CASE HISTORY

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GROUND IMPROVEMENT FOR WAREHOUSE OUTER AREA AND CONTAIER YARD USING TECHCELL GEOCELL AT JNPT, NAVI MUMBAI, MAHARASHTRA

JNPT, NAVI MUMBAI, MAHARASHTRA, INDIA

TECHFAB INDIA

Ground Improvement

Client:	Products used & Quantity:
OIL FIELD WAREHOUSE & SERVICES PRIVATE	• TECHCELL GEOCELL - 356X150 - 20000 SQM • PP 3030 BIAXIAL GEOGRID - 20000 SQM • TECHGEO PR 25 - 20000 SQM
Consultant:	
MHATRE SANJEEV ARCHITECTS	
Manufacturer & Supplier:	Year of Construction:
TECHFAB (INDIA) INDUSTRIES LTD.	2024

Project brief :

The site is located in JNPT, Uran, Navi Mumbai, where the presence of deep soft clayey deposits is very common. The soft clayey deposits have very low bearing capacity, shallow water table and become slushy during monsoons. The client wants to build a warehouse and a container yard where there will be heavy movement of large ridge stackers (Fig. 1) and constant dead load of containers in 4 stacking arrangement (Fig. 2). This needs improvement in soil bearing capacity to sustain heavy machinery traffic and dead loads.

Fig. 1: Movement of ridge stackers at the site.

Fig. 2: Container stacked at the site.

Conventionally, such site would require huge soil replacement and a very thick concrete pavement. This solution could be very uneconomical and time consuming, therefore in order to find a low cost solution for the soft soil deposits and improvement the bearing capacity, the consultant approached TechFab India to propose a solution.

Solution Proposed :

In order to enhance the soil subgrade conditions, provide a firm support to the top pavement layer which could sustain heavy loading and reduce bearing pressure on the low bearing strata, it was decided to reinforce the subgrade soil with TechCell Geocell and TechGrid PP Biaxial geogrid.

Based on the information provided by the client, ground improvement is suggested using TechCell geocells. TechCell of pocket size 356mm and depth 150mm was proposed according to IS 17483 – Part 1.

The TechCell geocell filled with GSB or non-cohesive coarse angular material will help in reducing the pressure on the subgrade thereby minimizing differential settlement due to the induced pressure and providing basal support to the slab. TechCell will improve the modulus of marginal fill material and transfer the load pressure to wider area and hence reduces the strains to permissible limits.

In addition to TechCell Geocell, TechGrid PP3030 Biaxial Geogrid and Non-woven Geotextile PR25 was also used below the Geocell layers to act as a separation and filter layer. PP3030 will provide additional basal reinforcement and counter the radial stresses generated due to tyre movement of ridge stacker and heavy tractor trailers, while Non woven geotextile PR25 will provide a separation layer between the fine soil of the soft ground and the infill material and prevent the intermixing. It will also help in preventing the erosion of fines from the either layers.

Furthermore, it was suggested that the client could use paver blocks as the top layer which are easier to install, maintain and come at a lower cost as compared to concrete pavement.

Fig. 3 depicts the proposed section with geosynthetics.

