THE USE OF RELATIVE DENSITY FOR COMPACTION CONTROL

by

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INTRODUCTION

The compaction control of the different kind of fills has been the concern of the engineers for many years. The adequate compaction of a fill guarantees its stability and will minimize the differential settlement of structures built on it.

The sand, classified as a cohesionless soil, shows special behavior during the compaction process. The Proctor Curve for clean sand takes the shape of a U in the different ASTM test procedures. This characteristic induced this research effort for a compaction control that takes into account the sand properties. One of these methods is the concept of relative density, widely used in the world. This test requires the use of costly equipment besides the uncertainty of the results. The construction specifications do not allow the use of a compaction control different from that previously specified, and the interpretation of the relative density result may delay the construction of the project or end in a quarrel between the constructor and the owner. The relative density test involves many errors and the use of other control methods seem to be worthwhile to develop.

SCOPE AND PURPOSE OF THE STUDY

The study will cover a review of the literature available on relative density and Proctor density, and a description of the more recent test methods, in order to have the best idea of the use of the relative density as a construction control criterion, the use of correlations of relative density with engineering properties of granular soils, and a series of data that uses the concept of relative density with the Standard and Modified compaction test and the percent compaction criterion.

LITERATURE REVIEW

Compactions Methods

The Proctor density compaction method was first described by R. R. Proctor (1), 1933, and it was developed for controlling the compaction of soil. Proctor found that soil can be compacted to a maximum dry density with the least amount of effort at a specific moisture content which he termed the optimum moisture content. The laboratory test procedure is called the Standard Proctor density test and is described in detail in ASTM D-698.

In recent years heavier compacting equipment has come into use and, in order to reproduce the greater densities obtained with this equipment, modified compaction tests have been developed (2). The laboratory test procedure is called the Modified Proctor density test and is described in detail in ASTM D-1557.

Tamping is the oldest method of compaction. It provides momentary pressure at the instant of impact and some vibration, and because of this dual action it is effective in both cohesive and cohesionless soils (3).

Rolling produces pressure that is applied for a relatively short time, depending on the roller speed. The sheepsfoot roller consists of a steel drum with projecting lugs or feet. It applies a high static pressure to a small area. Because of the small width of the loaded area, the sheepsfoot roller is adapted best to cohesive soils such as clays. A modified