

Use of Geofom Layers for Foundation System in BC Soils

Abdullah Ansari ^{1*}, Dr. Prashant B Daigavane²

¹Research Scholar, Department of Civil Engineering, Indian Institute of Technology Delhi, Hauz Khas, New Delhi - 110016 India

²Professor and Dean (Infra & Liaison), Department of Civil Engineering, Government College of Engineering Nagpur, Nagpur – 441108 India

E-mail:

aamomin183@gmail.com / prashant.daigavane@gmail.com

*Corresponding Author:

Ansari Abdullah

Research Scholar, Department of Civil Engineering, Indian Institute of Technology Delhi, Hauz Khas, New Delhi - 110016 India

aamomin183@gmail.com

Abstract

Because of swelling and extension, the construction of the framework base constructed on BC soils presents great challenges to civil engineers. The swelling pressure is developed in the soil and it's exerted on the foundation if the BC soils comes into contact with excessive moisture content or saturation. The cracks are created in the foundation, walls, slabs and beams because of the development of high swelling pressure. There are strong chances of uplifting of the light weight structures due to high magnitude of swelling pressure. This paper discusses about the experimental work done on actual tank model. The proper layering of geofoms is helpful to handle the problem of swelling pressure.

Keywords: BC soil, Foundation, Geofom, Swelling.

1. Introduction

The swelling and shrinkage behaviour of BC soils is attributed to the presence of clay minerals with expanding Lattice structure. In dry state, it is hard but loses its stability on wetting. Expansive clay is a major source of heave induced structural distress [1, 2]. The foundations may get damaged due to the swelling of expansive soils. The volume of expansion is decided based on the magnitude of swelling pressure either in horizontal or vertical direction [4].

2. Materials

The Soils used, in these investigations is obtained from the premises of Shankarapur, nearby Government College of Engineering, Nagpur. In compliance with IS.2720, the physical properties of the soil are calculated by standard laboratory methods [3, 5]. The properties are mentioned in the Table 1.

Table 1. Properties of Soil

No.	Particulars	Value
1	Specific gravity of soil	2.65 %
2	Liquid Limit	52.82%
3	Plastic Limit	24.19 %
4	Shrinkage Limit	17.50 %
5	Optimum moisture content (O.M.C.)	18.95 %
6	Maximum dry density (M.D.D.)	16.23 KN/cum

The geofoam used in these investigations was polyethylene foam (trademark Profeel). The geofoam sheets of thickness 12mm were used as horizontal layers. The properties of the geofoam used are mentioned in the Table 2.

Table 2. Properties of Geofoam [2]

No.	Particulars	Value
1	Structure	Expanded Cell
2	Polymer	Polyethylene
3	Tensile Strength	350-450 Kpa
4	Modulus of Elasticity	12-42 Kpa
5	Compressive Strength	18 Kpa
6	Unit Weight	0.38 KN/cum

3. Experimental Program

Two similar R.C.C. tanks of 1000 mm x 1000 mm x 1000 mm depth were designed for experimentation, the sides of which had holes of 20 mm in diameter. These tanks are surrounded by an outer immersion tank filled with water for soil saturation. With the use of a mechanical jack, two 150 mm x 150 mm x 80 mm loading frames are connected to the loading frame. The swelling pressure measurement instrumentation work done using LVDTs [3, 4].

The soil was filled into the tank layer by layer using the traditional compacting process in order to obtain the necessary density. M.S. Model Footing Plate of scale 150 mm x 150 mm was kept at center on the compacted soil & the load cell was kept vertically in contact with the plate. The 12 mm thick horizontal compressible sheets (HCS) of geofoam is placed where D and B are footing depth and footing width respectively, taking into account different D/B ratios.

4. Result and Discussion

For horizontal compressible sheets of geofoam and inferences, the observations were recorded which is shown in the following Fig. 1.

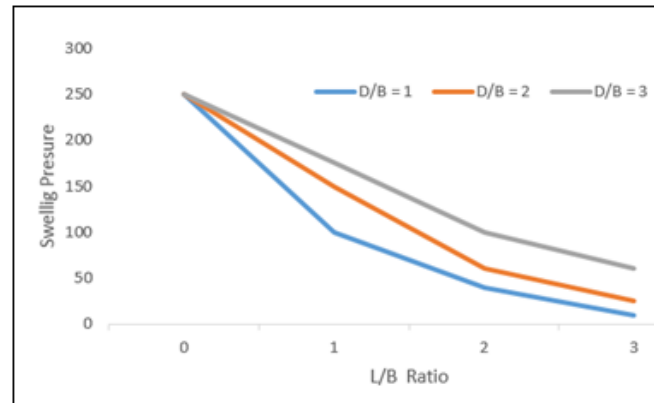


Figure 1. Swelling pressure reduction due to application of geofoam layer

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