

Effect of Alkali Activator Type on the Local UAE Sand Treated with Alkali Activated Binders

Bara Jarah¹, Mohamed G. Arab^{1, 2}, Talha Junaid¹, Maher Omar¹

¹ Civil & Environmental Engineering Department, College of Engineering, University of Sharjah
27272, Sharjah, UAE

U16200661@sharjah.ac.ae ;marab@sharjah.ac.ae; mjunaid@sharjah.ac.ae; momar@sharjah.ac.ae

²Structural Engineering Department, Mansoura University

Al-Gomhoria Street, Mansoura, Egypt

mg_arab@mans.edu.eg

Abstract - Unfavorable soil conditions may affect structures and pavement performance adversely during their service life. This study is a preliminary study on the use of Alkali-activated binders (AABs) known as geopolymers to stabilize surficial loose sand deposits at ambient temperature. Several mixes of fly ash (FA) and ground-granulated blast-furnace slag (GGBFS) to stabilize local dune-sands were investigated. Two different solutions were employed as reaction activators in this investigation namely sodium silicate solution (SS) and sodium hydroxide solution (SH). A precursor/soil ratio of 10% was used throughout this study. The factors studied for the geopolymerization process were activator/solids ratio, SS/SH ratio and FA/GGBFS ratio. The tested specimens were cured at a temperature of 35 degree Celsius for 8 days. Results showed that increasing SS/SH ratio from 0 to 0.5 causes a strength increase in all studied mixes, while increasing the ratio from 0.5 to 1 causes a strength reduction except in the mix with only GGBFS and 0% of fly ash. GGBFS reacts with sodium silicate to form the aluminu-silicate gel which strengthen the geopolymer sample. A preferred mix concluded in this study has a FA/GGBFS ratio of 50:50 and a SS/SH ratio of 0.5 due to its high strength and relatively economical value.

Keywords: Soil improvement; alkali activated; dune sand; fly ash, GGBFS