



Mechanical Behaviour of Soil-Cement

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Abstract

Soil-cement stabilization is a technique used worldwide in construction to improve the engineering properties of soils. This technique is used on variety kind of soil often under environmental extremes. This paper investigates the resultant density, optimum water content and compressive strength when cement is used to improve the properties of a clay soil. A series of compaction tests were conducted on mixture of soil cement. Furthermore, a number of unconfined compressive strength tests were performed on different soil-cement samples. The results indicated that maximum dry density and optimum water content change with different percent cement under same compactive effort and unconfined compressive strength increases approximately linearly with cement content.

Key words: Soil-cement, compressive strength, dry density, optimum water content

Introduction

It is accepted that the improving the properties of soil by stabilization is considered as a means of fulfilling the design criteria. Stabilization is usually performed to improve the strength and stiffness of soil. The stabilization or improvement is affected by controlling the void ratio of the soil, by introducing a cementing or waterproofing agent, or by injection substance to fill the pore volume. Although there are several technique of stabilization but the usage of it depends on the nature of soil. Cement stabilization is one of the well known techniques that have been practised from one hundred years age. In general there are three types of soil and cement mixture as follows:

Plastic soil cement

It is a hardened mixture of soil and cement. It is used to line or pave ditches, slopes and other area that are subjected to erosion.

Cement-modified soil

It is an unhardened or semi hardened mixture of soil and cement. It may be used for base courses, sub-bases, treated sub-grades, highway fills and as trench backfill material.

Compacted soil-cement

It is often referred to as a simply soil-cement, it is a mixture of pulverized soil and calculated amounts of Portland cement and water that is compacted to a high density. The result is a rigid slab having enough compressive strength and resistance to the disintegrating effects of wetting and drying and freezing and thawing.

Many researchers such as Broms and Boman (1977), Terashi and Tanaka (1981), Bell (1989) and Rajasekaran and Narasimha (1977) studied the mechanical and physical behaviour of soil-cement. They concluded from the experimental results that the cementing agents improve the geotechnical properties of soil such as shear strength and resistance to the effects of wetting and drying.

This paper describes an investigation into the effect of cement on maximum dry density and strength of a clay soil.