

CASE HISTORY

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SUBGRADE STABILIZATION USING GEOSYNTHETICS NEAR POWER PLANT FOR INTERNAL ROADS OF M/S. BKT, BHUJ, GUJARAT BHUJ, GUJARAT, INDIA



Soil Stabilization

Client:	Products used & Quantity supplied:
BALKRISHNA INDUSTRIES LTD, KUTCH	<ul style="list-style-type: none">• TFI TGB - 40• TFI 3100 WOVEN POLYESTER GEOTEXTILE• TFI TECHGEO NONWOVEN GEOTEXTILE PR 20
Main contractor:	
Manufacturer & Supplier:	Year of construction:
TECHFAB (INDIA) INDUSTRIES LTD.	

Problem:

Balkrishna Tyres (BKT) is one of the world's leading manufacturers of "Off Highway Tyres". The company has set up a new plant for the manufacturing of specialty tyres on Bhuj-Bhacahu road, District Kutch in the state of Gujarat. The factory premises consist of a network of roads, used to carrying heavy machinery on large trailer trucks for the manufacturing unit very frequently. The pavement was approximately 14m wide with a total stretch of approximately 2.5km.

The pavement was constructed by laying a layer of sand over the compacted sub grade above which rubble soling of 230mm thickness, followed with metal over it as shown in Fig.2. However the pavement was not sealed by providing any overlay at the top. Only binder was used, at the top for the half width of the road and quarry dust for the remaining half width of the road. During monsoon season, water percolated through the pores of the existing pavement into the sub grade and thereby reducing the bearing capacity of the sub grade.

The existing soil having 31 to 50% swelling index, liquid limit & plastic limit varies from 31to57 & 20to28, PH value is greater than 8.0 and belongs to CH and SC group. Hence when the heavy vehicles passed over the prepared pavement, due to the heavy tyre pressure, the soil immediately below the tyre got deformed. The soil on the surrounding sides of the tyre thereby got uplifted along with the metal laid in the pavement as shown in Fig.1.



Fig 1 : Existing Deformed Pavement

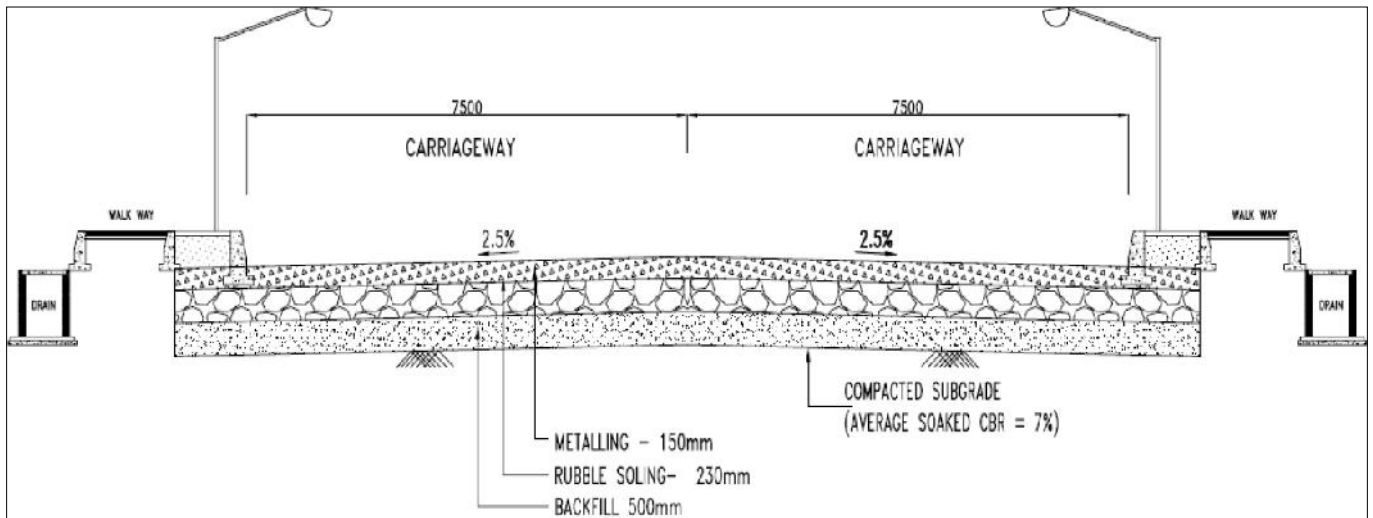


Fig 2 : Cross Section of Existing road

Techfab (India) Industries Ltd submitted a proposal of using Geosynthetics to strengthen the pavement against heavy vehicular impacts & also restrict the percolation of water through existing pavement. For treatment of such type of pavements, the existing road crust shall be first removed after that the various products as suggested below shall be preferred to cater the needs of high stresses developed by heavy vehicles.

