

## CASE HISTORY

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### CONSTRUCTION OF REINFORCED SOIL WALL WITH WRAP AROUND AND VEGETATED FACIA NEAR TUNNEL NO:1 AT KATRA, JAMMU & KASHMIR KATRA, JAMMU & KASHMIR, INDIA



#### RS Wall with Wrap around & Vegetated facia

Client:	Products used:
NORTHERN RAILWAYS	• TECHGRID KNITTED & PVC COATED POLYESTER GEOGRID WITH TENSILE STRENGTH OF 40 TO 250KN/m
Main contractor:	
KONKAN RAILWAY CORPORATION LTD / PROGRESSIVE CONSTRUCTION LTD.	Proof Check:
Manufacturer & Supplier:	INDIAN INSTITUTE OF TECHNOLOGY, DELHI
TECHFAB (INDIA) INDUSTRIES LTD.	Year of construction:
	JULY 2008

#### Project description:

Indian Railways had taken up the arduous task of linking the Kashmir Valley with Jammu by a rail network of 343 km. The work on first phase (56 km) between Jammu to Udhampur was completed in 2005 and services are operational on this route. The link 25 Km between Udhampur to Katra Vaishnodevi is under construction and may be completed by 2007. The work on 119 km track from Qazigund to Baramulla is nearing completion. The 138 km stretch between Katra to Qazigund was commenced in 2003. However this stretch is one of the most difficult and un-parallel to any rail linking project built in India so far. It involves 104 km of tunneling wherein one tunnel is about 10.9 km long under a rock cover of 2000 m below the Pirpanjal range of Himalayas.

This herculean task of 138 km has been entrusted to two public sector companies, from Katra to Laole between Km 30 to Km 120 to Konkan Railway Corporation Ltd (KRCL) and from Laole to Qazigund between Km 120 to 168 to IRCON International.

In Konkan Railway section, to execute entire 90 km track, construction of 225 km access road is necessary which has become a bottleneck to complete this project on time. Roads are to be built first and the railway tunnels later. The sector has a complicated topography consisting of deep gorges & heavy sliding zones.



RSRW with Wire Mesh Facia At Katra (J&K)

## Salient Features of the Reinforced Soil Walls :

- Wall Facing Area: 1080 Sqm.
- Wall Height: 10 m
- Soil Reinforcement: TechGrid knitted & PVC coated polyester Geogrids with Tensile Strength of 40 to 250 KN/m
- Facing: Geogrid wrapped face supported by galvanized welded wire mesh panels with random rubble packing
- Design Methodology: BS 8006 (Static) FHWA-NHI-00-043 (Seismic)
- TFIL's scope of work: Detailed Engineering designs & drawings, supply of Geogrids, Welded wire mesh Panels & Supervision of construction
- Proof checking: Designs and drawings were proof-checked by IIT Delhi



RSRW with Wire Mesh Facia At Katra (J&K)

## The Challenge:

The entire Railway Track meanders through young Himalayan Mountains which consist of sinking / slide zones. One such tough zone has been noticed at Tunnel No 1 at Katra (J&K) where the portal got buried under the slush & muck during the construction of the tunnel. This tunnel was being constructed by M/s Progressive Construction Ltd.

