

CASE HISTORY

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DEVELOPMENT OF SIX-LANE ACCESS CONTROLLED HIGHWAY USING TECHGRID PP3030 GEOGRID FROM ADHOYA MUSALMANA (AMBALA DISTRICT) TO SADOPUR (AMBALA DISTRICT) (FROM CH. 84+400 TO 121+786) OF SHAMLI – AMBALA SECTION OF BAREILLY – LUDHIANA ECONOMIC CORRIDOR, HARYANA

AMBALA, HARYANA, INDIA



Pavement Stabilization

Client:	Products used:
NATIONAL HIGHWAYS AUTHORITY OF INDIA	• TECHGRID PP3030 GEOGRID
Contractors:	
MONTECARLO	
Manufacturer & Supplier:	Year of Construction:
TECHFAB (INDIA) INDUSTRIES LTD.	2024

Project Brief & Problem Description:

The Shamli - Ambala section (NH-344GM) of the Bareilly - Ludhiana Economic Corridor forms an essential part of the Bharatmala Pariyojana Phase-1 in Haryana (Package-3) and is being executed under the EPC mode. This six-lane, access-controlled highway stretches from Design Chainage 84+400 near Adhoya Musalmana village in Ambala District to Design Chainage 121+786 near Sadopur village. It connects the Western Ambala Bypass on the Ambala - Chandigarh Highway and passes through a greenfield alignment across predominantly plain terrain.

The alignment covers several key locations, including Barara, Tandwal, Goga Medi, Ghaseetpur, Bihta, Khuddi, Panjokhara, and Khatoli. Challenges in this project include maintaining construction timelines in a greenfield zone, ensuring minimal disruption to local settlements, and managing geotechnical conditions across varying subsoil profiles while constructing an access-controlled corridor of national importance.

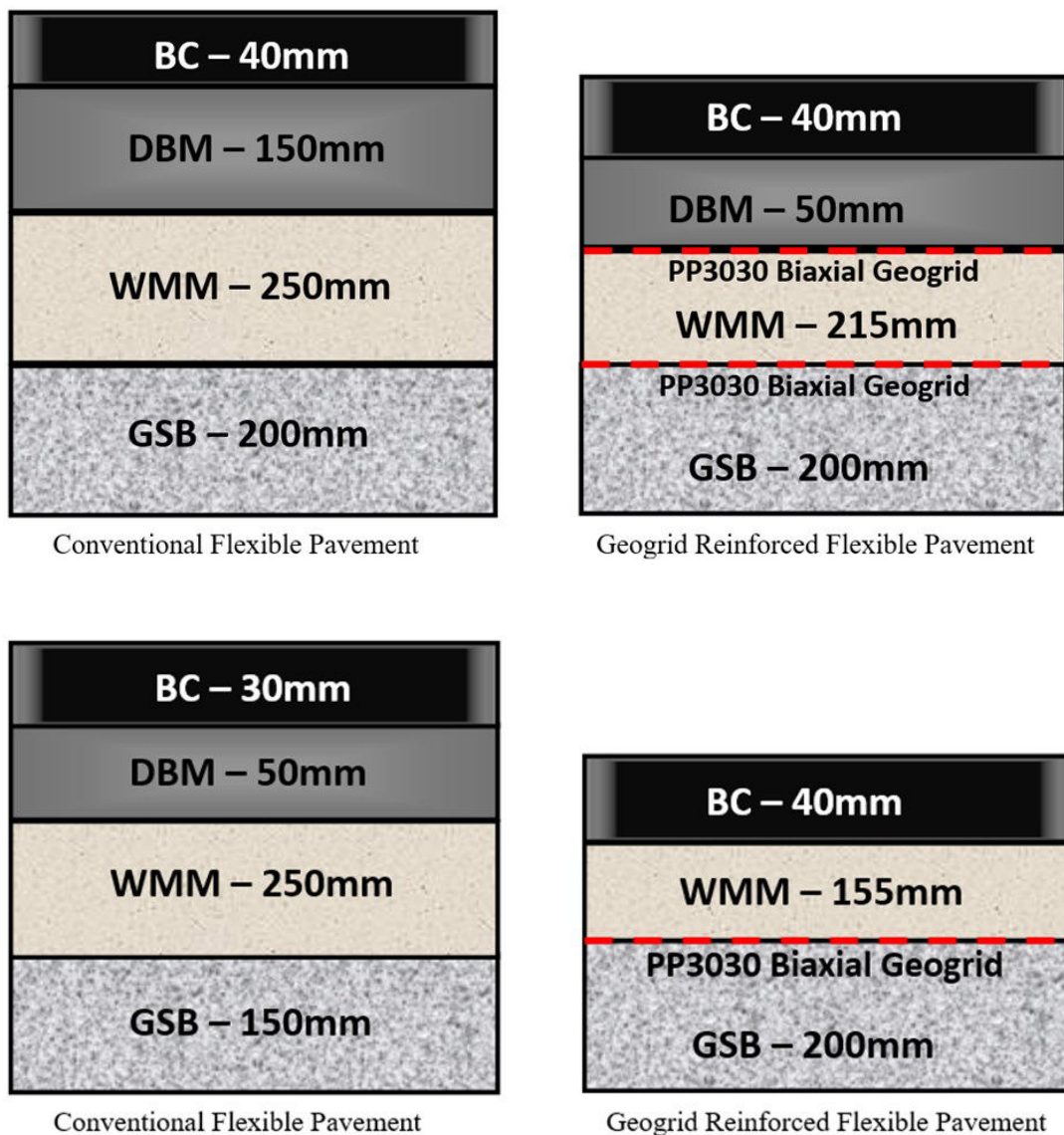


Photo 1 : Prepared Subgrade Layer as per the Design

Solution:

