

Soil-Geopolymer Mixtures for Pavement Base and Subbase Layers

Authors : Mohammad Khattak, Bikash Adhikari, Sambodh Adhikari

Abstract : This research deals with the physical, microstructural, mechanical, and shrinkage characteristics of flyash-based soil-geopolymer mixtures. Medium and high plastic soils were obtained from local construction projects. Class F flyash was used with a mixture of sodium silicate and sodium hydroxide solution to develop soil-geopolymer mixtures. Several mixtures were compacted, cured at different curing conditions, and tested for unconfined compressive strength (UCS), linear shrinkage, and observed under scanning electron microscopy (SEM). The results of the study demonstrated that the soil-geopolymer mixtures fulfilled the UCS criteria of cement treated design (CTD) and cement stabilized design (CSD) as recommended by the department of transportation for pavement base and subbase layers. It was found that soil-geopolymer demonstrated either similar or better UCS and shrinkage characteristics relative to conventional soil-cement mixtures. The SEM analysis revealed that microstructure of soil-geopolymer mixtures exhibited development and steady growth of geopolymerization during the curing period. Based on mechanical, shrinkage, and microstructural characteristics it was suggested that the soil-geopolymer mixtures, has an immense potential to be used as pavement subgrade, subbase, and base layers.

Keywords : soil-geopolymer, pavement base, soil stabilization, unconfined compressive strength, shrinkage, microstructure, and morphology

Conference Title : ICIPE 2019 : International Conference on Infrastructure and Pavement Engineering

Conference Location : Rome, Italy

Conference Dates : January 17-18, 2019