

CASE HISTORY

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TECHCELL GEOCELL AND TECHGEO NONWOVEN GEOTEXTILE FOR TRACK BED STABILIZATION FOR KOTA RAILWAY AT KOTA IN RAJASTHAN KOTA, RAJASTHAN, INDIA



Railway Track Bed Stabilization

Client:	Products used & Quantity Supplied:
KOTA DIVISION, WEST CENTRAL RAILWAY	
Main contractor:	TECHCELL TC - 356 X 150 - 538 SQM.
M/S. MULTIPLE ASSOCIATES	TFI 1220 - 1000 SQM.
Manufacturer & Supplier:	Year of construction:
TECHFAB (INDIA) INDUSTRIES LTD.	JANUARY 2019

Introduction:

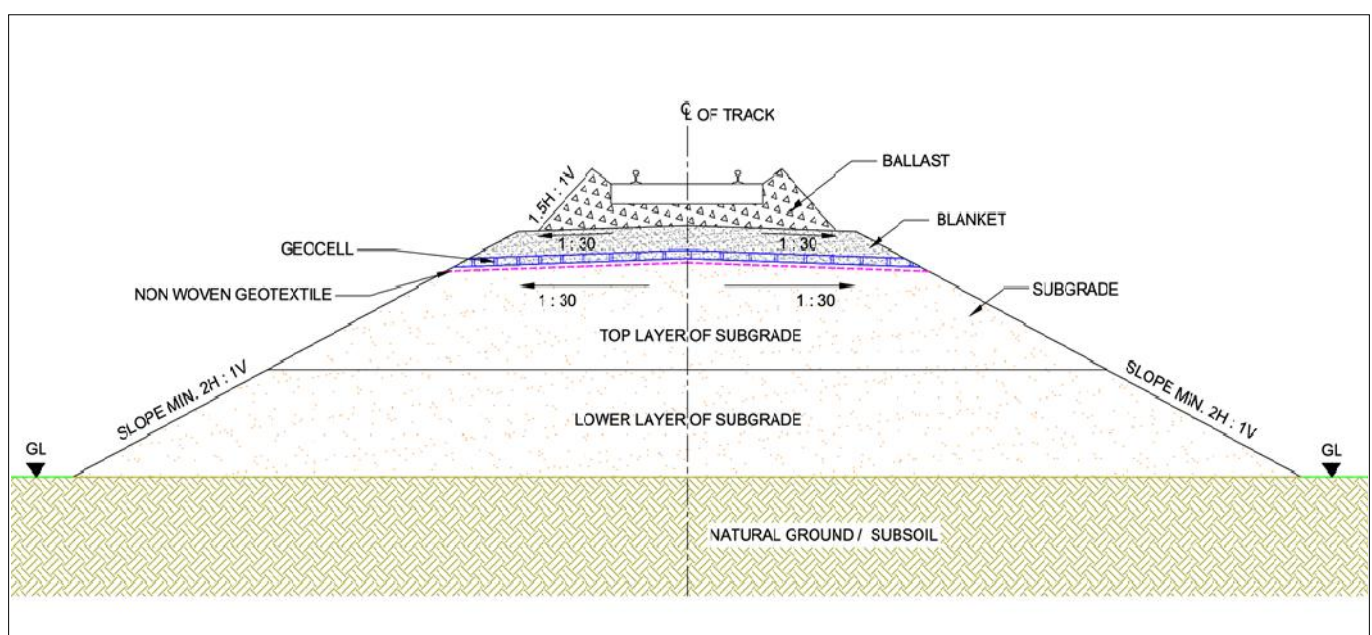
Keshorai Patan Railway Station, Gurla West Railway Station are the very nearby railway stations to Keshoraipatan. However, Kota Jn Railway Station is a major railway station 20 km (12 mi) near to Keshoraipatan.

Problem:

Generally granular ballast system is used in rails track bed for its capacity of absorbing vibrations originated by train traffic, ease of maintenance works, high hydraulic conductivity of track structure and simplicity in design and construction.

