

Cement and Silica Fume Treated Columns to Improve Peat Ground

ABSTRACT

Peat layers are weak; much weaker and more compressible than inorganic soils, and thus do not provide suitable support for most engineering structures. The usual methods have been either to remove peat and replace it with suitable soil or to pass piles through it to the stronger soil layers below. On the other hand, research has been carried out to discover ways to strengthen peat deposits by deep stabilization. Peat was reinforced with precast columns stabilized with cement and silica fume. Unconfined compressive strength, Rowe cell consolidation test and plate load test were carried out to evaluate the increase in strength. The compression index (C_c) of peat samples, upon use of stabilized precast columns, was found to reduce by 36 % using only 5 % cement. Further, when 10 % silica fume was added along with cement, the C_c decreased by 42 %. Plate load test results indicated that the bearing capacity of peat can be improved significantly by over 84.6 % when 15 % cement is used, and also the use of silica fume with cement further increased it to 107.7 % compared with untreated peat. The precast stabilized columns (stabilized with cement and silica fume) can be used successfully to improve the engineering behaviour of soft peat deposits and as a result improve its strength and bearing capacity. Finite element analysis was carried out to understand the distribution of stresses in peat as well as in the stabilized column.

Keyword: Peat, Cement, Silica fume, Precast column, Compression index, Recompression index, Plate load test