

Shear Strength Parameters and Consolidation of Clay Reinforced with Single and Group Bottom Ash Columns

Aminaton Marto · Muzamir Hasan · Masayuki Hyodo · Ahmad Mahir Makhtar

Abstract : Stone column could be used as a ground improvement technique where a portion of the soil is replaced with granular material such as crushed rocks or sand which is proven to increase bearing capacity and accelerate the dissipation of pore water pressure. Since bottom ash, as the waste of coal burning, possesses similar properties to sand, there is a potential of using bottom ash as stone columns. This paper discusses the results of the improvement in shear strength parameters of clay when reinforced with single and group bottom ash columns (BAC). A total of 39 specimens of kaolin samples were isotropically consolidated and sheared using Consolidated Undrained Triaxial Tests with pore pressure measurement to determine the shear strength parameters. Test variables include the diameter and height of columns and effective confining pressure. Results indicate that the installation of BAC in clay specimens increased the apparent cohesion but did not show any significant difference in the effective friction angle. Generally, the apparent cohesion of soft clay reinforced with partially penetrating columns is higher than that of fully penetrating columns. It is also found that during consolidation, the dissipation of pore water pressure was accelerated with the presence of BAC. Hence, it can be concluded that the consolidation and shear strength of soft clay could be improved by the installation of BAC.

Arab J Sci Eng

DOI 10.1007/s13369-013-0933-2