

TWO-TIERED REINFORCED SOIL WALL AT BIMALGARH ROB

ODISHA, INDIA

Reinforced Soil Wall

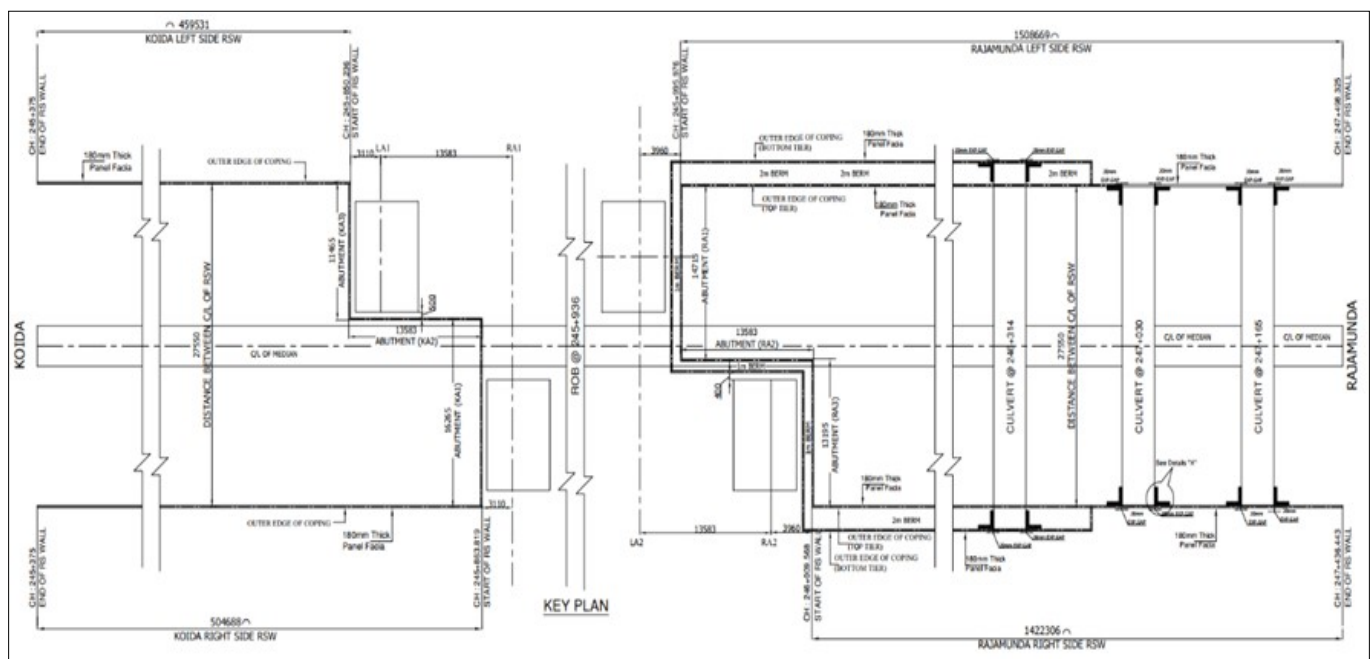
Client:	Products used:
NHAI	• TECHGRID UNIAXIAL GEOGRID
Main contractor:	
M/s. KMC - RKD (JV)	
Manufacturer & Supplier:	Year of Construction:
TECHFAB (INDIA) INDUSTRIES LTD.	2024

Project Brief & Problem Description:

The development of a country's infrastructure is vital to the growth of its sectors and the overall economy. The infrastructure sector primarily comprises roads, railways, ports and airports, telecommunications, irrigation, water supply and sanitation, electricity, storage facilities, and oil and gas pipelines. Road & Highways account for the highest share in infrastructure sectors followed by railways and urban public transport.

The project entails the rehabilitation and upgrading of the existing two-lane road to a four-lane highway, covering a 53 km stretch from Koida to Rajamunda on NH-215 (renumbered as NH-520) under the National Highways Development Project (NHDP) scheme. Awarded to M/s. KMC – RKD (JV), this initiative aims to boost connectivity, safety, and traffic efficiency in the region, which is vital for the transportation network in Odisha.

One of the critical structures along this section is the Road Over Bridge (ROB) at Bimalgarh, located at chainage 245+936. The ROB was developed to provide uninterrupted passage over an existing railway line, eliminating the delays and hazards associated with level crossings. Given the high volume of industrial and commercial traffic in the area, the ROB at Bimalgarh is a vital infrastructure upgrade, ensuring safer and faster transportation for both local and long-distance traffic. This bridge not only enhances the efficiency of travel on NH-520 but also supports the socio-economic growth of nearby regions by facilitating smoother movement of goods and people, aligning with NHDP's objective of providing a modern and sustainable roadway network in India.



