

Studies on strength characteristics of black cotton soil by using novel SiO₂ combination as a stabilizing agent

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Palabras clave

Nanoparticle, SEM, EDAX, Finite element analysis, CBR

Abstract

The rapid growth in industrialization and population leads to generation of large quantity of wastes, some materials were containing high silica contents is dumped as a waste. In this study such dumped silica wastes from various industries is collected and subjected to studies as a stabilizing material for black cotton soils, such assorted materials are Fly ash, GGBS, Rice husk ash, Precipitated silica and Calcium chloride. By effective nanoparticle studies like SEM, EDAX, presence of silica, aluminum and magnesium proportion in each industrial waste is formulated. From the result of nanoparticle analysis novel silica combination prepared by composition of all those materials based on cementitious mineral presence. In before studies one or two combinations only used as stabilizer but in this paper a new group bearing binder combination is designed and their behavior with chosen geo material and its respective engineering, strength and hydraulic properties is studied by Constantine combination proportion to 20% to weight of soil. Properties such as California bearing ratio (CBR), and North Dakota of the soils were determined with the addition of stabilizers. From the results engineering properties of the poor engineering graded soil were improved is clearly visualized. For the normal soil and effective result binder proportion, a comparison in finite element analysis using PLAXIS is carried out for footing study. Finally, the study showed that exact cementitious mineral combination from industrial waste could improve the geotechnical properties of highly inorganic soil.