World Academy of Science, Engineering and Technology
International Journal of Civil and Architectural Engineering
Vol:10, No:07, 2016

The Utilisation of Two Types of Fly Ashes Used as Cement Replacement in Soft Soil Stabilisation

Authors : Hassnen M. Jafer, W. Atherton, F. Ruddock, E. Loffill

Abstract : This study represents the results of an experimental work using two types of fly ashes as a cement replacement in soft soil stabilisation. The fly ashes (FA1 and FA2) used in this study are by-products resulting from an incineration processes between 800 and 1200 ˚C. The stabilised soil in this study was an intermediate plasticity silty clayey soil with medium organic matter content. The experimental works were initially conducted on soil treated with different percentages of FA1 (0, 3, 6, 9, 12, and 15%) to identify the optimum FA1 content. Then FA1 was chemically activated by FA2 which has high alkalinity by blending the optimum content of FA1 with different portions of FA2. The improvement levels were evaluated dependent on the results obtained from consistency limits and compaction tests along with the results of unconfined compressive strength (UCS) tests which were conducted on specimens of soil treated with FA1 and FA2 and exposed to different periods of curing (zero, 7, 14, and 28 days). The results indicated that the FA1 and FA2 used in this study effectively improved the physical and geotechnical properties of the soft soil where the index of plasticity (IP) was decreased significantly from 21 to 13.17 with 12% of FA1; however, there was a slight increase in IP with the use of FA2. Meanwhile, 12% of FA1 was identified as the optimum percentage improving the UCS of stabilised soil significantly. Furthermore, FA2 was found effective as a chemical activator to FA1 where the UCS was improved significantly after using FA2.

Keywords : fly ashes, soft soil stabilisation, waste materials, unconfined compressive strength
Conference Title : ICBMCE 2016 : International Conference on Building Materials and Civil Engineering
Conference Location : Paris, France
Conference Dates : July 25-26, 2016