

## IMPROVING GEOTECHNICAL CHARACTERISTICS OF KAOLIN SOIL USING SILICA FUME AND LIME

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Soil stabilization, as a cost-effective and environmentally friendly method, is used in the building of systems such as roads, dams, and river levels. Chemical stabilization of soil is carried out by adding binder or by-products such as lime (L) and silica fume (SF) to the soil, thereby modifying the geotechnical performance of the soil. This type of soil can be categorized as problematic due to its weak properties. At the preliminary stage, soft clay soil does not meet the requirements necessary for construction purposes because the entire load from the top of the building will be transferred to the underlying soil. This research considered the soil stabilization of a soft clay soil (Kaolin S300) stabilized with various percentages of lime and 4% SF. The percentage of lime varied at 3%, 5%, 7%, and 9%, while the percentage of SF was fixed at 4%. The main objective in this research was to improve the undrained shear strength of soft clay soil mixed with various percentages of lime and also 4% SF. The focus of the study was on determining the physical properties of the soils tested and the consolidation of kaolin mixed with 4% SF and different percentages of lime. The results showed that the optimum L-SF percentage with respect to the maximum shear strength occurred at 5%. The soil-L-SF mix increased the shear strength and angle of internal friction compared to the soil-L and soil-SF mixes because the pozzolanic reaction between lime and SF was more effective with soil particles. The optimum percentages for enhancing the shear strength and the angle of friction were 7% and 4% for lime and SF, respectively. Microstructural development took place in the stabilized soil due to an increase in the lime content of tertiary clay stabilized with the L-SF mix.

**KEY WORDS:** stabilization, soft clay, silica fume, lime, shear strength, consolidation, scanning electron microscope (SEM)