

CASE HISTORY

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SUSTAINABLE REPLACEMENT OF A FAILED STONE MASONRY RETAINING WALL WITH GABION RETAINING STRUCTURES AT THE FACTORY PREMISES OF GREENLAND PARTICLE BOARDS PRIVATE LIMITED, PERUMBAVOOR, ERNAKULAM, KERALA
ERNAKULAM, KERALA, INDIA



Retention works

Client:	Products used :
GREENLAND PARTICLE BOARDS PVT LTD.	• TECHFAB METAL GABIONS • TECHGEO NONWOVEN GEOTEXTILE PR25
Contractor:	
GREENLAND PARTICLE BOARDS PVT LTD.	
Manufacturer & Supplier:	Year of construction
TECHFAB (INDIA) INDUSTRIES LTD.	2024

Project brief & Problem Description:

Greenland Particle Boards Private Limited, a leading manufacturer of wood-based particle boards in India, is located in Perumbavoor, Ernakulam District, Kerala. During the development of a new building within the factory premises, a critical failure occurred in the existing stone masonry retaining wall, which was originally constructed to support the surrounding terrain. The wall, ranging from 6 to 7 meters in height and extending approximately 58 meters, suffered a collapse over a 40 - 45 meter stretch due to a sudden surge in loading.

The failure was attributed to excessive pressure caused by the presence of heavy construction machinery, large stockpiles of building materials, and increased workforce activity. The sudden surge in load surpassed the structural capacity of the stone masonry retaining wall, leading to its failure. The proximity of the superstructure, located just 11 meters away, heightened the risk of further structural compromise, making an immediate and effective solution imperative.

The potential failure of the stone masonry retaining wall could impact the foundation of the adjacent structure, potentially leading to the failure of the superstructure. Therefore, replacing the existing retaining wall with a sustainable and cost-effective solution was a top priority and needed to be executed promptly. This solution needed to ensure long-term resilience, cost-effectiveness, and ease of construction while mitigating further risks and reinforcing the foundation for ongoing and future developments at the site. A well-engineered solution was essential to withstand future load surges, enhance site safety, and provide a durable, low-maintenance alternative capable of adapting to varying ground conditions and environmental factors.

