



## **Effects of Freezing and Thawing on Consolidation Behavior of Clayey Soils**

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An apprehending of freezing and thawing effects on cohesive soil is considerable for many construction and environmental subjects. This paper relates the effects of freezing and thawing on consolidation behaviour of clayey soils. The Capital of Ankara settled on a sequence of lacustrine sediments. These sediments include fine grain soils, locally. Collected samples were undisturbed grey clay and clayey sand that were obtained from the bottom of a construction zone at about 1m depth below the ground surface. Total of 32 moulded samples were prepared with constant water content to reflect the moisture condition in the active surface layer. Gray clay and clayey sand were analysed in the laboratory, and found to have the plastic limits (PL) of 33.01% and 22.56%, the liquid limits (LL) of 75.05% and 36.97%, and the plasticity indexes (PI) of 42.04% and 14.41%. The soil samples were classified as "CH" and "SC" in accordance with the unified soil classification system. Soil samples for all tests were placed in a freezer that has  $-18^{\circ}\text{C}$  temperature. Samples have been waited in it for twenty-four hours. Then, they have been removed from the freezer and allowed to stand for twenty-four hours at a constant room temperature ( $21^{\circ}\text{C}$ ) and humidity (80% RH). As a result, one freezing and thawing cycle was achieved between  $-18^{\circ}\text{C}$  (24 hours) and  $21^{\circ}\text{C}$  (24 hours), and it took two days. Freezing and thawing (FT) sequences were selected as 1, 3, 7, 14 and 21. After each FT sequence, Atterberg limits and consolidation tests were carried out in accordance with ASTM standards. Liquid and plastic limits of soil samples, suddenly, were decreased after first FT cycle. That state is a sign of the clay mineral orientation due to freezing and thawing process. The soil classification of clayey sand was changed from "SC" to "SM" after first FT cycle. Furthermore, the coefficient of consolidation and permeability of grey clay had been increased by rising in FT cycles up to 7 and then continue to decline as well as these values of clayey sand start to decrease after 14 FT cycles.