Key Plan of ROB at Chainage 245+936 of Koida to Rajamunda Section

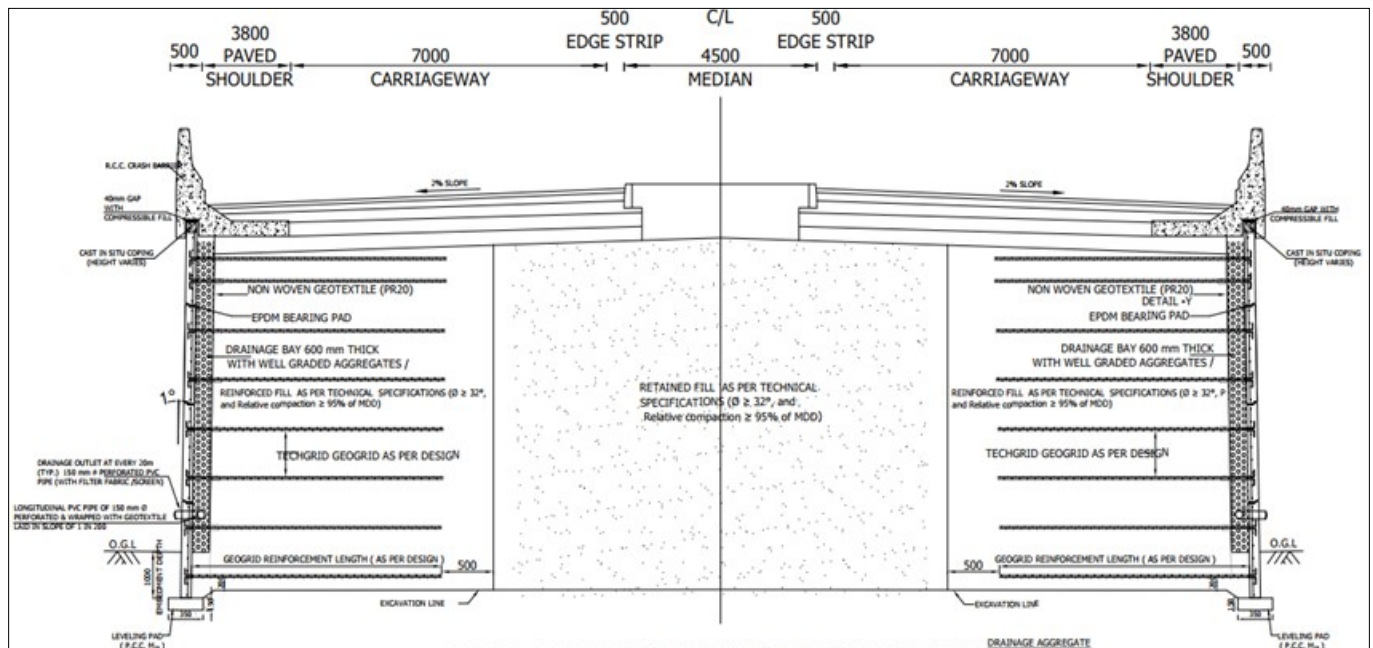
Solution:

TechFab India Industries Ltd. provided a reinforced soil wall (RSW) solution to address the significant height differences between the Koida (A1) and Rajamunda (A2) sides of the structure. Due to the height exceeding 15 meters on the Rajamunda side, as per IRC SP: 102-2014 guidelines, an intermediate berm was required.

The RSW with two types of height class were proposed at Bimalgarph ROB chainage 245+936:

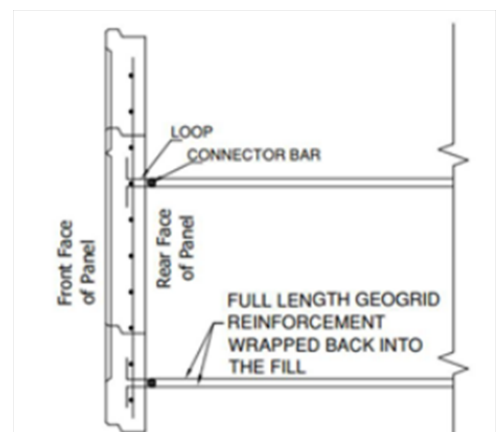
- (a) 15.6 m of maximum height of single tier RSW at Koida side
- (b) 22.8 m of Maximum height of two tiered RSW at Rajamunda side with 2 m wide berm

The connection between the RSW panels and geogrids was achieved using a loop and toggle connection system, ensuring effective reinforcement and stability. This design not only met the project requirements but also provided a durable and efficient solution for the challenging topography of the site, ensuring the long-term performance of the structure.

