

LANDSLIDE CONTROL PROJECT ON WENFU RAILWAY LUOYUAN COUNTY, FUJIAN PROVINCE, CHINA

SOIL REINFORCEMENT / DEBRIS FLOW EMBANKMENT

Product: Terramesh® System, Paralink®

Problem

The Wenfu (Wenzhou to Fuzhou) Railway is a high speed line in the east of China. The 300km line allows trains to travel at up to 250km/hour and forms part of the Southeast Coast High Speed Rail Corridor.

Bridges and tunnels account for nearly 80% of the total length of the line as it travels through challenging countryside and geological conditions. Problematic conditions exist in the 20m high slope on the right side of Wenfu Railway from Ch246 +182 to Ch246+420. The slope comprises weathered rock and a stratum of monzonitic granite. Completely weathered rock accounted for 50% of the slope with a rock particle size of 1.2m to 3.5m.

During a typhoon in July 2008, the completely weathered rock layer was fully saturated and was softened by the rainfall which resulted in the collapse of a large area of the slope. The subsequent landslide pushed over the adjacent retaining wall and flowed into farmland. This debris flow could have had a serious impact on railway safety. Due to the debris flow, the original design of a retaining wall in the area no longer satisfied the demands of railway safety.

Solution

Due to the landslide and loss of material, the supporting embankment / buttress wall needed to be 15m high. Considering that the cause of the landslide / debris flow was poor drainage within the slope, the experts, client and design institute on the project required a free-draining wall system. The solution selected was Maccaferri Terramesh® soil reinforcement system with Paralink® geogrid primary soil reinforcement, thus creating a 'reinforced block'.

The Terramesh® System offers excellent drainage characteristics and can accommodate differential settlements without sustaining damage.

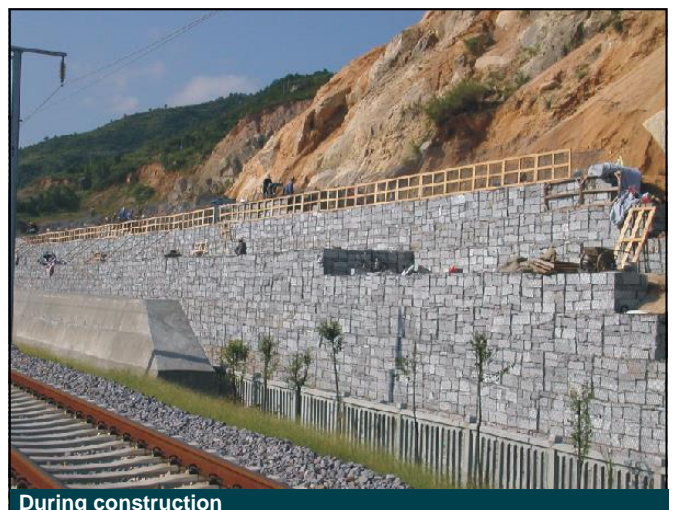
Paralink® is a high-performance soil reinforcing geogrid and is available in strengths up to 1350kN/m. This enables the amount of reinforcement in the slope to be optimised in terms of location, vertical spacing and required strength.



Before construction



During construction



During construction

Client:

NANCHANG RAILWAY ADMINISTRATION

Main contractor:

FOURTH RAILWAY SURVEY & DESIGN INST.

Designer:

