

# Strength of Soft Clay Reinforced with Group Crushed Polypropylene (PP) Columns

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## ABSTRACT

The use of granular columns as soil reinforcement technique has proved useful in problems of foundation stability and settlement, as well as improving soft clay for foundation construction. The purpose of this study is to investigate the enhancement of shear strength of soft kaolin clay when it is reinforced with group crushed polypropylene (PP) columns. Since PP is a waste material, the cost of soil improvement can be reduced which currently was disposed totally in large quantity into landfill. In order to proceed the study, physical and mechanical properties of materials used that are kaolin (soil sample) and PP (reinforcing columns) must be identify first. Then, consolidated kaolin as soft clay was reinforced with group crushed PP columns, and subsequently tested under Unconfined Compression Test (UCT). A total of 7 batches of kaolin sample including control sample had been tested to identify the shear strength. Each batches involved of four samples to find the average value of maximum stress. The variables used for the columns installation were the column heights of 60 mm, 80 mm and 100 mm, where the column penetrating ratio are 0.6, 0.8 and 1.0 respectively. In addition, different values of columns diameter had been used that are 6 mm and 10 mm for every different height of columns. A total of 28 unconfined compression tests had been conducted on kaolin samples. The kaolin samples had the dimensions of 50 mm in diameter and 100 mm in height. For the group PP reinforcement, shear strength increased about 2.13%, 13.51% and 12.84% for 1.44% area replacement ratio and 6.85%, 14.26% and 13.79% for 4% area replacement ratio at sample penetration ratio 0.6, 0.8, 1.0 respectively. It can be concluded that the shear strength parameters were affected by the diameter and the height of the columns and the presence of PP column greatly improve the shear strength.

**KEYWORDS:** Soft soil; soil improvement, PP columns.