

# Comparison of pullout resistance between square-shaped geocell and geogrids

Geo-disaster Mitigation Engineering

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## Research Outline

Geogrids are commonly used as planar reinforcements to tensile-reinforce the backfill of retaining walls. However, the application of geocell as tensile reinforcement to these soil structures is relatively new due to the lack of related research. This study compares the pullout tests of **tensar SS-35** which are widely used in soil structures and a newly developed geocell models (**square-shaped geocell**) embedded in three kinds of gravelly soils.



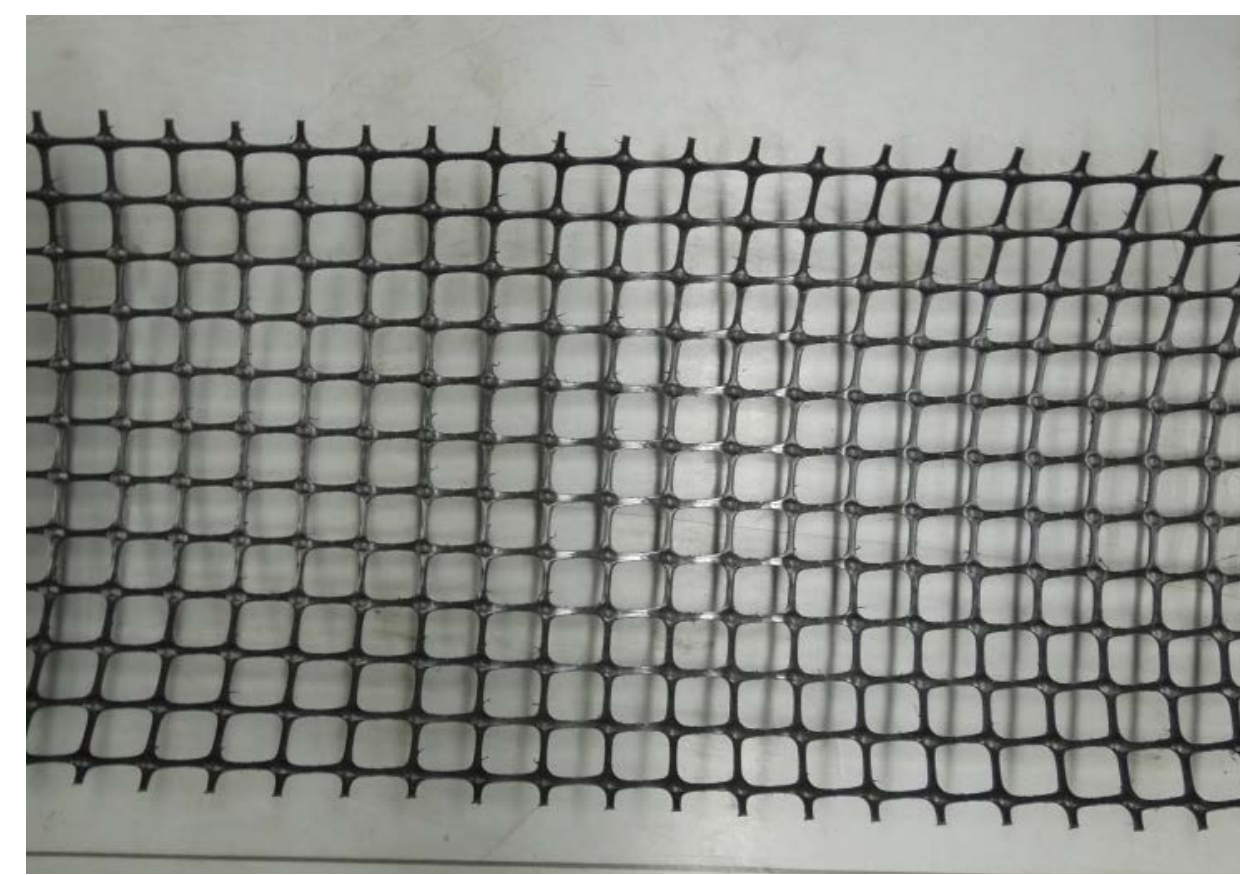
Gravel No.1 (3mm~5mm)



