**Tensar**[®]

Installation of Tensar geogrid during rehabilitation work along the Gemas-Mentakab railway line in areas susceptible to mud pumping and ballast spreading.

Malaysian railway project gets it right with Tensar

Replacing geocell with the proven performance of Tensar geogrids saved time and money for the rehabilitation works of a major railway line in Malaysia.

CLIENT'S CHALLENGE

Passing trains had caused fine grained soils to migrate up through the ballast along a stretch of the Gemas to Tumpat railway where it crossed areas of weak ground between Gemas and Mentakab, causing settlement and track alignment issues. The Public Works Department, investigating an alternative to a previous geocell solution, sought Tensar's advice for an economically attractive and rapid solution.

TENSAR SOLUTION

By using a single layer of Tensar geogrids below the ballast layer, the client was able to avoid expensive and slow ground improvement works through fill replacement or the geocell solution.

The client's consultant was convinced with the immediate benefit of rapid installation of Tensar geogrids in addition to the long-term benefits of effective ballast confinement in mitigating both differential settlement and loss of ballast.

Gemas-Mentakab Railway Rehabilitation

Ballast stabilisation
Gemas, Malaysia

BENEFITS

50%-60% material cost savings

through use of geogrids versus geocell

30%-50% savings in time

from construction speed without the need to pin or tension geogrids

Reduced maintenance

as a result of effective life-time confinement and stabilisation of ballast

REF TEN411



Tensor geogrid helped maintain trafficability of trains at design speed, preventing lateral displacement of ballast and mitigated differential settlement.

PROJECT BACKGROUND

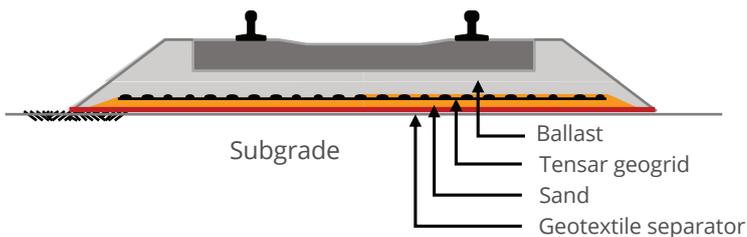
Railway line upgrade was required for the existing single railway track from Gemas to Tumpat that runs along the centre part of Peninsular Malaysia from the north of Johore state to north of Kelantan.

The track traversed through several kilometres of areas prone to mud pumping due to existing poor subgrade that were inundated by flooding.

The conventional approach would have been to install a geocell, instead of (more expensive) ground treatment or 'dig and replacement' of the weak soils. However, geocell had proved to be ineffective, expensive and time-consuming to install in the past. The client KTMB sought the help of the Public Works Department for a cost-effective solution, which would provide proven performance and enable fast construction.

Based on its proven performance history, Tensor stabilising geogrid was used to replace geocell for the rehabilitation of the 6km Gemas-Mentakab section. The geogrid interlocks with ballast particles under train loading, confining them vertically and laterally, increasing bearing capacity, mitigating differential settlement between areas of weaker and stronger ground and maintaining track alignment. This reduced maintenance requirements which saved further costs during the operation of the railway.

Not only did the use of stabilising geogrid reduce the required thickness of ballast, saving time and money, but it was also easier and faster to install than geocell. It was simply laid on the subgrade by hand, and the ballast placed and compacted, with no concerns about installation damage.



Main Contractor:

Hikmat Asia Sdn Bhd

Consultant:

**Public Works Department,
Malaysia**

Client:

**Keretapi Tanah Melayu
Berhad (KTMB)**

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