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Stabilization of Soil by Cement and Surkhi for Highways - Review

Tarun Garg[1], Er. Neeraj Kumar[2]

[1]M. Tech. Scholar SRMIET Kohra Bhura Naraingarh Affiliated to Kurukshetra University
[2]Assistant Professor and HOD of Civil Engineering SRMIET Kohra Bhura Naraingarh Affiliated to Kurukshetra University

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Abstract - *Stabilizing the soil is very important part of the construction process. This is because some of the soils do not have the proper strength to bear the load that is being put on them and thus many times lead to a complete collapse of the buildings/highways etc. To avoid this situation stabilization is done so that the strength of the soil is increased to withstand the designed load. Lime is a material that were mostly used for the soil stabilization since many years. But now a day, due to the depletion of the natural resources there is an increase in the utilization of the waste materials for the same. Some of the waste materials used are fly ash, marble dust, foundry sand, rice husk ash etc. These materials not only provide an alternative to the usage of conventional materials, but are also helpful in controlling the environmental pollution. At most of the places these waste materials are dumped into the open area which causes a lot of problem to the people around that area as well as to the workers working at these places. Utilizing these waste materials will not only reduce the pollution but will also reduce the human dependability on the natural resources, thus leading to a more sustainable approach of construction. In this work the materials used for stabilization is Cement and Surkhi.*

Key Words: Soil stabilization, cement, surkhi, strength.

INTRODUCTION

The Soil comprises of different components of silt or clay which are prone to change on geotechnical characteristics. It swells and become plastic when water is present in it, shrinks when dry and expand when exposed to moisture. Hence the soil stabilization is an important method of providing strength to the natural soil against the heavy load of modern-day traffic and to reduce the damage of roads in a different climate. There are different types of admixtures available for soil stabilization. Soil stabilization is a technique used to change different soil properties and to enhance its performance for engineering purpose specially using it as subgrade in making of highways. The admixtures can be chemical binders, industrial wastes, cement and fly ash Etc.. The selection of stabiliser depends mainly on the type of soil, type of construction and easy availability of materials to be used for laying the roads. The cement-based soil stabilization has a unique advantage of great strength and durability. Also it is commonly available and a better choice for stabilization of soil. The hydrated product of cement binds with soil to form the cement stabilized base of cement mixed coarse aggregate. Overall strength of soil will depend of quantity of cement used in the soil. The widely used material for stabilizing soil is Portland cement due to its nature of easy handling and quality control properties. Many researchers have found that stabilization using cement is more appropriate for granular soil and clayey soil having low plasticity index. Further, the physical properties of soil like particle size distribution, clay content, liquid limit and plasticity index play a major deciding factor for addition of soil stabilizer during construction of any highway. The factors affecting soil cement stabilization are soil, cement, pulverization, mixing, compaction and curing.

LITERATURE REVIEW

Various researches for the stabilization of soils, which are related to my work, are as under:

Yadu and Tripathi (2013) [1] studied the effects of granulated blast furnace slag in the engineering behaviour of stabilized soft soil. The performance of GBS stabilized soil was evaluated using physical and strength performance tests. Based on strength performance tests the optimum GBS was determined as 9% among 3%, 6%, 9% and 12%. Inclusion of GBS increases the strength of soil as well as the soaked and unsoaked CBR values.

Kumar et al., (2014) [2] accomplished the study on the compaction and sub grade characteristics of clayey soil by mixing it with foundry sand, fly ash and tile waste. These materials were taken in a ratio of 10% to 50% with an increment of 10%. Results showed an increase in the value of the CBR value from 2.43% to 7.35% when all the three materials were added into the soil. Thus they concluded that clayey soil mixed with foundry sand, fly ash and tile waste can be effectively used in the construction of sub-grade so roads with low traffic volume.

Pokale et al., (2015) [3] carried out an experimental investigation for Stabilization of Black Cotton soil by using waste material-Brick Dust. On the basis of experimental test results, it is observed that the moisture content (MC) reduces after 7 days and 28 days results respectively. MC of 30% BD is reduces to 26.46%. Hence replacement of brick dust is more effective.

Devi and Minhas (2016) [4] accomplished the stabilization of soil using marble dust. The proportion of marble dust used was 10%, 15% and 20% by the weight of soil. Tests carried out were the standard proctor test and the California bearing ratio test. The test results showed that addition of marble dust showed an increase in the optimum moisture content of the soil from 8% to about 12%. While the

maximum dry density decreased with addition of marble dust. The CBR value of the soil increased up to 15% addition of marble dust and after that on more addition of the same it decreased.

Kumari and Kumar (2019) [5] performed on three different types of soils that are generally available in Haryana. These are ML type (silts of low plasticity collected from Shahbad), CL type (clays of low plasticity collected from Ambala) and SM type (silty sands collected from Kala aamb (Ambala)). The laboratory investigations are carried out with a view to improve CBR value of the soils. The admixtures used with the soils include slaked lime (available in powder form) and fly-ash (source thermal power plant Jagadhari). The results of the study are applicable for the given types of soils and given admixture as used in study. The methodology and procedure used for conducting the study however, being general in nature can be applied to any other soil and admixture having similar properties. Investigations include evaluation of properties like specific gravity, gradation, Atterberg's limits, and wet sieve analysis, maximum dry density (MDD), optimum moisture content (OMC) and California Bearing Ratio (CBR) value of the selected soils. The lime and fly ash are mixed separately with the each of the soils at 4%, 7%, and 10% by the weight of dry soil.

OBJECTIVE

Main objectives of this study are as under:

1. To find the effect of addition.
2. To Study the strength and Stabilization of subgrade Soil using different percentages of additives.
3. To study Unconfined Compression Strength of soil used in highways by adding different Percentages of additives.

METHODOLOGY

Following steps shall be use to done this dissertation:

1. Selection of additives.
2. Tests on individual materials.
3. Cast specimens with/without additives.
4. Laboratory tests on casted specimens.
5. Collect outcomes and compare.

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