Gravel No.3 (7mm~10mm)



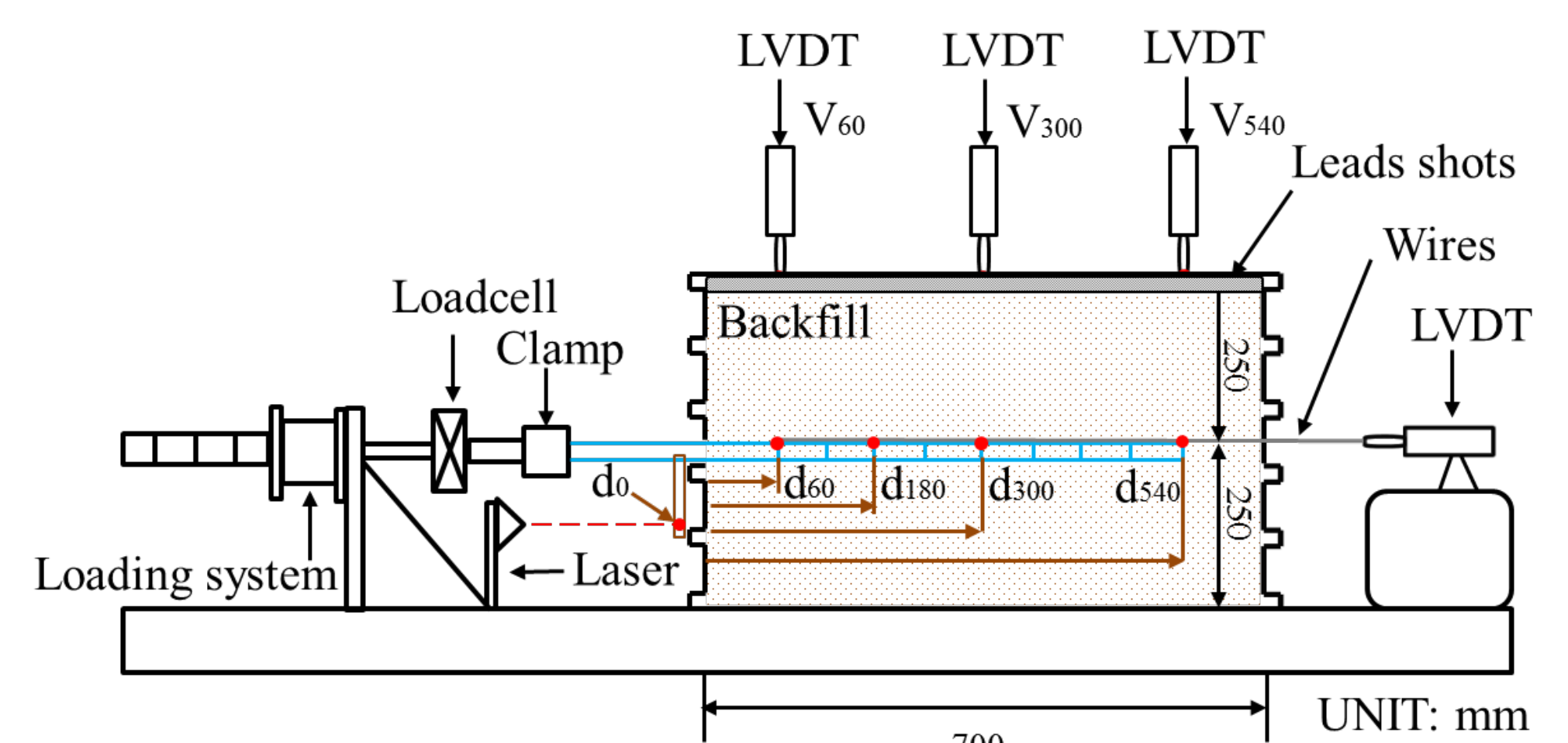
Gravel No.5 (12~20mm)