Main problem faced now a days is procuring granular material. It became difficult as scarcity of land and quarry products and State governments' restrictive policies on mining and transportation ultimately lead to higher costs overrun due to delay in projects. Moreover, large scale mining & excavations cause loss of cultivable land and adversely affect the environment.

To arrest these problems, alternative economical design by using geosynthetics may help in many ways.



Proposed Typical Cross Section drawing

Solution:

The choice of ballast material and the construction and proper maintenance of a sub-ballast layer are two key factors regarding the sustainability of a railway project, increasing its durability and improving its performance.

To ensure that new rail projects are constructed with an adequate sub-ballast layer with separation and filtering properties. Client decided to use locally available sand in blanket layer with Geocell for confining sand, maintaining thickness of blanket layer as it is and a layer of woven geotextile for reinforcement and preventing intermixing of sand in the sub-grade layer thus provoking ballast contamination and demanding its replacement or the addition of large amounts of new aggregate.

Therefore, one way of achieving sustainability of railway projects is guaranteeing that tracks will have longer service lives, with less frequent maintenance cycles and by diminishing the need for addition of new ballast material which can be achieved by using geosynthetics in railway construction.

Role of Geosynthetics

1. Techcell Geocell :

- This is a cellular confinement system when compacted well increases bearing capacity of soil. Hence, Techcell is used for ground improvement application. In this scenario, heavy load is expected on low bearing soil.
- Geocell with sand reduces traffic-induced stresses to a tolerable limit (i.e. threshold stress) on the top of sub-grade, thereby, prevents sub-grade failures.
- It results in increased track modulus and thereby reduces the track stresses & deformations.
- It facilitates dissipation of excess pore water pressure developed in sub-grade on account of cyclic loading and leads to increase in shear strength of sub-grade soil.

2. TFI Woven Geotextile:

- Woven geotextiles are primarily used for reinforcement which also provide helps stabilisation of track bed layers. It is also used as separator/filtration layer which will stop inter mixing of sand with sub-grade. It prevents penetration of ballast into the sub-grade and also prevents upward migration of fine particles from sub-grade into the ballast under adverse conditions, during service.
- This prevents mud pumping by separating the ballast and sub-grade soil.
- It facilitates drainage of surface water and reduces moisture variations in sub-grade, thereby reducing track maintenance problems.

Installation Method :

- The method consists of dismantling a portion of track under traffic block (4hrs duration) and removal of ballast and weak formation layer and replacement with blanket layer and reconnection of track on ballast.
- Lift single rail panels and remove balance ballast with excavators.
- Excavate formation to required depth(till sub grade level) with excavator.
- The work site (sub grade level) was well prepared before the installation. The sub-grade was compacted in accordance with the project specification. All surfaces to be deployed was free of all foreign and organic material or sharp objects.
- Geocell mattress are opened and the Geocell mattress sections are fastened together.
- Woven Geotextile filterplaced on the sub-grade surface as a séparation layer.
- Geocell mattress was laid on woven geotextile layer. They are then filled with locally available sand and then compacted using vibratory compactors.



Laying of Woven Geotextile



Laying of Techcell Geocell in Progress

- Spread blanket material to optimum thickness for full formation width + 50 cm on cess side(s) to facilitate compaction.
- Compact blanket material (being granular cohesion less & well graded) with vibratory roller to achieve min. 70% relative density (IS code no: 2720 (Pt 14) latest version).
- Spread ballast & put back track panels (kept on slope of embankment).
- Attend track and allow traffic.
- Progress of laying of blanket was in the range of 100-120m per day. Work can be taken up at more number of sites in shadow block.



Filling of Techcell Geocell in Progress



After laying of track in completed stretch



Removing another track panel

Conclusion:

Project was completed within given timeline and Railway authority was really happy with quality of products. Now its been more than year, client is really happy with performance of TECHCELL and TFI Woven Geotextile and also, look forward to use TFI products for their future projects.

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