

CASE HISTORY

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PAVEMENT STABILIZATION USING PP BIAXIAL GEOGRID BETWEEN GRANULAR SUBBASE AND WMM LAYER TO REDUCE CRUST THICKNESS AT MUNDRA PORT, GUJARAT
MUNDRA, GUJARAT, INDIA



Pavement Stabilization

Client:	Products used:
ADANI	• TECHGRID PP BIAXIAL GEOGRID 30/30
Main contractors:	
ADANI	
Manufacturer & Supplier:	Year of Construction:
TECHFAB (INDIA) INDUSTRIES LTD.	2023

Project Brief:

Mundra Port, situated on the northern coast of the Gulf of Kutch in the Kutch district of Gujarat, India, holds the distinction of being the country's largest privately operated port. Initially under the management of Mundra Port and Special Economic Zone Limited (MPSEZ), a subsidiary of the Adani Group, it subsequently underwent expansion and now falls under the purview of Adani Ports & SEZ Limited (APSEZ), overseeing the operations of multiple ports. During the fiscal year 2020-21, Mundra Port efficiently managed the handling of a significant cargo volume totalling 144.4 million tonnes.

Problem:

The soil present near Mundra port is marine clay that comes soft soil category. This type of soil is usually associated with high differential settlements and instability, leading to overall failure of the pavement structure within its service life. Considerable failure could occur even with light loads and it shows flat or featureless surface. This kind of soil is considered as problematic due to the existence of high moisture content and usually exists as slurry with noticeable percentage of expandable clay minerals.



Photo 1 : Prepared Surface for Laying Geogrid

Solution:

To construct a flexible pavement over soft soil, it is necessary to use a higher thickness of pavement to support heavy loads. To address this issue, the authority has decided to use modern technology to stabilize the pavement. In this project, a biaxial geogrid made of polypropylene material called Techgrid PP Biaxial 30/30 Geogrid is used between the WMM and GSB layers to reinforce the pavement. The Geogrid will interlock the aggregate particles and increase the modulus of the respective layer. Further, this increase in the modulus of aggregate layers will lead to improvement in service life of pavement and better distribution of loads on to the subgrade.

Execution on Site:

Storing and Handling:

- Never drag the Geogrid or Geotextile Rolls, it may lead to damages.
- The recommended method of unloading is, to use the Stout Bar. A Bar can be passed through the roll tube & attached via chain, which in turn can be lifted by Hydra Crane or Forklift. The sequence for the same is shown in figure below.
- The Geogrid shall be kept dry and wrapped such that it is protected from any damage during shipping and storage. If stored outdoors, it shall be elevated and protected with a cover.
- The Rolls should also be carefully handled when being deployed from storage to their position just prior to installation.



Photo 2 & 3 : Handling of Geosynthetic roll



Photo 4 & 5 : Rolls of Techgrid PP biaxial Geogrid ready to install



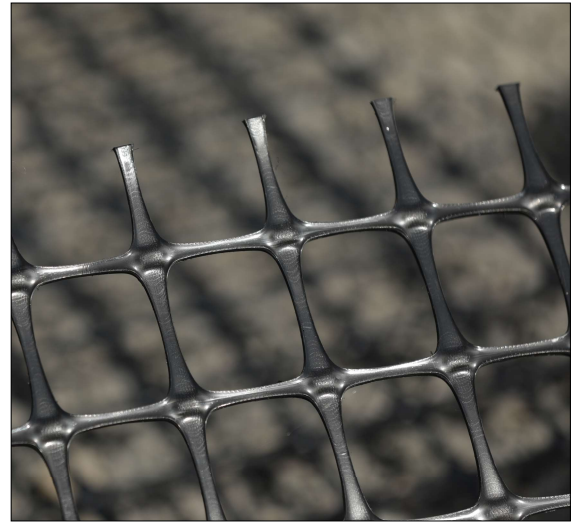
Photo 6 : Carrying Geogrid for installation



Photo 7 : - Installed geogrid over GSB layer

Techgrid PP Biaxial Geogrid:

Techgrid PP Biaxial Geogrids are high modulus polypropylene geogrids, produced by an extrusion process characterized by a tensile resistance both in the longitudinal and transverse direction. Techgrid PP Biaxial Geogrid can enhance the performance of paved and unpaved roadways, parking lots, airports, loading docks, and storage areas through stabilization / reinforcement of the base aggregates.



Geogrids act as a tensile element at the bottom of a base or within a base course to:

- Improve the service life, and/or
- Obtain equivalent performance with a reduced structural section. PP Biaxial Geogrids are mainly used for “soil stabilization” and also, for soil reinforcement applications.



Photo 8 : Applying tension by hand to minimize wrinkles in Geogrid

Installation of Techgrid PP Biaxial Geogrid :

The following sequence shall be adopted for the laying of Techgrid PP Biaxial Geogrid:

- Unroll the geogrid on the subgrade and apply tension by hand to minimize the wrinkles as shown in Figure. Geogrid panel overlap requirements, either side by side or end to end with overlapping, shall depend on strength of subgrade.
- The overlapping (150-200mm) shall be made in the direction of GSB spreading to avoid the geogrid uplift.
- The geogrids may be tensioned and fixed along the outer edges with 12mm “U” bars 3 to 4m intervals with 200 to 300mm U-pin length or as per site requirements as shown in Figure.
- Fill grain size distribution shall be carefully selected in order to optimize geogrid performance.
- When applying fill material over relatively competent subgrade ($CBR > 8$), rubber tyre trucks can drive directly over the geogrid with speeds lower than 10 kmph and dump the GSB material. As they go, operators must not apply excessive braking when driving across the geogrid.
- Tracked vehicles should not be driven on the geogrid directly. Minimum of 100 mm fill/GSB should be placed between the geogrid and tracks.
- Base course material should be placed in lift thicknesses and compacted as per the design requirements.
- Any rut developed during spreading and compacting should be fill with GSB material to reach to the design thickness.



Photo 9 : Overlapping of 150 mm Geogrid at the edge and fixing it with 12 mm U bar



Photo 10 : During Construction Photograph

Conclusion:

TechFab India has successfully delivered the complete Techgrid Geogrid quantity within the agreed timeframe and in compliance with all quality specifications. The contractor has finished the granular layers of the pavement to the complete satisfaction of MUNDRA PETROCHEM LIMITED and the Project Management Consultants. The subsequent steps involve the laying of WMM and Bituminous layers.

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