

CASE HISTORY

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SUBGRADE STABILIZATION USING TECHCELL GEOCELL FOR SION PANVEL EXPRESSWAY, MUMBAI, MAHARASHTRA MUMBAI, MAHARASHTRA, INDIA



Soil Stabilization

Client:	Products used & Quantity supplied:
PUBLIC WORKS DEPARTMENT, MAHARASHTRA	• TECHCELL GEOCELL - 350 X 150 • TFI 3000 HIGH STRENGTH PET WOVEN - GEOTEXTILE
Main contractor:	
Manufacturer & Supplier:	Year of construction:
TECHFAB (INDIA) INDUSTRIES LTD.	

Project brief:

This case study describes the restoring failed pavement by sub grade stabilization using Techcell geocell and High Strength woven polyester geotextile. Techcell is used for soil confinement, stabilization and reinforcement in wide variety of load support applications. Geotextile will act as filtration and separator layer.

Project Challenges:

The Sion Panvel Expressway is a 25 km highway located entirely in the state of Maharashtra, that connects Sion in Mumbai with Panvel, via Navi Mumbai. It is one of the busiest and most important roads in the Mumbai Metropolitan Region (MMR), and connects Mumbai with the city of Pune. The National Highway 4 and Mumbai Pune Expressway begin at the eastern end of the expressway, at Kalamboli junction, near Panvel. The highway is also used by vehicles traveling towards Mumbai from Konkan and Goa.

Existing road was constructed with concrete pavement and incomplete portion of pavement of 4Km length was constructed with bituminous pavement earlier. This 4 km, bituminous pavement was causing problems and had many potholes. After evaluation, we came to know due to poor drainage and weak sub grade were causing problem in the heavy rains which create the number of potholes and severely damaged the pavement. As this is the busiest highway and due to damaged surface and big potholes the traffic movement was slow down. This slows traffic leading to massive snarls. (Photos attached.)

So for this damaged incomplete portion, PWD had decided to complete construction of rigid concrete pavement with some effective ground improvement in complete portion. Here the scope is to widen the existing bituminous road (3+3 lanes) to 7 lanes for 400 m length +5 lanes for 150m length with concrete pavements.



Existing Damaged Road

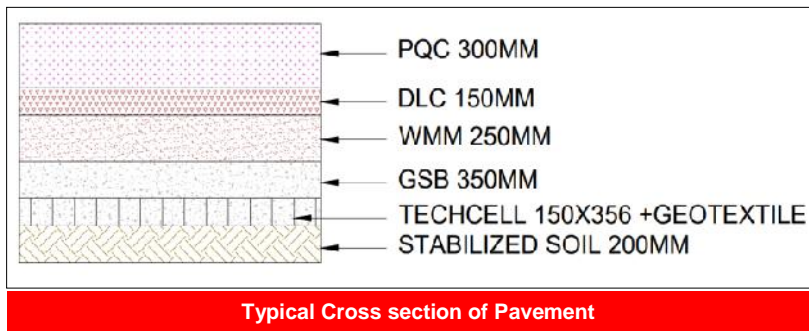
Solution proposed:

After careful evaluation of failed pavement section, it was found that the sub grade soil is resting on marshy land or unable to support adequate traffic loads for long time duration due to heavy traffic and created the permanent deformation in the pavement.

Improvement of load carrying capacity with replacement of soil is one of the solutions but it is costly as well as impractical & time consuming solution as this is the busiest highway. So here the solution which is less time consuming, economical, durable that is soil stabilizations with the smart material - Techcell Geocell which can offer low life-cycle cost by improving structural capacity as well as reducing of deformation and thickness of pavement that are construction cost efficient, eco-friendly and easy to construct in less time.

PWD suggested contractor to use Techcell Geocell with High Strength Woven polyester geotextile for soil stabilization. A rigid pavement section was designed as per code requirement, and for subgrade stabilization, the geocell with woven geotextile was used but PWD did not opt for any thickness reduction in pavement section instead want long lived pavement.

Solution proposed in this case is using Techcell geocell and TFI woven geotextile.



High Strength Woven PET Geotextile laid



Techcell geocell tying in progress



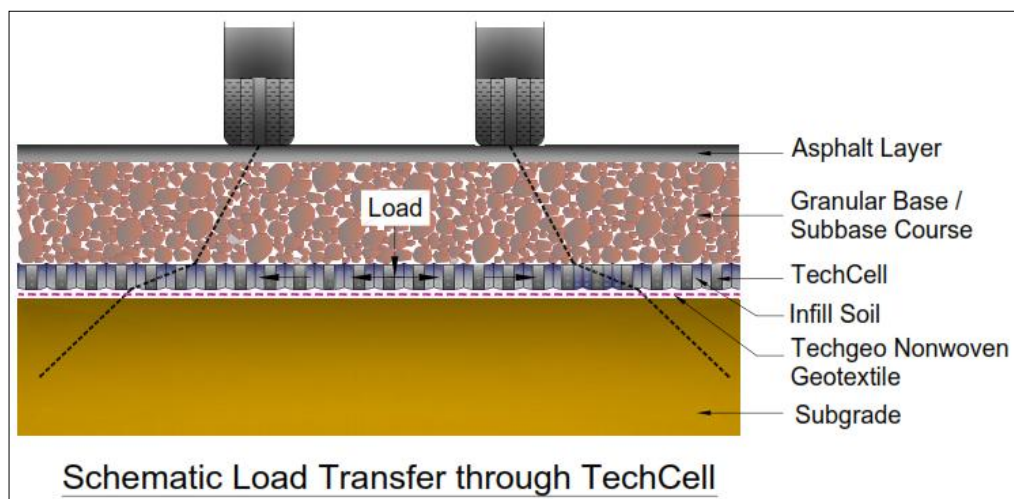
Compaction of Infill material in progress



Curing of PQC layer by water ponding method

Working mechanism of Geocell:

Techcell confinement system improves performance of infill material, due to the stiffness of the infill and cell, which is increased by the hoop stress developed on the cell as well as by passive resistance from surrounding cells.



The 3D confinement prevents movement and shearing of soil infill under cyclic loading, while reducing aggregate attrition. The confinement system also maintains soil compaction, thereby providing long term soil reinforcement and structural strength as well as improves moduli of infill materials, while increasing the bearing capacity of the structural pavement layers of load support.

Execution on Site:

Execution of this project was difficult as it is busiest road, proper safety measures were taken while construction was going on.

Profile correction with suitable Sub grade stabilized soil was done and it was compacted properly. TechFab Woven Geotextile was laid properly and above that Techcell Geocell was installed and filled with GSB and it was compacted. After that all other layers are constructed as per design section as shown above.

Conclusion:

PWD officials were very happy observing the ease of installation and seeing the performance of Techcell Geocell during construction, it was observed that the geocell holds together and no movements of GSB occurred during compaction activity of WMM and shows very good confined base for upper layers.

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