Tensar SS-35



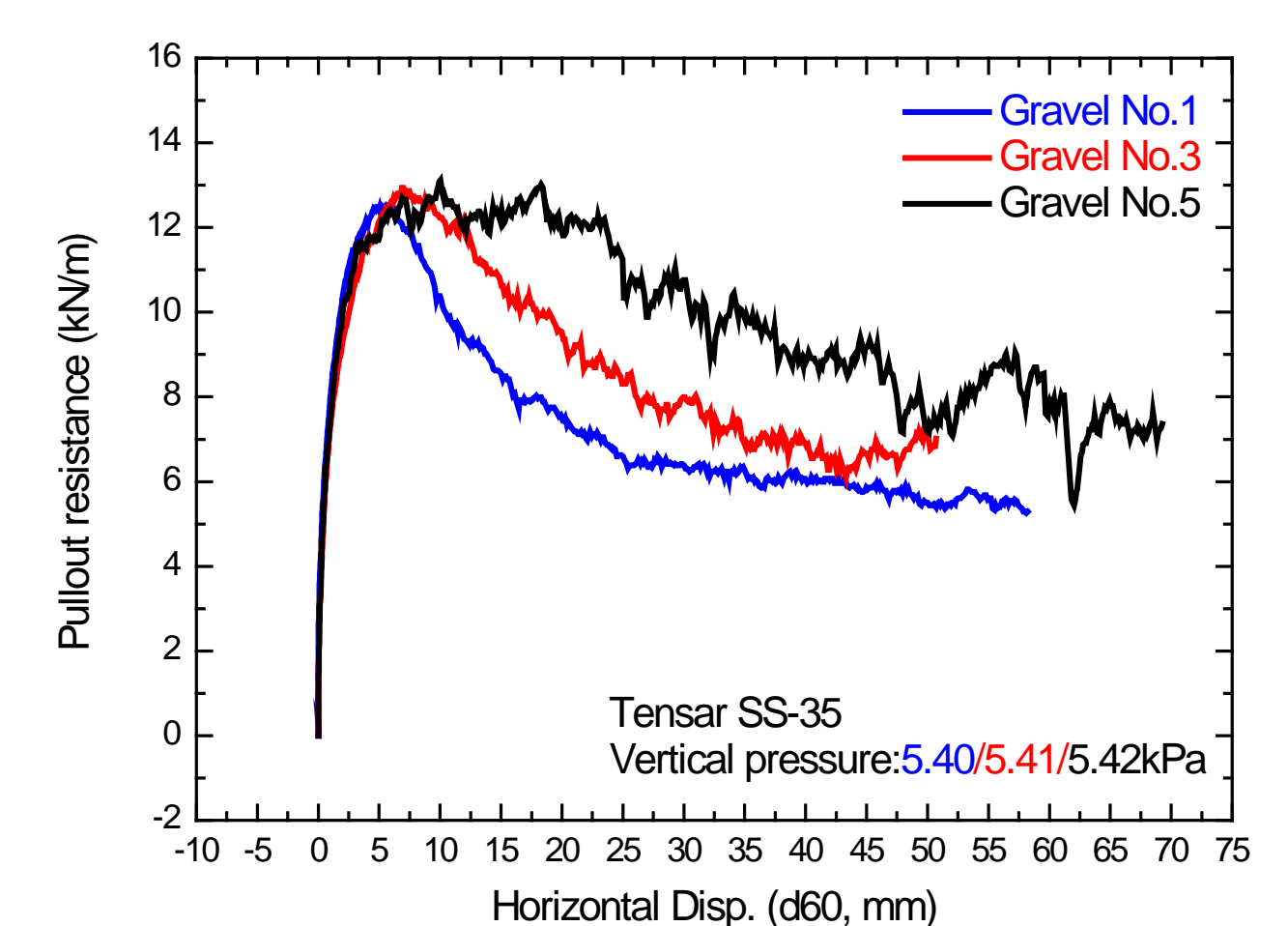
