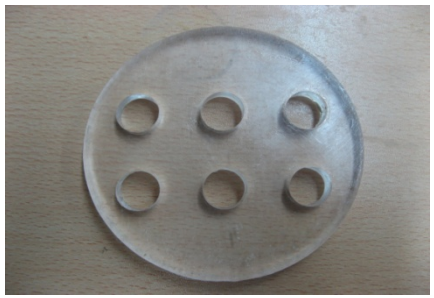
Shaking Table Tests on Geosynthetic Reinforced Retaining Walls

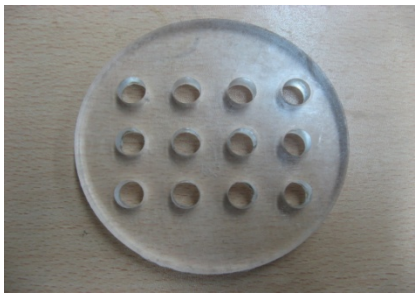
Experimental Studies on Internal Erosion of GCLs

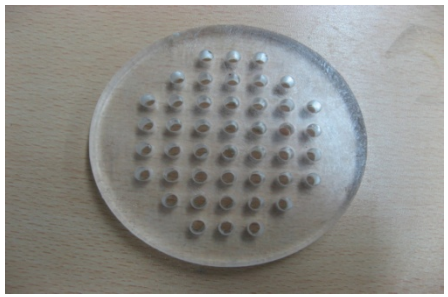
Base plate with 0.5 cm diameter holes



Assembled GCL Permeability setup

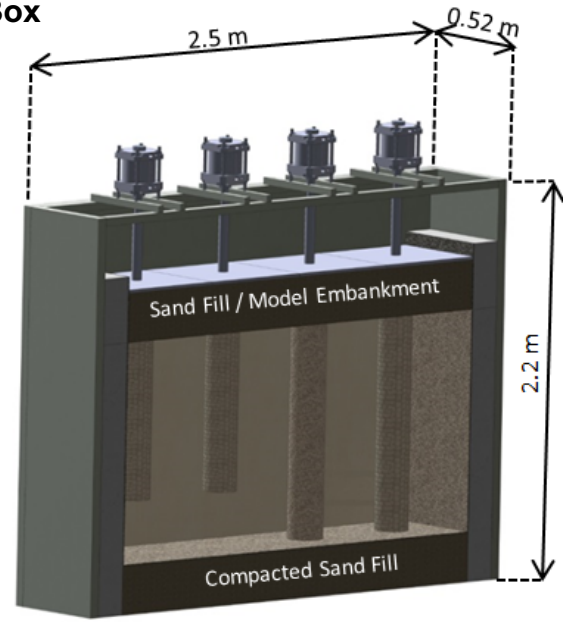


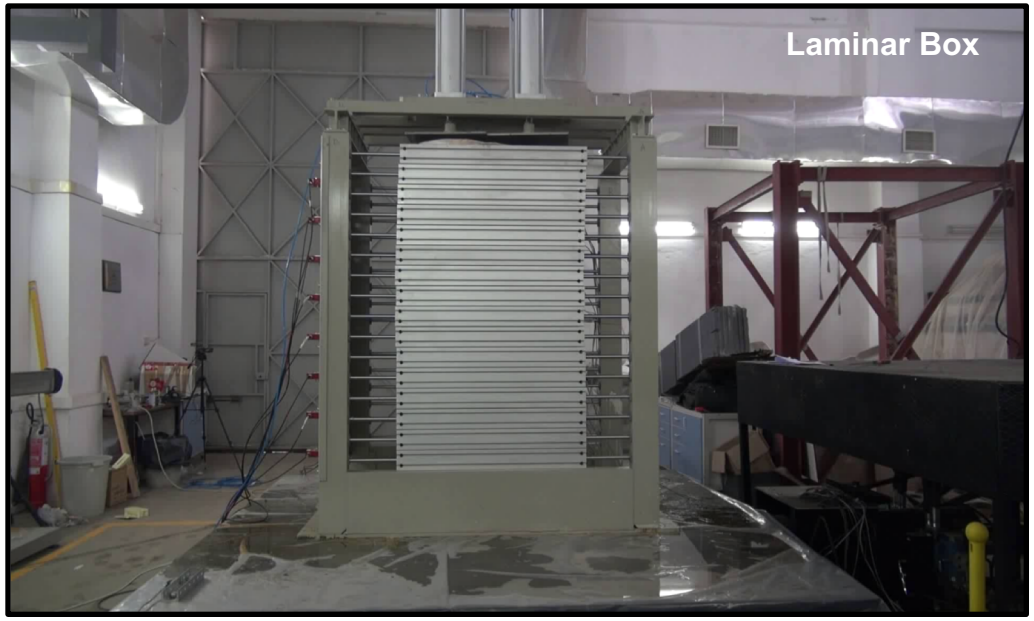


