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The Effect of Zeolite on Sandy-Silt Soil Mechanical Properties

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Abstract : It is well known that cemented sand is one of the best approaches for soil stabilization. In some cases, a blend of sand, cement and other pozzolan materials such as zeolite, nano-particles and fiber can be widely (commercially) available and be effectively used in soil stabilization, especially in road construction. In this research, we investigate the effects of CaO which is based on the geotechnical characteristics of zeolite composition with sandy silt soil. Zeolites have low amount of CaO in their structures, that is, varying from 3% to 10%, and by removing the cement paste, we want to investigate the effect of zeolite pozzolan without any activator on soil samples strength. In this research, experiments are concentrated on various weight percentages of zeolite in the soil to examine the effect of the zeolite on drainage shear strength and California Bearing Ratio (CBR) both with and without curing. The study also investigates their liquid limit and plastic limit behavior and makes a comparative result by using Feng's and Wroth-Wood's methods in fall cone (cone penetrometer) device; in the final the SEM images have been presented. The results show that by increasing the percentage of zeolite in without-curing samples, the fine zeolite particles increase some soil's strength, but in the curing-state we can see a relatively higher strength toward without-curing state, since the zeolites have no plastic behavior, the pozzolanic property of zeolites plays a much higher role than cementing properties. Indeed, it is better to combine zeolite particle with activator material such as cement or lime to gain better results.

Keywords : California bearing ratio, CBR, direct shear, fall-cone, sandy silt, SEM, zeolite
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