

The Significance of Disturbance and Thixotropy in Mobility Problems

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ABSTRACT

The details of an investigation to evaluate the effects of disturbance on stress-strain relationships of cohesive soils in the problem areas of plate sinkage and shear strength are described in this paper. The problem presented is twofold:

1. The investigation of the effects of complete disturbance or remolding to clay soils and subsequent thixotropic regain characteristics as measured by empirical soil stress-strain parameters.

2. The establishment of a measuring system for identifying different degrees of disturbance imparted to clay soils.

Disturbance processes result in a decrease of the empirical vertical load sinkage soil values and the shear strength properties, with subsequent increase noted with increased time after disturbance. A general increase in resistance to sinkage of both a test footing and a rigid wheel is also noted with increased time after disturbance, demonstrating the significance of thixotropic regain characteristics of cohesive soils in mobility problems.

Partial disturbance was initially investigated by analyzing thixotropic regain characteristics of the soil in both wheel sinkage and shearing strength in an attempt to simulate measurable degrees of disturbance. This method did not provide a positive approach and was replaced by a constant volume shear box to uniformly introduce a predetermined amount of disturbance.

An analysis of force-angular displacement relationships obtained with a modified constant volume shear box resulted in establishment of a system for identifying different degrees of disturbance. This makes it possible to analyze the significance of partial disturbance on a mobility soil value system in cohesive soils.

THE FIELD OF OFF-ROAD transportation is one of the oldest known to man and yet the problems inherent in this field have attracted little attention from engineers and scientists until recently. The mechanics of off-road transportation or land locomotion are concerned with the complex problems of the relationship between wheeled or tracked vehicles and various types and conditions of natural soil surfaces. The need for basic research on the ground properties which affect vehicle performance has been emphasized by experience of land locomotion in the areas of military mobility, agriculture mechanization, timber transport, and earth moving equipment.

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