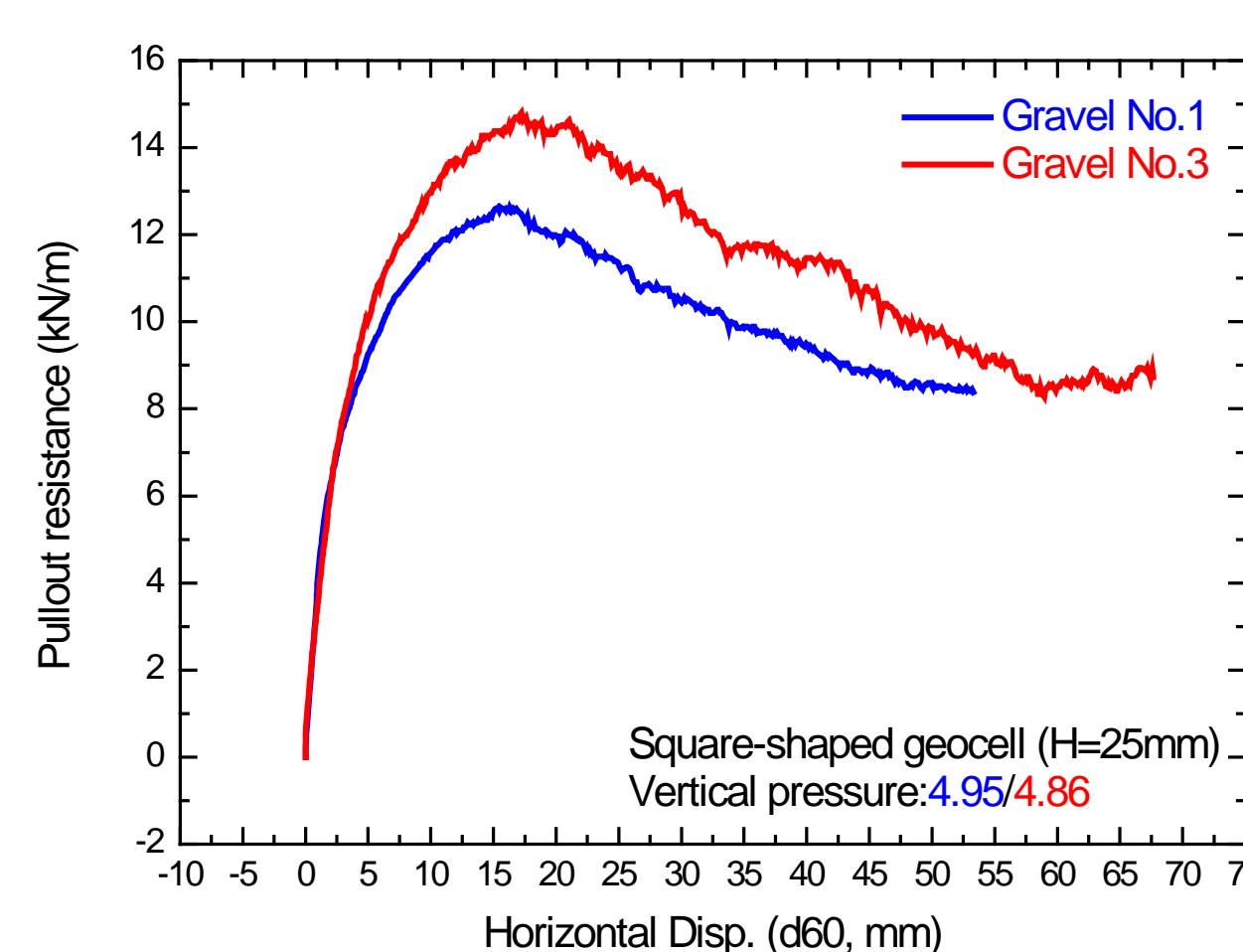