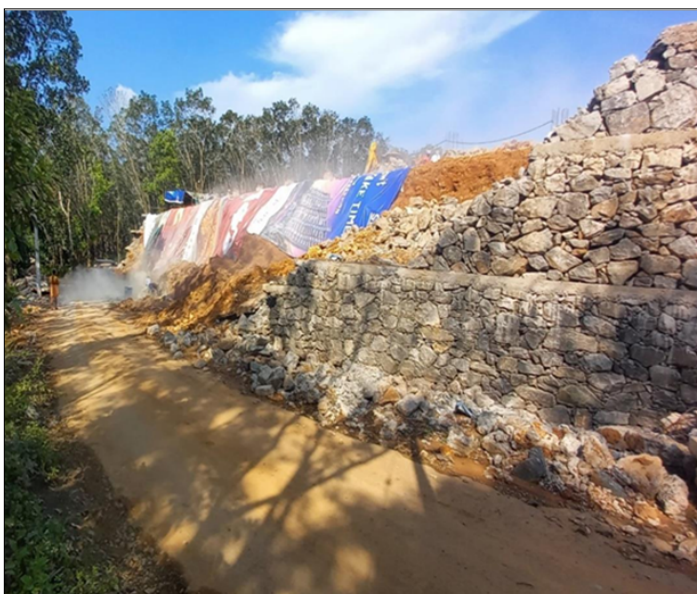


Photo 1 & 2 : View of the Collapsed Existing Stone Masonry Retaining Wall

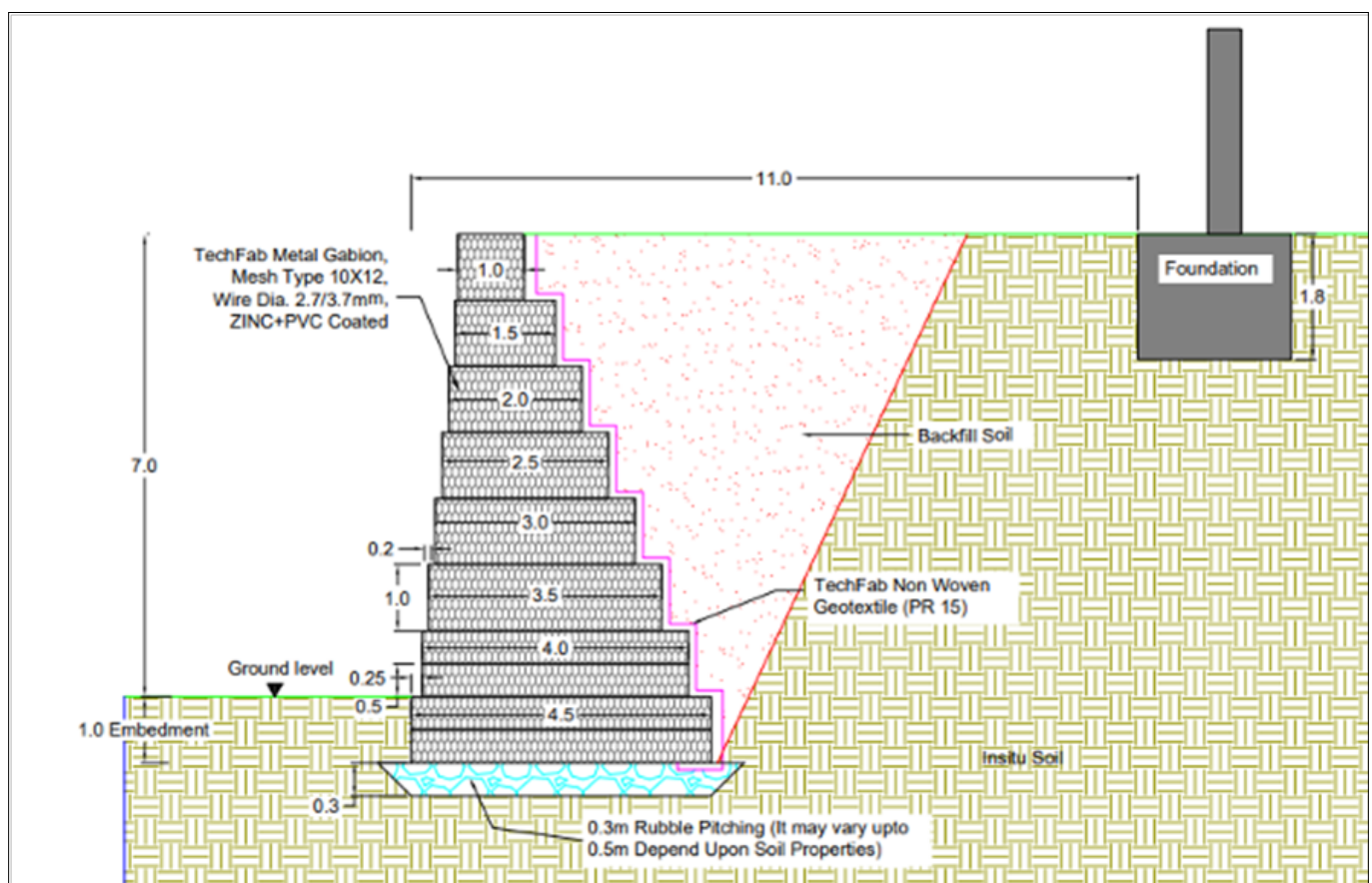
Solution Proposed:

After analyzing the situation and urgency of the project, TechFab India proposed a Gabion Gravity Retaining Wall (TechFab Metal Gabion, shown in Cross Section Drawing below) as a replacement for the failed stone masonry retaining wall. The proposed wall heights were 7m (6m AGL + 1m embedment depth) and 8m (7m AGL + 1m embedment depth).

Gabion gravity retaining walls are one of the quickest and most economical solutions for sudden retaining wall failures in a short period. Their flexible, permeable, and durable nature makes them highly suitable for soil retention and structural protection. The gabions, constructed using woven wire mesh baskets filled with locally available boulders, offer both structural integrity and cost efficiency. Additionally, gabion construction is fast and can be executed using unskilled labor, further reducing costs and ensuring swift completion.

To enhance drainage and filtration, TechGeo Nonwoven Geotextile PR 25 was installed behind the gabion wall. This geotextile prevents soil migration while allowing water to pass through freely, thereby maintaining wall stability and preventing erosion.

This solution not only met technical demands for slope stabilization and erosion control but also aligned with the environmental and aesthetic needs of the region. Most importantly, the project was completed in a short time, ensuring minimal disruption to factory operations and safeguarding adjacent infrastructure.



Cross Section Drawing of Proposed Solution

Benefits of TechFab Metal Gabion over Conventional Retaining Wall on site:

TechFab Metal Gabion was suggested for retaining and erosion control purposes in lieu of the conventional Retaining Wall for achieving the following advantages:

- Flexible structure which can accommodate differential settlement.
- Free draining structure with no pore pressure development behind wall.
- Easy in construction, as it does not require skilled labourers.
- Eco-friendly, as the vegetation growth over it, is compatible with surrounding environment.
- Does not corrode under areas which are in constant / partial submergence.
- Cost incurred is very less compared to other retaining walls and depends only on the local availability of boulders.

Benefits of TechGeo Nonwoven Geotextile:

- Acts as a “Filter” by preventing the backfill material from being washed out through Gabion face.
- Acts as a “Separator” between the backfill material and the Gabion fascia and thereby prevents the mixing of the tow.



Photo 3 : After Completion of Project



Photo 4 : Completed Structure

Conclusion:

The project was successfully completed in June 2024, before the monsoon, and is performing as intended to the satisfaction of both the client and contractor. This reflects TechFab India's commitment to eco-friendly engineering solutions that ensure structural stability while preserving the environment.

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