

## **Performance of chemically treated natural fibres and lime in soft soil for the utilisation as pile-supported earth platform**

### **ABSTRACT**

This work presents the effect of lime and treated coir fibre on the mechanical behaviour of soft clay soil as a pile-supported earth platform. The experimental programme comprised three types of test (flexural strength, indirect tensile strength and triaxial compression strength). Experimental results were used in a numerical analysis in order to observe the performance of the treated soil as a load-transfer base layer depending on the height of the earth platform and the material properties of the treated soil. Two-dimensional physical model experiments were performed to validate the numerical model of the pile-supported load transfer platform. The numerical analyses showed the importance of the mechanical properties of the treated soils for the efficacy and effectiveness of the reduction of the settlement of the earth platform, as well as to enhance the bending performance of the earth platform. The efficacy of limed soil reinforced with chemically treated coir fibres is up to 30 % under various loadings of structures when the effective height of the earth platform is 0.3 m. The differential settlement at the elevation of the pile head is significantly reduced by up to 100 %. Present study concluded that this treatment technique can not only increase the mechanical performance of the coir fibres and lime-reinforced soil, but can also improve the interfacial mechanical interactions between the coir fibre surface and the soil particles, resulting in higher performance of the composites used as a pile-supported earth platform.

**Keyword:** Natural fibre; Lime; Mechanical properties; Numerical analysis; Physical model; Pile-supported earth platform