

CASE HISTORY

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GROUND IMPROVEMENT WORKS FOR SOFT SOIL FOUNDATION BY USING TECHCELL GEOCELL AT MACHILIPATNAM, ANDHRA PRADESH

MACHILIPATNAM, ANDHRA PRADESH, INDIA



Ground Improvement

Client:	Products used:
APTIDCO HOUSING SCHEME - GOVERNMENT OF ANDHRA PRADESH	TECHCELL - 445X100 PET GEOGRID
Main contractor:	Quantity supplied:
	46000 SQM.
Manufacturer & Supplier:	Year of construction:
TECHFAB (INDIA) INDUSTRIES LTD.	2019

Project description:

The APTIDCO (Andhra Pradesh Township And Infrastructure Development Corporation) is the state level nodal agency for Pradhan Mantri Awas Yojana (PMAY) with capabilities of holistic planning, development, financing and implementation of affordable housing in the state for the below poverty people.

It is found that foundation soil is black cotton soil, which has very low bearing capacity and hence the conventional foundation cannot be implemented.

This case study describes ground improvement for foundation over weak soil and recommends using Techcell Geocell over conventional methods in such conditions. Ground improvement by using Techcell Geocell resulted in minimum settlement of foundation.



Project challenges:

APTIDCO Housing scheme at Machilipatnam, Andhra Pradesh is government housing scheme. Machilipatnam town is in the Krishna Dist which is one of the coastal districts of Andhra Pradesh. The predominant soils in the district are black cotton soils/deltaic soils, red loamy soils and sandy soils.

It has been found that construction site has black cotton soil which is grey brown to black in color with fine to medium texture. The most important characteristic of the black cotton soil is, when it is dry, it shrinks and becomes hard like stone and has very high bearing capacity, but due to shrinkage it develops large cracks in the bulk of the soil. When the soil comes in to the contact with water or when it moist due to its high swelling index it starts expanding as per its swelling index properties, and becomes very soft and loses its bearing capacity.

Due to such soil properties of swelling and shrinkage, it exerts the pressure during increase of volume of soil which exerts pressure. The upward pressure exerted becomes so high that it tends to lift the foundation upwards. This reverse pressure in the foundation causes cracks in the wall above.

These unusual characteristics of the soil make it difficult to construct foundation in such soil. Special method of construction of foundation is needed in such type of soil. The major challenge of the project is to improve the bearing capacity of black cotton soil by suitable ground improvement method and minimize and control the settlements for the superstructure.

Solution:

The design solution included construction of raft foundation over improved ground by using Techcell Geocell (445 X 100) filled with granular material. Techcell will transfer the load pressure to wider area and hence reduces the pressure intensity on the soft soil to permissible limits.

This type of solution can be feasible in case of shallow foundation system and single story building/ large parking areas/ storage areas where the settlement needs to be control.

NOTE: In case of high rise building/ Rigid structures or special loading condition, such type of ground improvement can be adopted only after concerning Structural Consultants or Subject Experts.



The advantages of Techcell Geocell below raft foundation are as follows:

- Loads coming from superstructure are distributed over a larger area by Raft foundation and it is further distributed in larger area by TechCell Geocell confinement system.
- Differential settlement of soil can be reduced.

Why Techcell Geocell is recommended?

- Techcell is the cellular confinement system created, 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.
- This system can be use full for large parking areas, Storage areas; coastal areas, over poor subgrade for pavement constructions where ground improvement is require and needs to control the settlement.



Aerial View: Techcell laid and Infilling in progress



Aerial View: Compaction of infill and PET Geogrid on top



Aerial View: Raft Foundation completed

Execution on Site:

- The work site shall be well prepared before the installation. The ground shall be compacted in accordance with the project specification. All surfaces to be deployed shall be free of all foreign and organic material or sharp objects.
- Soil Infill layer of approximate 50 mm thick is laid and compacted to form uniform surface then as per the design requirement PET Geogrid is laid. PET Geogrid is provided on top and bottom layer of TechCell Geocell.
- Stretch Techcell Geocell to maximum area and allow it to relax and install J-pins (permanent or temporary) to anchor the edge cells. Align and fasten the Geocell by using hooks.
- Fill the system with the infill material suggested and level to approximately 50mm above the cells. Compact the infill material with Roller or compacter as suggested by Engineer in charge or as per the project specification.
- Proper side-to-side cell alignment is maintained to prevent loss of cell infill material. Compact every surface of the panels well as per the specification.
- Raft or Mat foundation was constructed as specified in design.



Aerial View: Construction of house over foundation is in progress

Conclusion:

The project was successfully completed, Client was very happy after looking at the performance of Techcell Geocell and PET Geogrid.

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