



## GEOFABRICS CASE STUDY



# BUILDING A 330M LONG RETAINING WALL USING KEYSTONE TW3

## PRODUCTS USED

### KEYSTONE® TW3 WALL SYSTEM

- Widely used as a retaining wall solution for infrastructure works including bridge abutments, culverts, tunnel portal entrances and technically challenging retaining structures
- Easy installation with no cranes or propping required as the blocks are simply dry-laid, and their geometry allows curves, corners, stairs and other features to be easily constructed
- Cost-effective alternative to traditional retaining walls, offering both versatility and substantial savings in cost and construction time, especially high walls with high loads
- Uses a unique high strength positive connection system which securely locks the Tensar RE500 geogrid to the modular block face for the full utilisation of geogrid strength



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## PROJECT DESCRIPTION

Oakdale Industrial Estate is a large-scale precinct, located in western Sydney that forms part of the development project for the Western Sydney Employment Area (WSEA). Strategically situated near the M7 and M4 motorways, the development site consists of Oakdale Central, South, West and East with a total area exceeding 300 hectares. The estate will be used as a warehousing industrial hub to international companies such as online retailers, automotive users, logistic services and pharmaceutical products.

For grade separation of warehouse lots, multiple retaining walls were constructed across the development site with technical design support from Geofabrics.

## OUR SOLUTION

Geofabrics provided technical support to the design and build contractor, UCBC and their appointed designer, CMW Geoscience with a reinforced soil wall solution. The second Keystone TW3 retaining wall, located in Oakdale West was the longest wall constructed, exceeding 330m in length and a wall height ranging from 3m to 13.4m. The wall face area was approximately 2,000m<sup>2</sup> with 17,000m<sup>2</sup> of Tensar RE500 Series Uniaxial Geogrids installed. Due to the variation of heights, the Geofabrics technical team prepared 5 cross-section plan views for each height of the retaining wall that had different geogrid layouts for the contractor to incorporate into the drawings.

The reinforced soil retaining wall design was created with the TensarSoil software. The Keystone TW3 system uses a mechanical connector between the blocks and Tensar RE500 geogrid. This positive connection means the maximum geogrid tensile strength can be utilised at the connection interface at the modular block, enabling the geogrid spacing to be wider in comparison to frictional base connection block systems with different geogrid types. As a result, wider spacing was possible, (three Keystone TW3 blocks) which reduced the intervals of fill placement and overall geogrids quantity, allowing for a quicker build.

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## PRODUCTS USED

### TENSAR RE500 GEOGRIDS

- Manufactured from high quality HDPE which is resistant to soil wide range of chemicals and pH values commonly found in soil. It has a robust and damage-resistant structure, which makes them suitable for use with medium to coarse granular fill material
- BBA certified for use as soil reinforcement to construct reinforced soil structures with a design life of 120 years
- Excellent ability to interact with soil makes them superior in their resistance to pull-out even under shallow buried depth
- Integral junctions and stiff transverse ribs of the geogrids allow the use of purpose-made connectors to form positive connection to Keystone TW3 modular

Among the many challenges in this project, one of them was to incorporate a noise barrier wall that was at a close distance to the front face of the Keystone TW3 retaining wall. The foundation design of the noise barrier wall was addressed separately to the wall design, with deep poles that were slotted into corrugated pipes. The poles were embedded in the foundation and filled with grout to provide structural support for the noise barrier.

The top portion of the reinforced soil wall was designated as 'no geogrid zone' to allow for services. This was modelled as a top slope without geogrid in the TensarSoil software with an additional 20kPa surcharge load on the slope portion to make up on the soil and blocks self-weight. The 1m top portion between the TW3 block face and noise barrier wall is further strengthened with no fines concrete and 2 layers of geogrid at 2m length.

Wall exceeds  
**2000m<sup>2</sup>**  
face area

**330m**  
length with  
max. height of  
**13.4m**

**17,000m<sup>2</sup>**  
Tensar Uniaxial  
Geogrids used



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