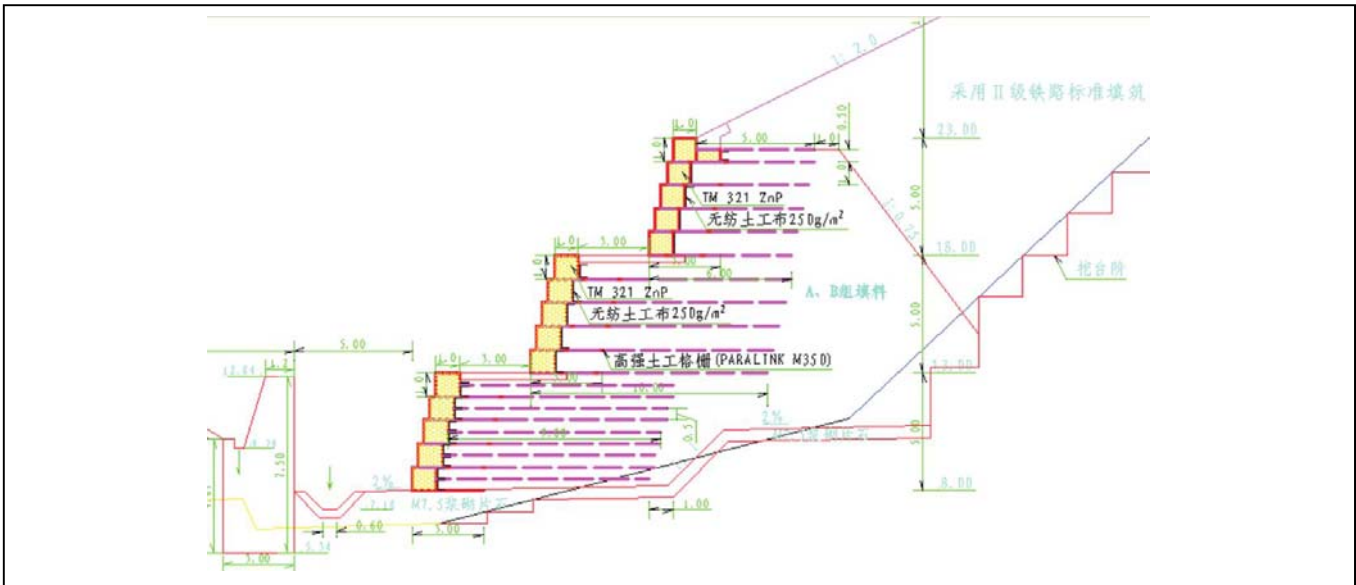
CHINA RAILWAY 18TH, 12TH & 11TH BUREAU

Products used:

TERRAMESH, PARALINK

Date of construction

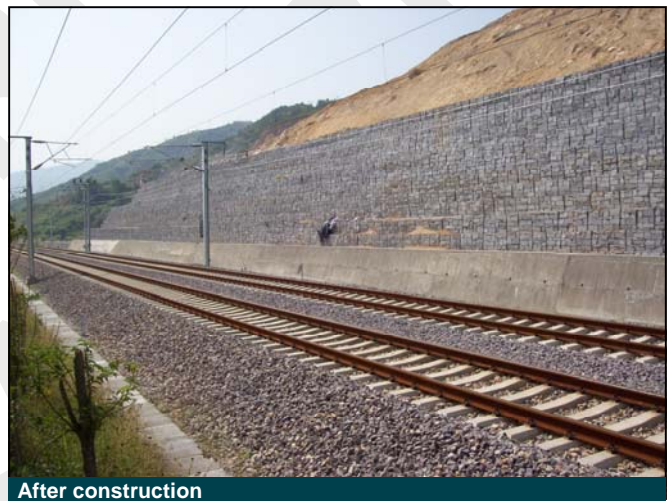
AUTUMN 2009



Typical cross section

Maccaferri Terramesh® units used in the buttress wall comprise a continuous horizontal panel of woven steel-wire mesh geogrid with an integral gabion fascia unit. This makes the system efficient and economical to construct as there is no complex connection between grid and fascia element. Installation is quicker and there is less potential risk of errors and omissions during construction.

The fascia unit of Terramesh is filled with hard, rock-fill in the same manner as a gabion and the geogrid tail and Paralink are then sandwiched between layers of compacted granular fill. When forces within the reinforced soil block are demanding, the Terramesh® geogrids are supplemented with higher strength polymeric geogrids. BBA Certified Paralink® is a premium geogrid for demanding situations. It has high tenacity polyester strength elements encased within a polyethylene sheath providing best-in class installation damage resistance.



After construction

The technical benefits of the Terramesh® System meant that it was the optimum solution for the problem.

- **Flexibility:** The Terramesh®/Paralink® structure can adapt to uneven settlement of the foundation.
- **Permeability:** Natural permeable structure can quickly reduce the groundwater level due to rainfall or other reasons, and so maintain the strength of the soil, reduce the risk of landslides.
- **Durability:** The mesh wire in the Terramesh® is heavily galvanised and PVC coated with a design life of up to 120 years, under normal circumstances.
- **Aesthetics:** Whether the rock fill or following future inundation with plants & green vegetation, the appearance of the wall fits into the surrounding environment.
- **High construction efficiency:** The structure was 15m high and 238m long. It took only 22 days to complete the whole construction and ensured that the railway line opened to traffic on time.



After construction

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