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Stabilization of Soil Using Egg Shell Powder and Quarry Dust

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Abstract:
Nowadays, considerable attention has been paid to the utilization of alternative materials, which bear higher engineering quality than traditional materials and are financially affordable. Soil is one of the most important materials used in a variety of construction projects including earth canals and earth dams. The fact that soil may provide all the resistance characteristics necessary for a project illustrates the importance of various methods used to improve soil quality. Clay soil is widely used in most of the construction projects. Clay soils, particularly soft clay soils, have good plastic properties so that increased moisture results in their decreased shear strength, compressive strength and volume changes. These damages typically take an irreparable toll on structures, which further clarifies the importance of soil improvement. Considering millions of tons of waste produced annually across the country, which not only poses the problem of disposal but also adds to environmental contamination and health risks, utilization of such refuse and industrial wastes and their subsidiary products as alternatives to construction materials may effectively contribute to environmental preservation and minimization of their adverse effects on the Environment.

1. INTRODUCTION

For any land-based structure, the foundation is very important and has to be strong to support the entire structure. In order for the foundation to be strong the soil around it plays a very critical role. So, to work with soils, we need to have proper knowledge about their properties and factors which affect their behaviour. Soil stabilization is a process whereby natural or synthetic materials are added to soil improving soil properties. It is typically used to modify and improve low-quality materials, which brings about changes in soil properties including decreased rate of subsidence, decreased adhesion coefficient in soils with high cohesion (clay), increased adhesion coefficient in soils with low cohesion (sand), reduced percentage of water absorption and prevention of soil expansion, reduced cost of earth structures (transport), speeded road construction operations, resistance to frost and defrost, improved ductility, reduced rigidity of earth structures, lack of weed growth in the surface of earth structures such as roads and reduced thickness of bearing layer. One of the most common methods of fine soil improvement is to stabilize it using additives that improve soil properties through physical and chemical changes. It is, however, worth noting that fine soils behavior should be well studied before deciding on the method of improvement. In India, the modern era of soil stabilization began in early 1970's, with a general shortage of petroleum and aggregates, it became necessary for the engineers to look at means to improve soil other than replacing the poor soil at the building site. Soil stabilization was used but due to the use of obsolete methods and also due to the absence of proper technique, soil stabilization lost favor. In recent times, with the increase in the demand for infrastructure, raw materials and fuel, soil stabilization has started to take a new shape. With the availability of better research, materials and equipment, it is emerging as a popular and cost-effective method for soil improvement.

2.SOIL STABILIZATION: Soil stabilization is the process of altering some soil properties by different methods, mechanical or chemical in order to produce an improved soil material which has all the desired engineering properties. Soils are generally stabilized to increase their strength and durability or to prevent erosion and dust formation in soils. The main aim is the creation of a soil material or system that will hold under the design use conditions and for the designed life of the engineering project. The properties of soil vary a great deal at different places or in certain cases even at one place; the success of soil stabilization depends on soil testing. Various methods are employed to stabilize soil and the method should be verified in the lab with the soil material before applying it on the field.

3.PRINCIPLES OF SOIL STABILIZATION

Principles of Soil Stabilization:

1. Evaluating the soil properties of the area under consideration.
2. Deciding the property of soil which needs to be altered to get the design value and choose the effective and economical method for stabilization.
3. DESIGNING THE STABILIZED SOIL MIX SAMPLE AND TESTING IT IN THE LAB FOR INTENDED STABILITY AND DURABILITY VALUES.

4.METHODS

A. Mechanical method of Stabilization

• In this procedure, soils of different gradations are mixed together to obtain the desired property in the soil. This may be done at the site or at some other place from where it can be transported easily. The final mixture is then compacted by the usual methods to get the required density.

B. Additive method of stabilization

• It refers to the addition of manufactured products into the soil, which in proper quantities enhances the quality of the soil. Materials such as cement, lime, bitumen, fly ash etc. are used as chemical additives. Sometimes different fibers are also used as reinforcements in the soil.

C. Agriculture and Domestic waste method of stabilization

It is important to mention here that recent trends on soil stabilization have evolved innovative techniques of utilizing

local available environmental and industrial waste material for the modification and stabilization of deficient soil. In the process of soil stabilization and modification emphasis is given for maximum utilization of local material so that cost of construction may be minimized to the minimum extent. At the same time safe disposal of agricultural and domestic wastes become challenging task for engineers. Hence an attempt has been made by researchers to use agricultural and domestic wastes as soil stabilizers.

5.PROCEDURE-

5.1 Taking Soil Sample
We are using the road construction soil to perform the test on the soil sample.

5.2 Taking Sieve Analysis Test on Soil Sample
Different size of sieves are: 4.75mm, 2mm, 1mm, 0.425mm, 0.250mm, 0.075mm, and pan.
Almost 100g soil has been taken. This sample is passed through different size of sieves. Then we will find the amount of soil retained on all sieves.

5.3 Collecting The Egg Shells
We find the nearest hotels, restaurants, etc, to ask them for egg shells and We collect the egg shells from the nearest hotels, Chinese restaurants, etc.

5.4 Collecting the Quarry Dust
We collect the quarry dust from the construction site of about 150-200gms.

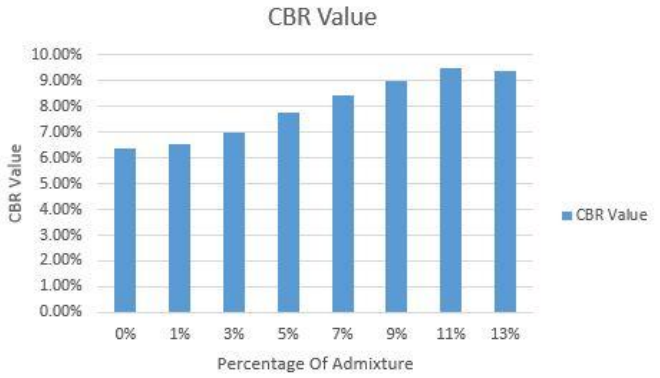
5.5 Washing the Egg shells
Wash the collected egg shells by water and clean them and also dry them properly in good sunlight.

5.6 Crushing the egg shells
Crush the shells after washing and drying. And make its powder.

5.7 Adding some quantity of water in egg shell powder.
Add some amount of water in the egg shell powder.

5.8 Use egg shell powder and quarry dust.
Use egg shell powder and quarry dust in the soil. Add different percentage in soil.

6.RESULTS



7.CONCLUSION:

The following are the conclusion were obtain based on Egg shell and Quarry dust is add to clay soil.

1. The optimum moisture content was found to be increase.
2. The California bearing ratio was found to be increased.
3. The unconfined compressive strength will be increased.

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