

The Use of Kaolin and Cement for Stabilization of Clay

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ABSTRACT

Different ways in order to stabilize the soil and retrofit it to build huge buildings and structures on the ground and also to notify the sustainability of the soil base is always presented. This research paper focuses on the impact of Porcelain soil or kaolin, as well as Portland cement on soil stability, and these factors have been studied.

This impact is evaluated by use of different tests such as direct shear test, standard density and infinite compressive stress on the sample clay. Result of these tests in the form of charts and tables shows the impact of using kaolin and cement on the different parameters of soil sample; such as dried density, optimum moisture, stress and strain made in it.

Keywords: stabilized clay, kaolin, silica sand, cement

1. INTRODUCTION

Soil sustainability has often been the main concern of researchers in geotechnical sciences, and civil engineers had always looked for solutions to stabilize and sustain the soil besides having an economical design. Thus, different ways such as mechanically stabilized earth, anchorage, nailing and etc., have been evaluated and employed so far [3]. These methods in addition to achieve good results would impose high costs on shoulders of company or individual. One of the most influential factors which improves the soil stabilization, is the usage of cement which improves the soil structure by increasing inter-cluster cementation bonding and reducing the pore space. As the cement content increases for the given water content, three zones of improvement are observed: active, inert and deterioration zones. The active zone is the most effective one for stabilization where the cementitious products increase with cement content and fill the pore space. In active zone, the effective mixing state is achieved when the water content is 1.2 times the optimum water content. In this state, the strength is the greatest because of the highest quantity of cementitious products. In the short stabilization period, the volume of large pores (larger than 0.1 μm) increases because of the input of coarser particles (unhydrated cement particles), while the volume of small pores (smaller than 0.1 μm) decreases because of the solidification of the cement gel (hydrated cement) [1]. In this study, by injection of kaolin as a mineral material, tried to stabilize and sustain the soil which has the clay permeability features.

2. Goal and research plan

Among the goals of building a structure in first steps of work is to be informed of local soil structure which in the case of any problem, soil stability should be done. One of the ways currently used in most cases is grouting in which by injecting cement or a suitable material into the soil structure and