

CASE HISTORY

Rev:00, Date : 04.02.2026

SLOPE MITIGATION MEASURES FOR THE PROTECTION OF HEAVY WATER TANK OVER VULNERABLE HILL SLOPE IN GUWAHATI, ASSAM

GUWAHATI, ASSAM, INDIA

Slope Protection

Client:	Products used :
GUWAHATI METROPOLITAN DEVELOPMENT AUTHORITY (GMDA)	• TECHFAB METAL GABIONS • TECHGEO NONWOVEN GEOTEXTILE PR25 • TECHSLOPE MESH • TECHANCHOR & TECHMAT EROSION CONTROL MAT
Contractor:	
Manufacturer & Supplier:	Year of construction
TECHFAB (INDIA) INDUSTRIES LTD.	2025

Project brief & Problem Description:

The Guwahati Metropolitan Development Authority (GMDA), Government of Assam, has undertaken major water supply infrastructure projects to ensure an affordable, reliable, and continuous 24×7 pressurized water supply to the Guwahati Metropolitan Area (GMA). As part of this initiative, a critical water storage tank has been constructed at the top of a hill in the western zone of Guwahati, within a region characterized by steep terrain and complex geotechnical conditions.

The project site lies in Seismic Zone V, indicating very high seismic vulnerability, and is subject to intense monsoon rainfall, flash floods, and significant surface runoff. The steep hill slope located downhill of the heavy water tank has experienced progressive erosion due to runoff, loose soil detachment, and the surcharge load imposed by the water storage tank, leading to the formation of cavities and exposed slope faces. These conditions raised serious concerns regarding slope instability and potential failure, posing a threat to the water tank, nearby infrastructure, and public safety.

Additionally, the presence of overhanging rock formations further increased the risk of rock detachment and sliding, endangering lives and properties located at the toe of the slope. Space constraints, difficult access, and seismic considerations limited the feasibility of conventional rigid retaining structures, necessitating an effective, flexible, and resilient slope mitigation solution to stabilize the vulnerable hill slope and ensure long-term safety and performance of the water supply infrastructure.



Photo 1 : View of Exposed Slope experiencing erosion and cavity due to loose soil detachment