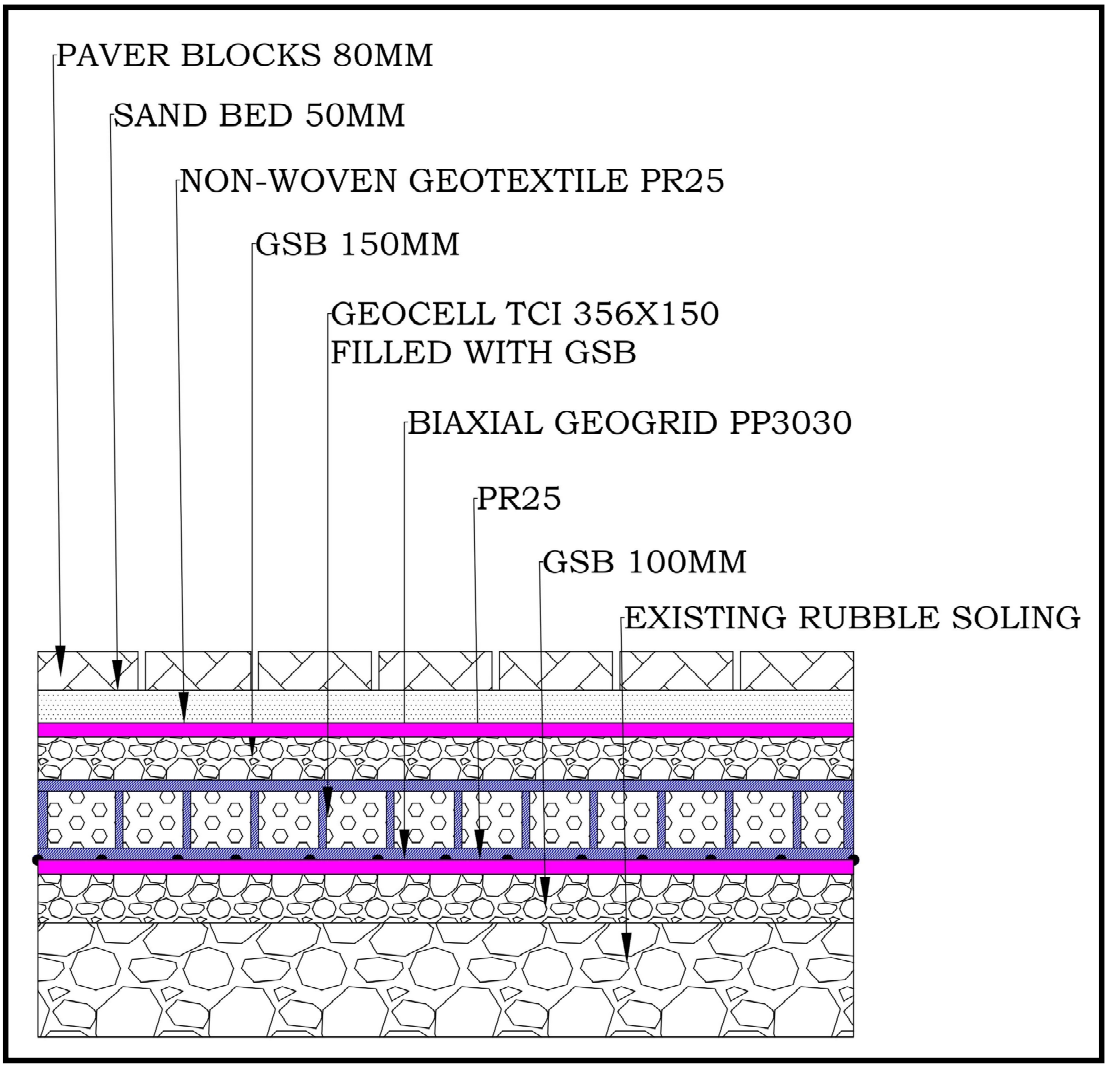

Figure 3: Proposed Section with TechCell Geocell, TechGrid Biaxial Geogrid and TechGeo NW Geotextile for Ground Improvement

Figure 4 a & b : Installation of Products at the site

The advantages of Techcell Geocell for pavement stabilization works are as follows:

- Lower capital costs - lower aggregate costs, reduced pavement structure, Enables use of lower quality / local granular infill in base layer
- Lower maintenance costs – decreases pavement degradation, repairs, rehabilitation cycles
- Easy and fast all-weather installation by work crews (trained onsite)
- Reduce infill requirements decrease quarrying, hauling, fuel and carbon pollution

Why Techcell Geocell is recommended?

Techcell is the cellular confinement system created, indigenously manufactured and distributed by TECHFAB INDIA made from High Density Polyethylene stabilized with carbon black which has higher tensile strength and stiffness.

Techcell is expanded on-site to form a honeycomb like structure, which is in filled with granular infill which creates unique cellular confinement system. Techcell will increase the shear strength of the confined soil, and increase load carrying capacity. With granular infill material and holes in Techcell wall, it enhances drainage and release pore water pressure.

Techcell is used for soil confinement, stabilization and reinforcement in wide variety of load support applications.

Designed for challenging roads, Geocells are a new standard in road base reinforcement and ground improvement. Geocells provide a stiffer layer which distributes the loads over a wider area and reduce the stress on the subgrade layer. The increased soil modulus allows you to save greatly reduce the overall pavement thickness.

Known as the “beam effect”, the result is a strengthened base layer, which prevents rut development and degradation of the sub-base layers. Thanks to the stiffness and strength of Techcell Geocell, the soil confinement is retained for entire road design life.

Aggregate resources are becoming scarce and costly. With Techcell Geocells you can use locally available infill materials. Thanks to our innovative technology, the same increased modulus effect can be achieved with marginal fill materials.

Why PP Techgrid is recommended?

With its rigid planar structure and junction efficiency, it works best with stone aggregates. The aggregates are locked in its aperture and prevented from lateral movement during loading. This helps in preventing the lateral spreading of the soil layer and also counter the radial stresses generated due to the wheel movement.

Why Techgeo Non woven geotextile is recommended?

Techgeo with its small aperture size, acts as a separator between two types of soil layers, preventing intermixing of soil and promoting the drainage of water through the soil layers.

Figure 5 : Installation of Products at the site

Conclusion:

The work is completed by contractor and presently the in excellent condition after one monsoon and the client is satisfied with the performance of TechCell Geocell, TechGrid PP Biaxial Geogrid and Techgeo Nonwoven Geotextile.

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