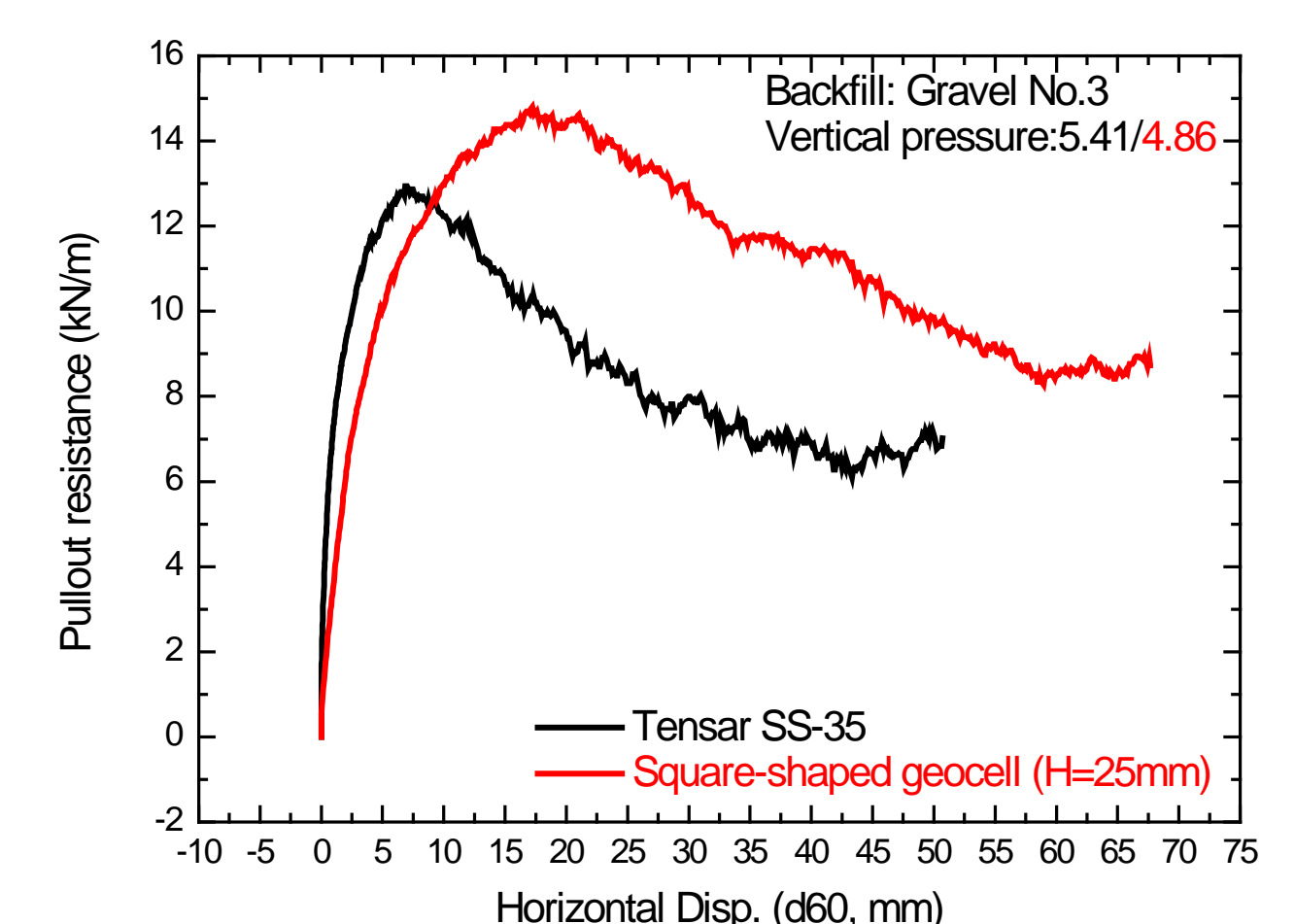
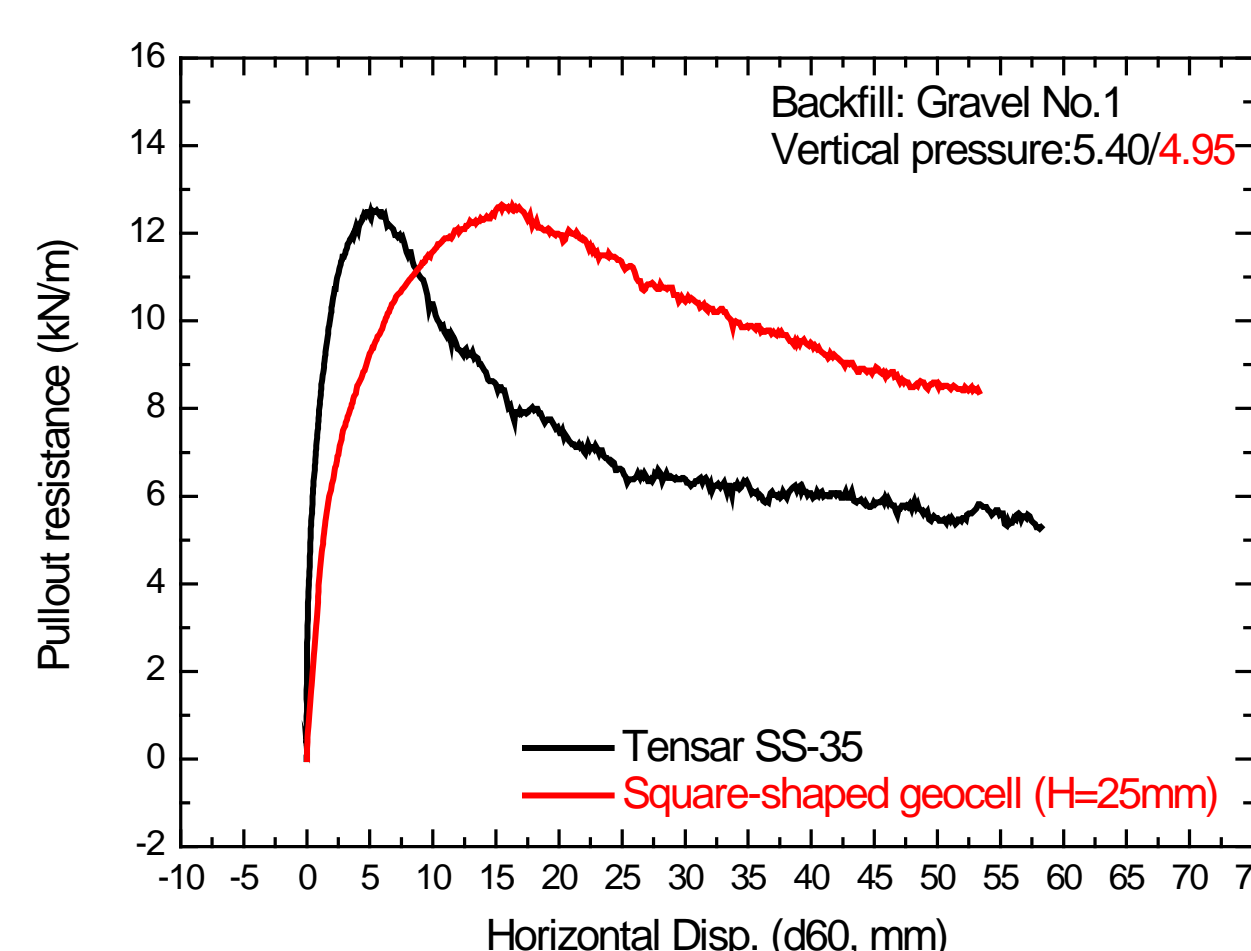
Square-shaped geocell (H=25mm)