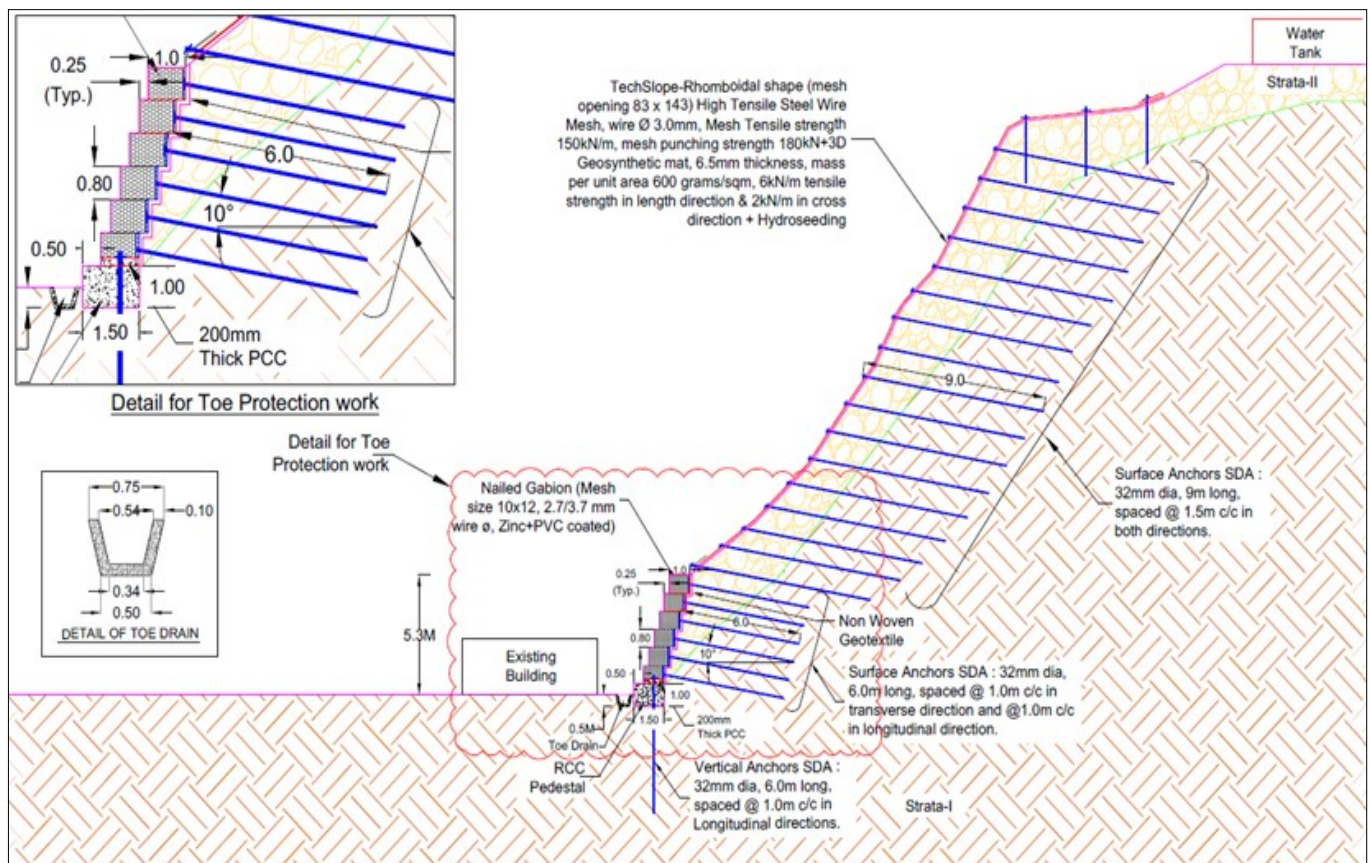
Solution Proposed:

To ensure global and local stability of the vulnerable hill slope supporting the heavy water storage tank, TechFab India suggested an integrated slope stabilization solution combining structural reinforcement, erosion control, and bio-engineering measures.

Due to challenging site conditions, economic considerations, and Right of Way (ROW) constraints, reprofiling of steep slopes involving large-scale excavations was not feasible. However, localized slope profiling and removal of overhanging portions were recommended wherever required.

Owing to severe space constraints at the toe of the hill slope, a 4.8 m high nailed gabion structure was proposed as a toe protection measure along the hill-side road level to resist potential undercutting at the base. The structure was constructed over an RCC pad and anchored using 32 mm diameter Self Drilling Anchors (SDAs) of 6.0 m length, installed vertically at the bottom in one row and inclined at 10° to the horizontal for each 0.8 m high gabion layer, with anchors spaced at 1.0 m centre-to-centre in the longitudinal direction.

To mitigate associated geotechnical risks, a secured drapery system using soil nailing with 32 mm diameter SDAs of 9.0 m length, spaced at 1.5 m centre-to-centre in both directions, was provided along with a flexible fascia comprising Techslope High Tensile (HT) steel wire mesh. To restrict surface erosion and support ecological restoration, a 3D geosynthetic mat in combination with hydro-seeding and bio-engineering measures was adopted to promote vegetation growth over the protected slope surface.



