

## **Bearing Enhancement of Pad Foundation on Geomat Reinforced Soft Soil: Numerical study**

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A foundation is a substructure that transmits the load coming from the superstructure to underlying soil or rock. When designing a shallow foundation, special consideration should be paid to critical parameters such as bearing capacity and settlement. Increasing population growth and the demand for the land, force the constructions on soft soil, where the bearing capacity of the soil needs to be improved. Reinforcing the soil with environmentally friendly material made from coconut fiber, known as coir geomats, is one of the sustainable and cost-effective methods used to improve the bearing capacity of such soils. Many studies have been carried out related to improvement in the bearing capacity of sand soil using reinforcing material. However, there have been only few studies focusing on the improvement of very soft soil using geomats. Thus, the aim of the study was set to investigate the bearing capacity of peat by varying the number of geomats at different depths. Coir geomat is to be coated with polythene to improve the durability in the peat. Analytical methods such as Terzaghi's theory and Eurocode7 provisions, were used to estimate the unreinforced bearing capacity and settlements of a pad footing in a specific configuration. Then, a numerical model was developed in the finite element software, *PLAXIS*, to predict the load-settlement behavior. Fine mesh analysis was used for numerical analysis to confirm the convergence of results. The analytical estimates were compared with results from numerical analysis. Furthermore, the numerical analyses were extended to investigate the effect of various parameters: depth to first reinforcement ( $u$ )/ Footing width ( $B$ ), spacing between reinforcement layers ( $h$ )/ $B$ , and length of the reinforcement layer ( $L$ )/  $B$ . The results showed that the reinforcement configuration has a very significant effect on the behavior of reinforced peat soil foundation. For effective utilization of coir geomat reinforcement, the optimum depth to first reinforcement should be  $0.2B$ , the vertical spacing between reinforcement layers should be  $0.2B$ , the length of the reinforcement layer should be  $3B$  and the number of reinforcement layers should be at least three.

**Keywords:** Bearing capacity, Coir geomat, Peat soil, Settlement, Shallow foundation