C-15: Improvement of engineering properties of peat by preconsolidation

S A S Kulathilaka, C I Bamunuvita
(Dept of Civil Engineering, University of Moratnwa)

Presence of peat layers of large thickness poses a major construction difficulty due to their very high compressibility and very low shear strength. Loads from any fill and the proposed structures would cause unacceptably high settlements in the peat causing much distress in the structure. In some cases it could even lead to shear failure. For single or two storied structures imposing moderate loads and for road embankments, use of piled foundations would not be economically feasible. Transferring the structural loads to a "improved peat" would be an attractive alternative.

Preconsolidation can be used to improve the engineering properties of peat. In this process a load equal to or greater than the expected structural load is applied to the peat and it is allowed to consolidate. Once the desired consolidation is achieved preload is removed and the structure is erected. Generally preloading is applied through an additional layer of fill.

Settlements in a loaded peat are due to initial compression, primary consolidation and secondary consolidation. In addition to large initial compression and primary consolidation settlements, peats are known to exhibit large secondary consolidation settlements as well.

The process of preconsolidation (preloading) in the field is simulated in the laboratory by carrying out loading-unloading and reloading tests in a conventional consolidation test setup.

Test results indicated that primary consolidation settlements as indicated by the parameter compression index C_c or coefficient of volume compressibility m_v can be reduced to about 10% of an "unimproved" peat. It is also shown that the coefficient of secondary consolidation C_α is reduced to 1/100th of the initial values.