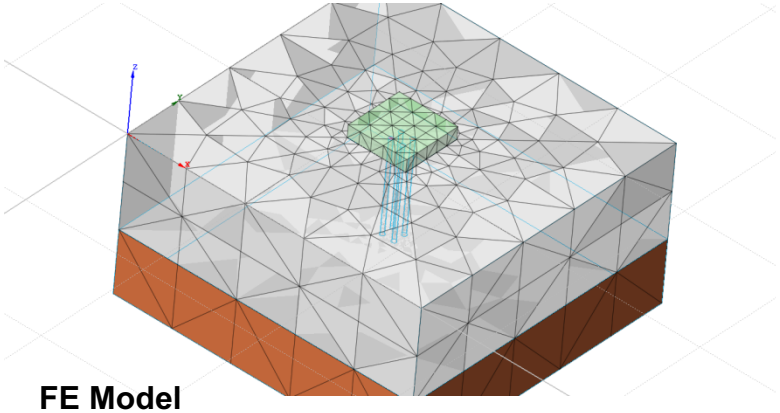


Shaking Table Tests on Geosynthetic Encapsulated Columns

Rigid Box

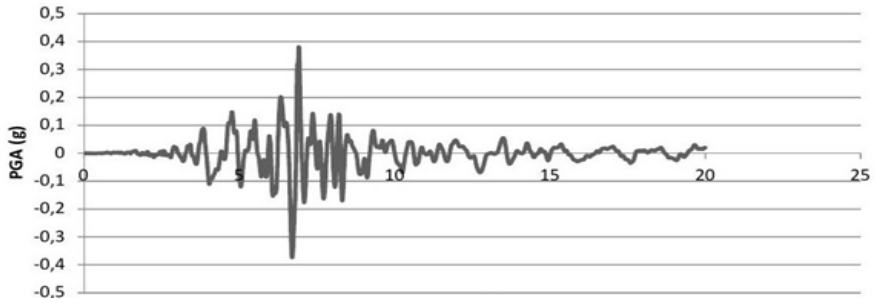




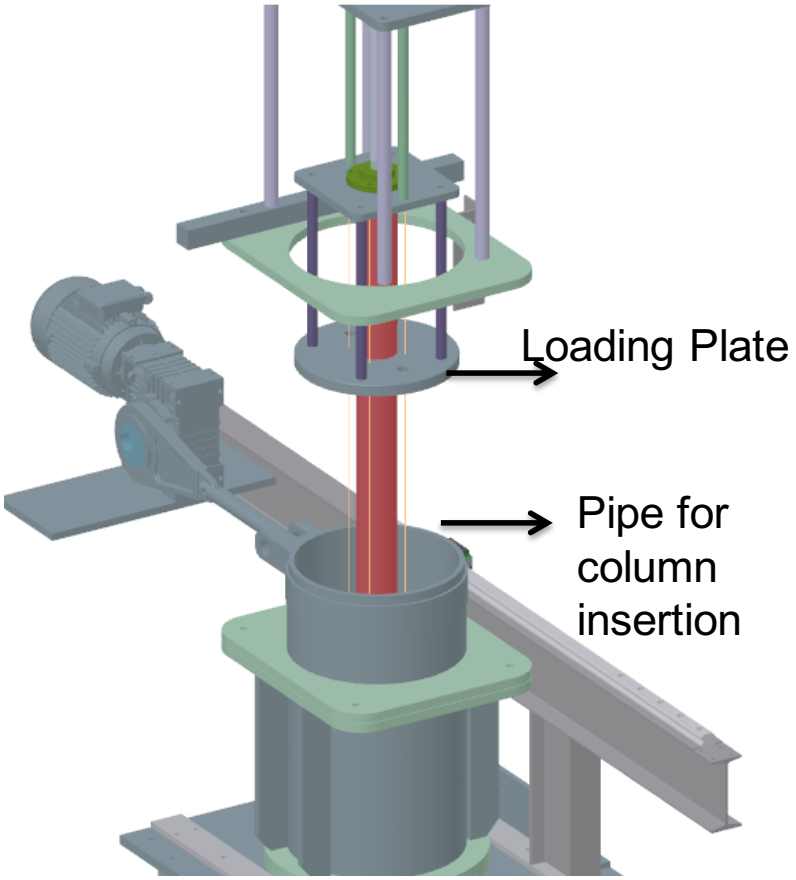


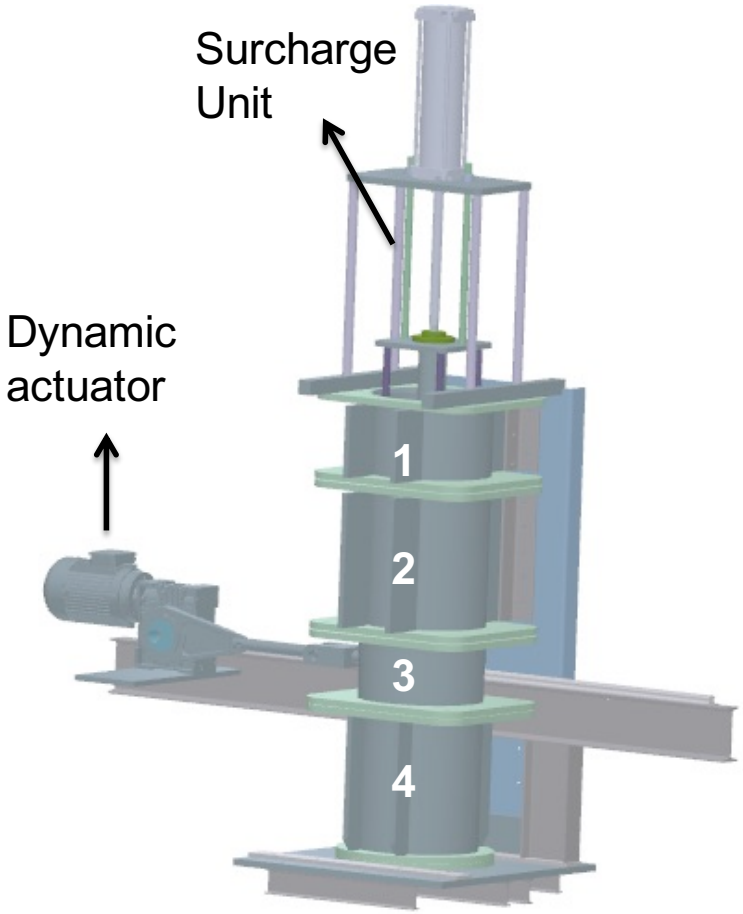
FE Model

Ground Motion Record



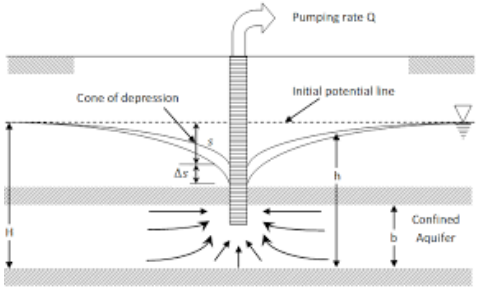
Unit Cell for Direct Shear Testing of Geosynthetic Encapsulated Columns

