The Novel Usage of EPS Geofoam as Column Material: A Laboratory Study

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Abstract

The technique of stone column to improve the performance of soft soil is well established. However, an alternative material to enhance the performance of the soft soil by reinforcing with geofoam materials is suggested. Expanded polystyrene (EPS) geofoam is a superlight weight geosynthetic material used in various geotechnical engineering applications. This study deals with the innovative use of geofoam as a column material in soft soil for improving the bearing capacity. The method was developed in small-scale laboratory tests, and a series of loading tests were carried out on various single floating geofoam columns (normal geofoam and hollow geofoam) with two different diameters and the length-to-diameter ratio of ۵. Next, a comparison was made with the results of ordinary stone columns and reinforced stone columns to obtain the benefits of geofoam columns. According to the results and by considering the bearing capacity, geofoam columns could be a good alternative material for improving the bearing capacity of soft soils. It was also found that the efficiency of the geofoam columns is almost similar to that of the ordinary stone columns and the usage of the geofoam is easy and economical. However, encasing the stone columns with geotextile results in further growth in the bearing capacity.

Keywords :

Geosynthetics · Geofoam · Stone column · Ground improvement · Laboratory study