

FLYOVER FOR BRIDGE ACROSS CHAKKAI CANAL

TRIVANDRUM, KERALA, INDIA

Vertical Walls with Concrete Facing Panels

Problem

A Bridge was planned to be constructed across the Chakkai canal connecting NH bypass with the new international airport in Trivandrum. The approach ramp for the bridge was to be constructed using reinforced soil (RS) wall concept. The foundation soil was found to have inadequate bearing capacity to bear the load of the RS walls. Soil investigation reports revealed that the subsurface soil primarily consisted of clay upto 3m depth followed by sand with silt upto 4.5m and with traces of clay as deep as 9m. Ground water table was also encountered near the ground owing to the proximity of the Chakkai canal.

Solution

Reinforced Soil wall with concrete panels as fascia and Paraweb as reinforcement was selected as the best solution in comparison to RS wall with steel strips. T-shaped panels with plain finish were mainly used as fascia panels and bottom panels were half panels. Some special end panels and corner panels were also used. The connection between the panels & fascia was done by galvanized toggles and loops. PVC dowels were used to connect different types of panels.

One side of the approach ramp had a curvature of radius 35m which put forward a great challenge in front of the designers & construction team. Additionally, the width of ramp was less than the length of reinforcing strip- ParaWeb required by design. ParaWeb strips of either side of walls were connected to each other.

Initially, a proposal for soil replacement was suggested to improve the bearing capacity of the foundation soil. However, due to high water table, replacement of soil could become a cumbersome and difficult process. Thus, keeping in mind the high water table and excessive consolidation settlements, such a ground improvement technique was to be proposed which would improve bearing capacity of soil, reduce post-construction settlement and also facilitate the process of implementation.

Thus, considering all these factors, stone column technique with composite soil was proposed. The proposal got approved by IIT Chennai who also gave the approval for the design.

Client: Airports Authority of India

Designer / Consultant: Maccaferri (Designer) / IIT Chennai

Contractor: M/s. Consolidated Construction Consortium Ltd

Products used (Qty.)

- MacRes 1,140 sqm

Date of construction: 03/2009 - 02/2010

Comparison between ParaWeb and Steel based Reinforced Soil Wall Systems		
Parameters	ParaWeb (Polymeric Strip)	Steel based systems
Strength providing material	Polyester	Steel in form of strips or ladder
Protection against environment	Polyethylene coating by extrusion process.	Galvanisation and sacrificial thickness is considered in design for favourable soil conditions only.
Corrosion	Being polymeric system corrosion is not a problem.	Prone to corrosion
Behaviour under seismic loading	Due to inherent flexibility can endure intense earthquake	Some failures have been observed under high intensity earthquakes.
Economy	The system economical due use of polymeric reinforcement.	The system is costlier as compared to ParaWeb reinforced soil wall system.
Experience	ParaWeb systems has experience of 40 years	Oldest steel based system has experience of over 40 years

Photo 1: Difference between ParaWeb and Steel based reinforced soil wall system



Photo 2: Installation of stone column



Photo 3: Laying of boulders at foundation levels on top



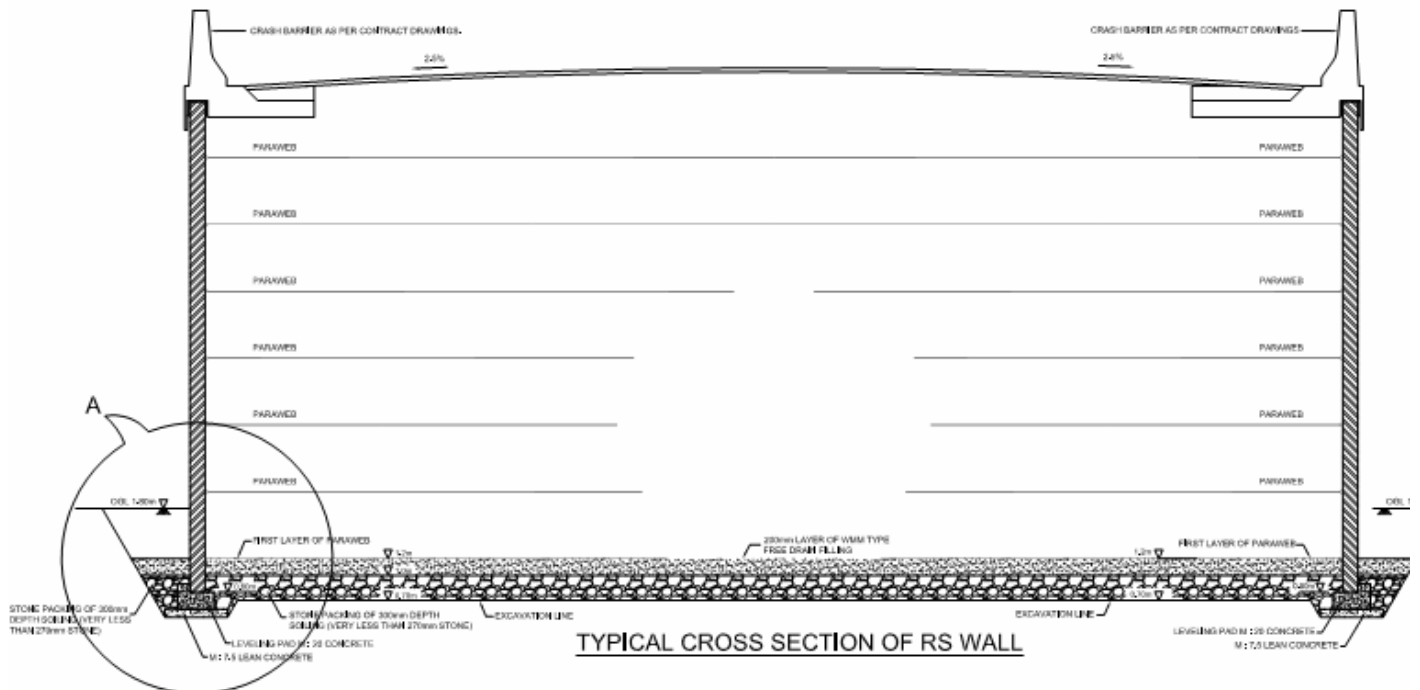
Photo 4: Placement of boulders



Photo 5: Installed Paraweb



Photo 6: Completed structure



Cross sectional drawing

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