- TechGeo PR series Nonwoven Geotextile is strong, flexible and dimensionally stable fabric structure, with optimum pore sizes and high permeability. TechGeo PR Geotextile can be used as a separator, filter & drainage purpose.
- Woven Geotextile TFI 3000 Series having high tensile strengths, low elongation and low creep. It has been used for basal reinforcement and to minimize the differential settlement.
- TechGrid Geogrid TGB Series having with high tenacity, high tensile modulus, low creep and low shrinkage. The PVC coated grids shows a protective cover enhancing the dimensional stability of the geogrid, resistance to installation damage and protection from the environment act as an area stabilization & reinforcement for the granular road base & sub base.

M/s TCS has finalized the cross-section, considering the proposal, and based on that high strength woven geotextile has been used. Final cross-section, approved from M/s TCS has attached as Figure:3. Considering site condition and water level, other products (TechGeo PR and TGB) are used with consultation of Engineer-in-charge. Execution sequences are as follows:

- Preparation of Sub grade with compaction.
- Over the leveled and compacted sub grade, 230mm rubble soling is provided. To avoid the puncture of Geosynthetic material (TFI3100), sand cushion of 50mm thickness is provided, after rubble soling.
- Compacted sand layer is laid over the TFI3100, followed with Water bound macadam and other pavement layers.
- In some locations, where less severe condition is prevailed, with high water level, it has been recommended to use of TechGeo Nonwoven Geotextile, along with Techgrid biaxial TGB40, followed with sand layer and other pavement layers, with the consultation of Engineer-in-charge
- It has been decided, not to lay, any bituminous layer for at least a year to allow settlement.
- Please find below the photographs for the execution of pavement with the proposed Geosynthetic materials under the guidance of site engineer:

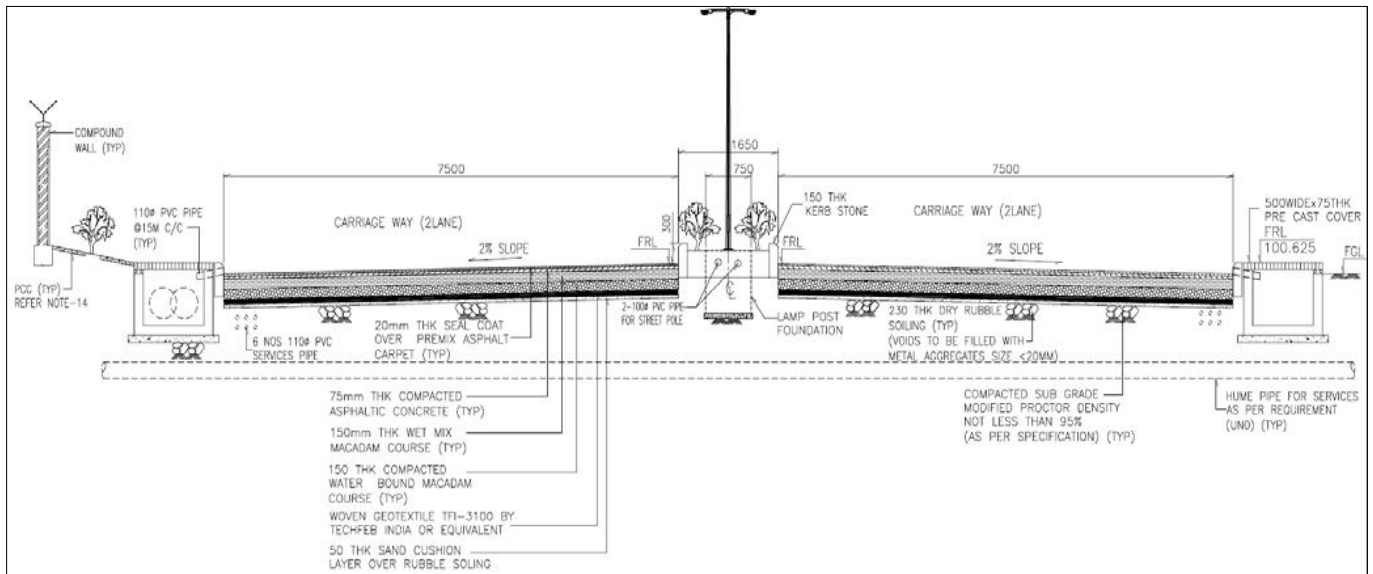


Fig 3 : Typical Roads Cross Section with Geosynthetics



Fig 4 : Laying of TechGeo PR-20 (Non-Woven Geotextile)



Fig 5 : Laying of TFB-40 over TechGeo PR-20

Benefits of TechGeo Nonwoven Geotextile:

- Acts as a “Filter” by preventing the backfill material from being washed out through Gabion face.
- Acts as a “Separator” between the backfill material and the Gabion fascia and thereby prevents the mixing of the tow.

Advantage of Techgrid Geogrid Biaxial:

- Better Interlocking and load transfer, due to apertures and high interface frictional resistance between Geogrid and sand.
- It will minimize the differential settlement.

Benefits for Woven Geotextile –TFI 3000 Series:

- It is used as a “basal reinforcement” of embankments on soft ground conditions.
- Act as a “Working Load Transfer Platform” to transfer vehicular/ impact loads deep into the soil safely.



Fig 6 : Sand Layer over Techgeo PR & TGB



Fig 7 : Sand layer over TFI-3100 Woven Polyester

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