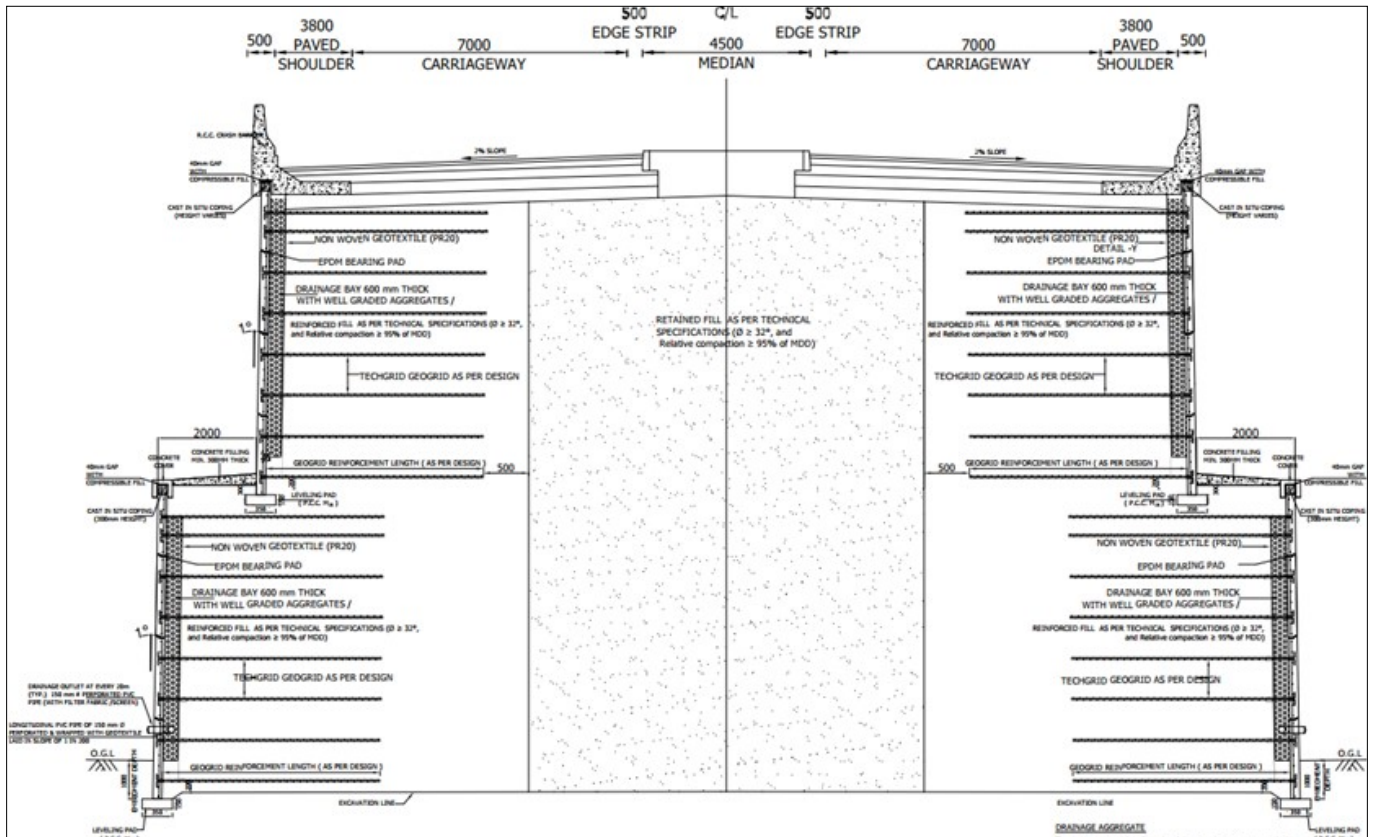


Typical cross-section of single tier RSW at Koida side up to height 15.6 m

The stability of an RSW depends on the following factors: The geotechnical properties of the foundation soil, embedment for RSW, the presence of water table in the sub-soil, infill soil materials, quality of compaction and drainage, surcharge loads, type of reinforcement, and seismic zone. RSW with T-panel was designed based on prevailing codal guidelines considering all the above factors. The geogrids were intended as a reinforcement of backfilling in this RSW. A drainage bay 600 mm thick with well-graded aggregates was suggested behind the T-panel fascia to allow for smooth movement of water from the RSW. To prevent backfill material from escaping from the face, nonwoven geotextile was laid behind the fascia unit.