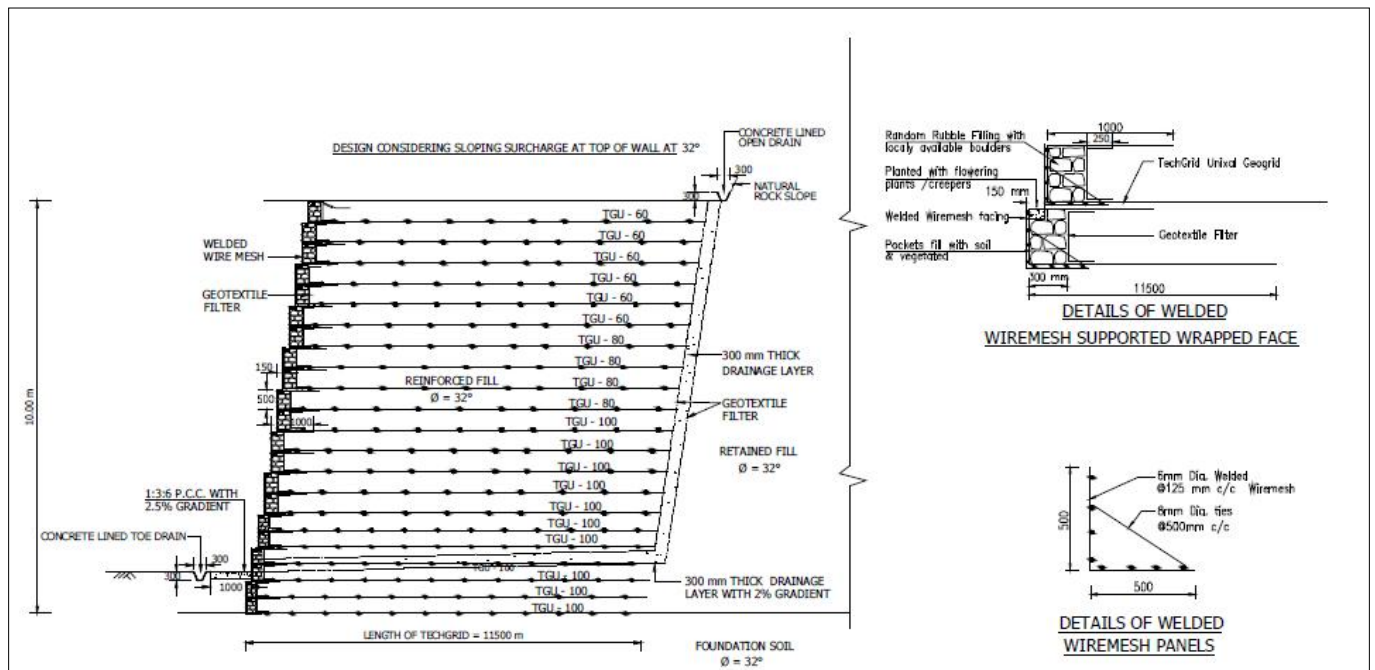
Following the slide the work was suspended for sometime, further discussion and proposals were undertaken with various consultants and agencies to avoid such unfortunate incidents in future.

Finally, the existing muck was cleared and a false tunnel 30 m length was constructed from the face of the tunnel. The Portal of the Tunnel consists of more than 100 m high slide zone, which is very vulnerable to land slide and washing away of the foundation soil from the both side of the portal, it was proposed to have Reinforced Soil Walls on both the sides of the tunnel.

## Solution:

M/s Progressive Construction Ltd (PCL) contacted TechFab India Industries Ltd for providing the techno-commercial offer for the protection of tunnel against the landslide occurring in the highly seismic prone zone.

After a careful evaluation of the project requirements and site conditions a geogrid reinforced soil wall with a welded wire mesh supported wrapped face was finalized as the most optimum solution.



**Typical Cross section drawing**

TechGrid knitted and PVC coated polyester geogrids, manufactured by TechFab India at their state of the art ISO 9001: 2000 certified plant in Silvassa, were used as the soil reinforcement. TechGrid geogrids are manufactured from select grades of high tenacity, high molecular weight polyester yarns using an advanced weft insertion warp knitting process and coated with a specially formulated PVC plastic. The high performance characteristics of these world class geogrids enabled the walls as high as 10 m, to be designed safely and economically.

The facing comprised a geogrid wrapped face supported by L shaped galvanized welded wire mesh panels with galvanized steel ties at 500 mm spacing. Ability to accommodate appreciable amounts of differential settlements



was one of the major reasons for adopting this type of facing. After completion of the project the facia was vegetated, to give it additional stability against the erosion.

The proposed Reinforced Soil Wall would act as impact resistance pad on both sides of the tunnel taking the load of the slush/ muck which may come over the tunnel with high momentum endangering the foundation if the portal.



**RSRW with Wire Mesh Facia At Katra (J&K)**

The design of the walls was carried out using the BS 8006 (static) FHWA-NHI-00-043(seismic) guidelines and comprised checks for external, internal and global stability under static and seismic conditions. The design calculations and construction drawings were proof-checked by Indian Institute of Technology Delhi.

Construction of the wall was carried out under the supervision of TechFab India Industries Ltd.



RSRW with Wire Mesh Facia At Katra (J&K)

**Conclusion:**

The project was successfully completed in July 2008.

**For further details kindly contact :**

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