Schematic diagram of pullout test apparatus

## Pullout Test Results

- ❖ For Gravel No.1, square-shaped geocell and tensar SS-35 show **the same peak resistance**, but tensar SS-35 exhibits higher initial stiffness while square-shaped geocell shows higher residual resistance.
- ❖ For Gravel No.3, the peak resistance of square-shaped geocell is **higher** than that of tensar SS-35, but initial stiffness is still lower.



Pullout resistance against horizontal displacements ( $d_{60}$ )

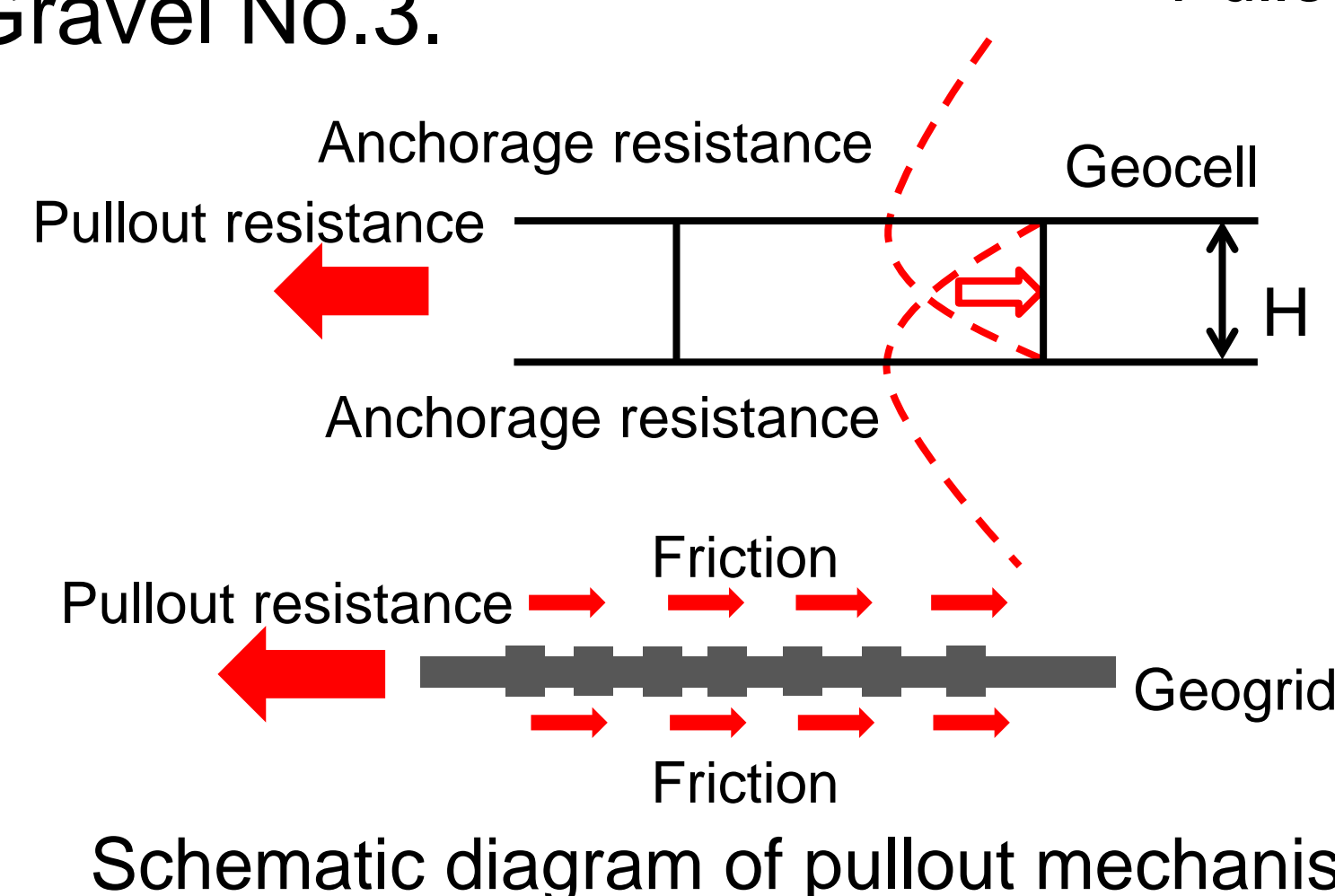
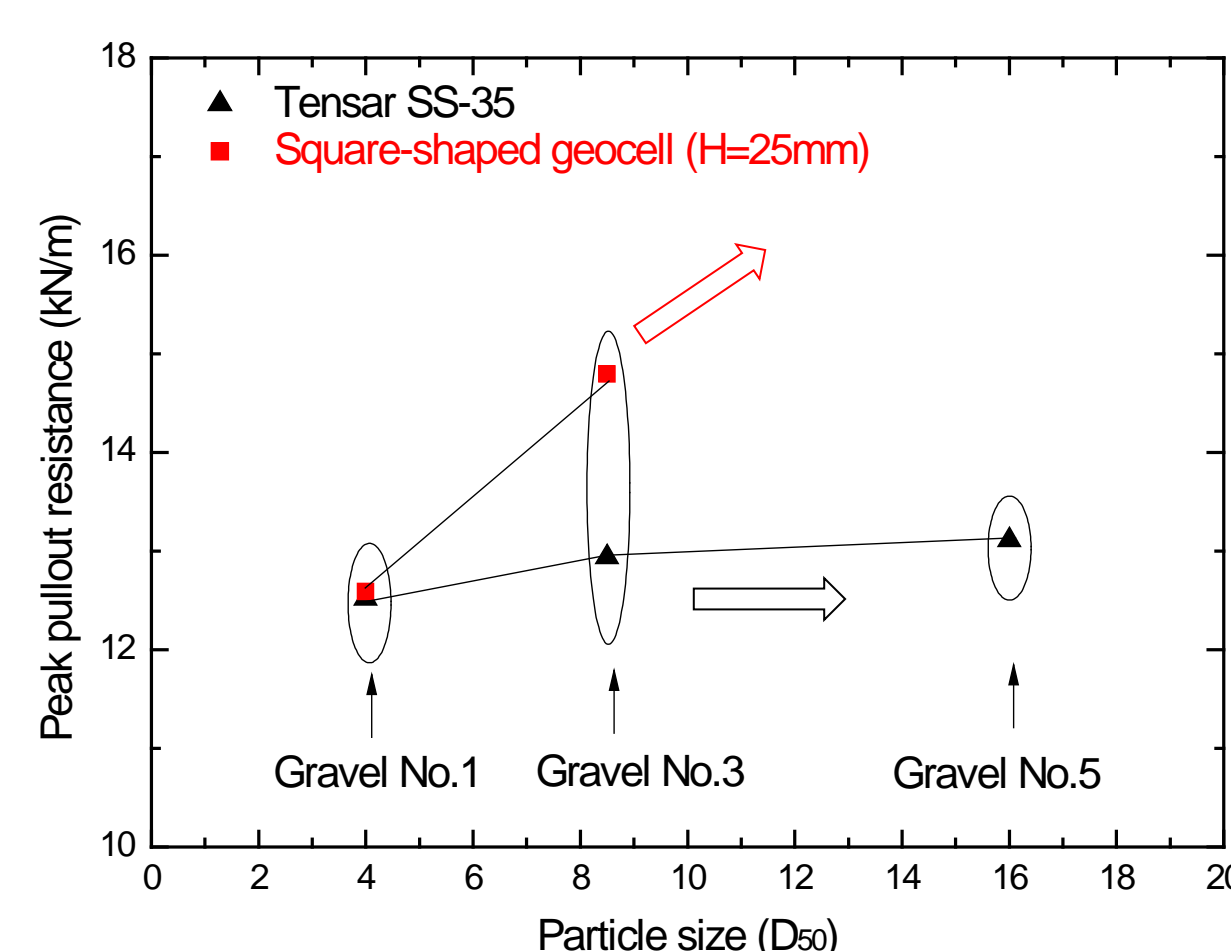
### ❖ Particle size effect

#### • Tensar SS-35:

The peak pullout resistance increases **slightly** with an increase in particle size from Gravel No.1 to Gravel No.5.

#### • Square-shaped geocell:

The peak pullout resistance increases **significantly** with an increase in particle size from Gravel No.1 to Gravel No.3.



Schematic diagram of pullout mechanism

### ❖ Pullout Mechanism of geogrids and geocell

- The resistance of geogrids mainly relies on **the friction** between geogrids and soil, while geocell can confine large particles in the cells exhibiting a large **anchorage effect**.

➤ **Square-shaped geocell can confine larger particles and provide corresponding higher peak anchorage resistance.**