Cross-section of Panel showing connection details



Typical cross-section of two tiered RSW at Rajamunda side upto height of 22.8 m



Photo 1 : Photograph of RSW on LHS side



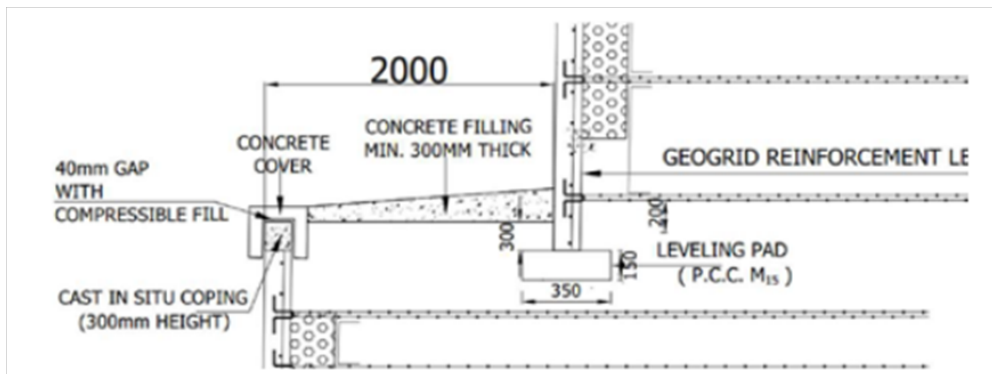
Photo 2 : Photograph of RSW on RHS side

Reinforced soil wall was designed for various checks such as sliding, overturning and bearing capacity for external stability checks. The design was also checked for rupture and pullout for internal stability checks for all the layers. The above external and internal checks were carried out for static as well as seismic condition. The global stability checks were carried out in commercially available software for various cases like sudden drawdown and seismic cases.

- A) Panel Casting and Curing: At the time of casting care was taken for the placement of Panel reinforcement and connectors as per the approved drawings.
- B) Excavation and Foundation Preparation : Excavation was carried out as per dimensions mentioned in the approved drawings. The trench for the leveling pad was excavated to the correct depth and width. In the reinforced soil zone, the ground was excavated to a depth of 400mm (minimum) below the first layer of geogrid. Roller was passed over the excavated ground for even finish and requirements compaction.
- C) Foundation and Levelling Pads: From the marked centerline of the levelling pad on the bottom of the trench the centerline was fixed with required offset to ensure final batter (1°) for the facing panels. Curing of poured concrete in leveling pad was done for minimum period of 24 prior to the commencement of panel placement.
- D) Erection of first course of Panels: The first or bottom course of RS wall consist of alternative full panels and half panels in the direction of construction.
- E) Placement of Drainage System:
- F) Fill material was used as per the approved specifications. Fill material was placed and compacted in lifts with the compacting equipment to the desired degree of compaction. Atmost care was taken during the

deposition, spreading, leveling and compaction of the fill to avoid any damage, disturbance or misalignment of facing panels and geogrid.

- G) Installation of geogrid: The geogrid of specified grade and length was placed in position as per the approved specifications layer by layer.
- H) Coping Beam: At the top of the upper most panels, provide a cast insitu coping beam to achieve the required longitudinal profile.



Details of 2 m wide intermediate berm



Photo 3 & 4 : Photographs of RSW on LHS and RHS side



Photo 5 & 6 : Photographs of Completed Structure

Conclusion:

The two-tiered reinforced soil wall at Bimalgarh ROB, with a total facing area of 45,000 square meters and 2,26,000 square meters of geogrids supplied by Techfab Industries, successfully addressed the project's challenging height and stability requirements. This innovative solution ensured long-term structural integrity and enhanced the overall project performance.

For further details kindly contact :

TechFab India Industries Ltd.

46 & 47, Maker Chambers VI, Nariman Point, Mumbai - 400021

Tel: + 91- 22 - 2287 6224 / 6225

E: info@techfabindia.com

W: www.techfabindia.com