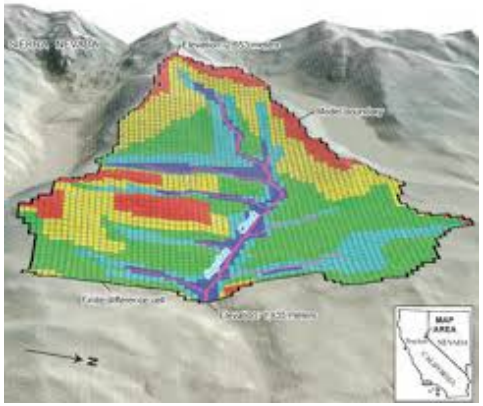


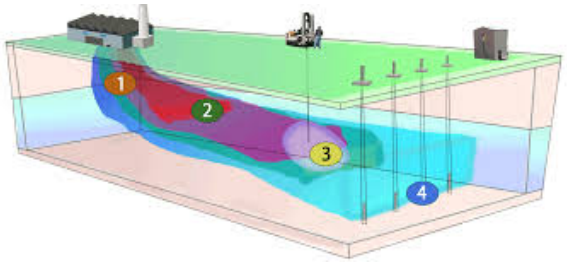


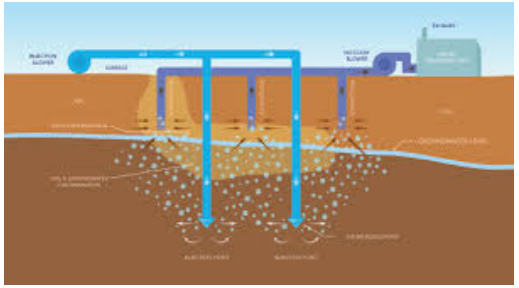
Ground Water Modeling

- Groundwater hydraulics: Analytical and Numerical Methods
- Site Assessment
- Finite difference and Boundary Element Method Usage
- Soil and Groundwater Remediation Assessment










Thank you