



Evaluation of U-Lnp' Curves for the Stabilization of Saline Clayey Soils

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Abstract

Saline soils are one of the challengeable soils that can cause many problems in civil engineering designs. In this study, volume change behavior and stress path changes in the U-Lnp' space of these soils, and the effect of stabilization and reinforcement on them have been investigated. Case study of this research is Amirkabir Highway between Qom and Kashan. In 54th Km of this highway, road surface is distorted and it is observed that its soil is saline clay in field investigation; and considering surface flow of water in that place, it is induced that, probably, the presence of water causes such a condition. For this purpose, after sampling and conducting preliminary experiments such as particle size analysis, Atterberg limits and compaction, first of all, the soil of considered place was examined by swelling potential and consolidation tests. as a result, volume change behavior parameters of undisturbed and disturbed soils have been determined and it was specified that disturbed soil has a considerable swelling potential. Then swelling potential and consolidation tests have been conducted on stabilized samples with different amount and curing time of lime, epoxy – resin polymer and also reinforced samples with different amount of polypropylene fiber; moreover, their results for two cases of stabilized and non-stabilized samples have been compared. According to the results of the consolidation experiments and the potential for swelling, it is observed that the impaction strongly affects the volume behavior and the soil stress path. The comparison among swelling parameters (free swelling and swelling pressure) of stabilized samples with polymer and lime and reinforced samples with polypropylene fiber showed that all of these materials reduce free swelling, but for the case of swelling pressure, with 9 % of polymer swelling pressure increases and for other cases this pressure decreases, that this issue is one of disadvantages of polymer stabilization. The results obtained from the consolidation test indicate that the slope of the normal consolidation line λ and the swell line slope κ in the stabilized samples are smaller than the unstabilized samples.

Keywords: Saline Clayey Soil; Volume Change Behavior; Stress Path in the U-Lnp' Space; Swelling; Consolidation; Stabilization; Lime; Epoxy –Resin Polymer; Polypropylene Fiber.

1. Introduction

Considering that nearly 15 percent of Iran's territory is covered with saline soils, there is little study in the field of soil mechanic parameters and studies done limited to agricultural and geological fields, as well as considering the problems that these soils cause for development projects, the geotechnical characteristics of these soils are studied and a solution for improvement is provided.

Saline soils are one of challengeable soils that could cause many problems in civil engineering designs. Many studies have been conducted for determining geotechnical properties of saline soils all over the world. Sabkha soils are one of saline soils that much researches has been done into them [1, 2]. Main features of saline soils are high compressibility

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