Cross Section Drawing of Proposed Solution

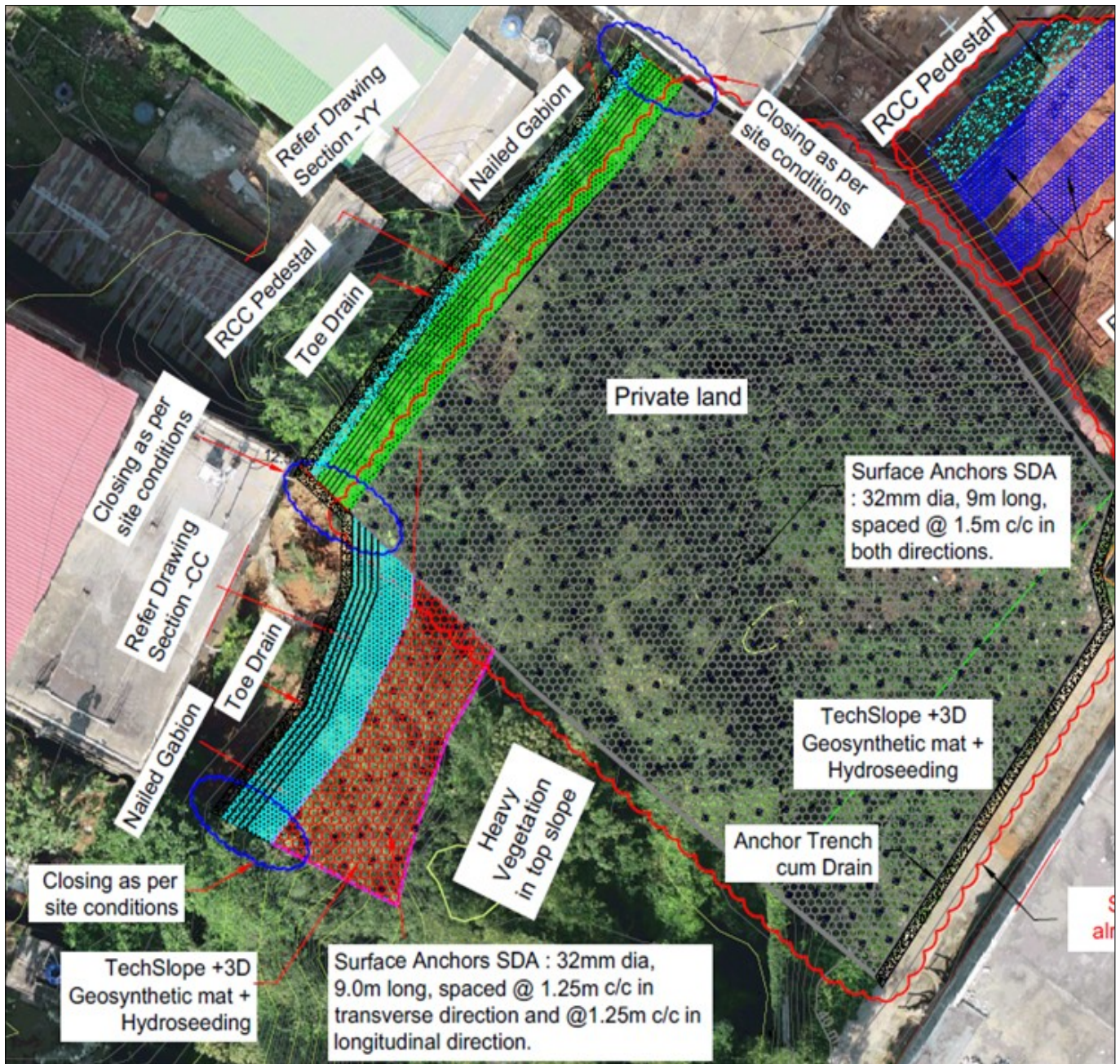


Photo 2 : Plan of Slope mitigation measures

The proposed slope mitigation layout demonstrates TechFab India's strong technical capability and deep expertise in geohazard mitigation and slope stabilization projects. Through detailed site assessment, design optimization, and selection of appropriate protection systems, TechFab suggested a tailored solution suited to complex terrain, seismic sensitivity, and severe space constraints. With proven experience in executing challenging hill-slope projects across diverse geological conditions, TechFab provided a reliable, innovative, and sustainable solution for safeguarding critical infrastructure in this project.



Photo 3 & 4 : Completed Installation of Slope Mitigation measures safeguarding the slope and adjoining infrastructure



Photo 5 : Completed Structure

Conclusion:

The stabilization measures were successfully executed, and the system is performing effectively, ensuring long-term stability of the slope beneath the water tank. The completed mitigation works efficiently safeguard the slope and adjoining infrastructure from erosion and movement. The client expressed complete satisfaction with the solution and its performance.

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