The conventional approach to pavement design involves the use of granular aggregates, which requires extensive use of natural resources and results in a high carbon footprint. An alternative method to enhance the performance of the road and to conserve natural aggregate without compromising integrity is geogrid-reinforced pavement. In this project, the suggested geogrid is Techgrid PP3030 geogrid. It comprises biaxial geogrids manufactured from superior grades of polypropylene using a precisely controlled punching and drawing process TechGrid PP Biaxial Geogrid functions as a stretched membrane, effectively resisting vertical loads while simultaneously confining the subgrade soil. Additionally, it enhances the bearing capacity and provides a greater margin of safety by intercepting potential failure surfaces that may develop under vertical loads. By reinforcing the WMM and GSB layer, vertical deformation is reduced, preventing rutting at the pavement surface.

Typical cross section of the proposed improvement measures is as shown below for main carriageway and service road.



Design Considerations:

Following are the design basis considered for the design of geogrid reinforced flexible pavements .

1. Effective CBR of Subgrade – 10%
2. Traffic – 110 MSA for Main Carriageway & 5 MSA for Connecting Roads
3. Bitumen Properties
 - A. Bitumen Type – VG40
 - B. $V_a = 3.8$
 - C. $V_{be} = 10.8$
4. Type of Geogrid used to reinforce the GSB & WMM layer – TechGrid PP3030 Biaxial Geogrid.
5. Certified improvement Value of Geogrid used for the design – MIF = 1.95; LCR = 1.46



Photo 2 & 3 : Laying of Geogrid on the Subgrade

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.

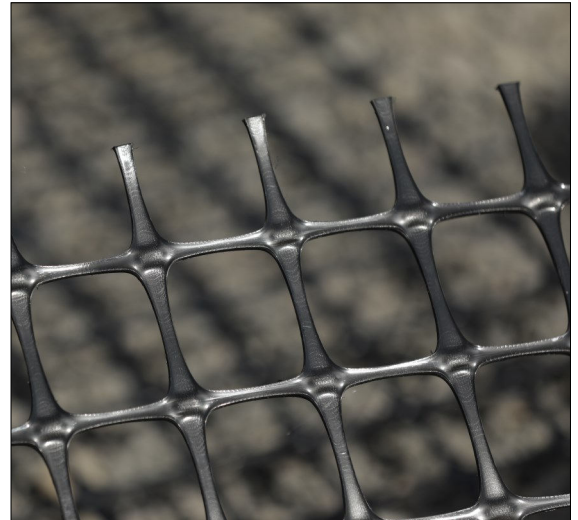


Photo 4 : Overlapping of Geogrid at the edge and fixing it with U bar

Installation of Techgrid PP Biaxial Geogrid :

- Prepare the subgrade according to project specifications, the surface was cleared, grubbed, or levelled to match the design grade. This process involves removing any loose topsoil and vegetation, if present.
- The first layer of geogrid was unrolled over the prepared subgrade and the ends was secured with “U” hooks at every 2 to 4 meters.
- The GSB layer was laid over the geogrid, compacted, and was free from vegetation and extraneous matter, as shown in the figure.
- The second layer of geogrid was unrolled onto the GSB layer and hand-tensioned to eliminate wrinkles. The geogrids were secured along the outer edges using 10mm "U" bars at intervals of 2 to 4 meters as per site requirements.
- Adjacent geogrid rolls had a 300mm overlap, while the roll ends shall be overlapped by 1000mm, in accordance with the specifications of IRC SP 59:2019.
- The base material was dumped over the geogrid layer in a way that minimized contact between the truck tires and the geogrid.
- When applying fill material over the geogrid, the truck speed was kept below 10 km/h, and the WMM material was dumped carefully. Wheel turning and excessive braking on the geogrid were avoided.
- The base course (WMM) layer was compacted as per the required density, and the DBM layer was applied as per the project requirements



Photo 5 : Spreading of GSB Material over the Subgrade



Photo 10 : Finished surface after compaction of reinforced WMM layer

Conclusion:

TechFab India has successfully delivered the Techgrid Geogrid quantity within the agreed timeframe and in compliance with all quality specifications and LCR and MIF value evaluated at the field. The contractor has finished the GSB and WMM layers of the pavement to the complete satisfaction of National Highway Authority of India and the Project Management Consultants.

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