



Research paper

Improvement of a subgrade soil by using EarthZyme and cement kiln dust waste

A. H. Abdulkareem¹, S. O. Eyada², N. S. Mahmood³

Abstract: Soil stabilization techniques are widely used for road construction to improve the properties of the subgrade materials. Using new additives and stabilizers to improve soil properties can reduce the costs of construction and reduce the possible negative effects of these materials on the environment. The purpose of this study was to evaluate the use of a liquid based nano-material called EarthZyme (EZ) and cement kiln dust (CKD) as admixtures to improve the soil properties. A mixture of two soils was used in this study which were prepared from mixing sand soil and fine-grained soil. Compaction tests were performed on the soil that was stabilized with the CKD to determine the density-water content relationships. Unconfined compression tests were also conducted on specimens without treatment, specimen treated with the CKD only, and specimens treated with the CKD and the EZ after curing period for seven days. The obtained results indicated that adding the CKD to the soil decreased the values of the unconfined compression strength (UCS) from 5 to 15 percent. However, adding the CKD reduced the maximum dry density (MDD) from 10 to 12 %. As discussed herein, soil stabilization with the EZ had insignificant effects on the results obtained from the unconfined compression test.

Keywords: Soil stabilization, Unconfined compressions, EarthZyme, Cement kiln dust, Nano material.

¹ PhD, Civil Engineering Department, University of Anbar, Ramadi, Iraq, e-mail: ahm1973ed@uoanbar.edu.iq, ORCID: <https://orcid.org/0000-0001-9175-2512>

² MSCE, Civil Engineering Department, Selcuk University, Turkey, e-mail: saadooneyada@gmail.com, ORCID: <https://orcid.org/0000-0001-9613-4940>

³ PhD, The Department of Dams and Water Resources, University of Anbar, Ramadi, Iraq, e-mail: nabeelshm@uoanbar.edu.iq, ORCID: <https://orcid.org/0000-0002-4886-2529>