STABILIZATION OF SOIL BY USING POLYTHENE : A REVIEW

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ABSTRACT: Soil Stabilization is the alteration of soils to enhance their physical properties. Stabilization can increase the shear strength of a soil **,** and control the shrink-swell properties of a soil, thus improving the load bearing capacity of a sub-grade to support pavements and foundations. Soil stabilization can be utilized on roadways , parking areas , site development projects , airports and many other situations where sub-soils are not suitable for construction.

The properties can be improved by the addition of suitable admixtures like polythene , cement, lime and waste materials like fly ash, phosphor gypsum etc. This new technique of soil stabilization can be effectively used to meet the challenges of society, to reduce the quantities of waste, producing useful material from non-useful waste materials. Plastic such as shopping **plasticbags** is used to as a reinforcement to perform the CBR studies while mixing with soil for improving engineering performance of sub grade soil. **Polythene** strips obtained from waste carry bags were mixed randomly with the soil. A series of California Bearing Ratio (CBR) tests were carried out on randomly reinforced soil by varying percentage of polythene strips with different lengths and proportions. Results of CBR tests demonstrated that inclusion of waste plastic strips in soil with appropriate amounts improved strength and deformation behavior of sub grade soils substantially. The tests such as liquid limit, plastic limit, standard proctor compaction test, **California bearing ratio (CBR)** test and **unconfined compressive strength (UCS**) have been conducted to check the improvement in the properties of soils having low bearing capacity such as black cotton soil.

Keywords: Soil Stabilization, CBR, Unconfined compressive strength, Polythene, Plastic bag .

I. INTRODUCTION

Engineers are often faced with the problem of constructing facilities on or with soils which do not possess sufficient strength to support the loads imposed upon them either during construction or during the service life of the structure .Many areas of India consists of soils with high silt contents, low strengths and poor bearing capacities .The poor engineering performance of such soils has forced . Stabilization of soils is an effective method for improving the properties of soil and pavement system performance. The objectives of any stabilization technique used are to increase the strength, durability, erosion control, improve workability and constructability of the soil Due to rapid growth in population and development activities suitable ground for constructions are depleting day by day. This situation leads to take unsuitable ground for construction by improving the properties of these soils. Soil stabilization is one of the best methods to improve the properties of soil. Inclusion of polythene waste strips comes in the category of reinforced earth technology of soil stabilization. Plastic /polythene products have become an integral part in our daily life. The aim of the research is to increase the physical properties of soil having low strength and low bearing capacity such as black cotton soil.

II. TYPES OF STABILIZATION TECHNIQUES

a. Mechanical stabilization: Where the stability of the soil is increased by blending the available soil with imported soil or aggregate, so as to obtain a desired particle-size distribution, and by Compacting the mixture to a desired density. Compacting a soil at appropriate moisture content itself is a form of mechanical stabilization.

b. Chemical stabilization: Mixing or injecting additives such as lime, cement, sodium silicate, calcium chloride, bituminous materials and resinous materials with or in the soil can increase stability of the soil. Chemical stabilization is the general term implying the use of chemicals for bringing about stabilization.

III. APPLICATIONS OF SOIL STABILIZATION

The process of soil stabilization is useful in the following applications:

- Reducing the permeability of soils
- Increasing the bearing capacity of foundation soils.
- Increasing the shear strength of soils
- Improving the durability under adverse moisture and stress conditions
- Improving the natural soils for the construction of highways and airfields
- Controlling the grading of soils and aggregates in the construction of bases and sub bases of the highway and airfields.

In addition , there are several environmental advantages. When unimproved roadways are stabilized and treated with the right additives , run off of storm water will not cause erosion , which in turn sends silts to river and bays . Thus our soil stabilization methods help to preserve soils , water ways , unimproved roadways and much more.

IV. OBJECTIVES OF THE PRESENT STUDY

.•To determine Specific gravity, Grain size analysis and determine its index properties of soil

.• To mix plastic strips with Red soil in various percentages and determine its CBR value

.• To arrive the optimum mix from Red Soil-Plastic strips combination

.• To manage the undecomposable and upgradable plastic waste.

• To alter the soil condition in the site by using low cost plastic waste.

V. METHODOLOGY

Soil samples are collected from our college campus are tested for their geotechnical properties and strength characteristics. The various tests conducted to obtain geotechnical parameters are:

a. Free swelling index

b. Liquid Limit

c. Plastic Limit

d. Core cutter method

e. Standard proctor test

f. Modified proctor test

g. Sieve analysis of soil

h. California Bearing Ratio test.

i. Plate load test .

VI. RESULT AND DISCUSSION

Tests results of the soil sample are

1. FREE SWELL INDEX TEST: Free swell index ratio of soil is 11.52%

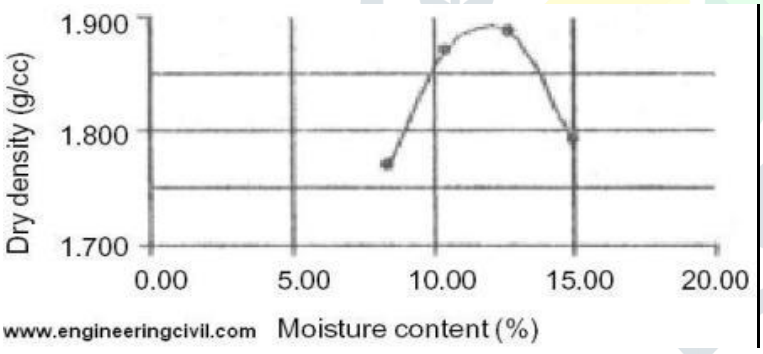
2. LIQUID LIMIT OF SOIL: Moisture content of soil is 48%

3. PLASTIC LIMIT OF SOIL:

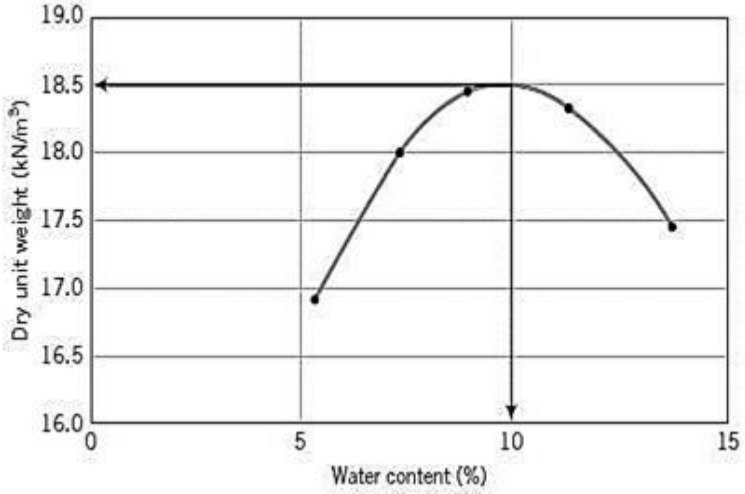
Plastic Limit: 16.66%

Plastic Index: 33.34

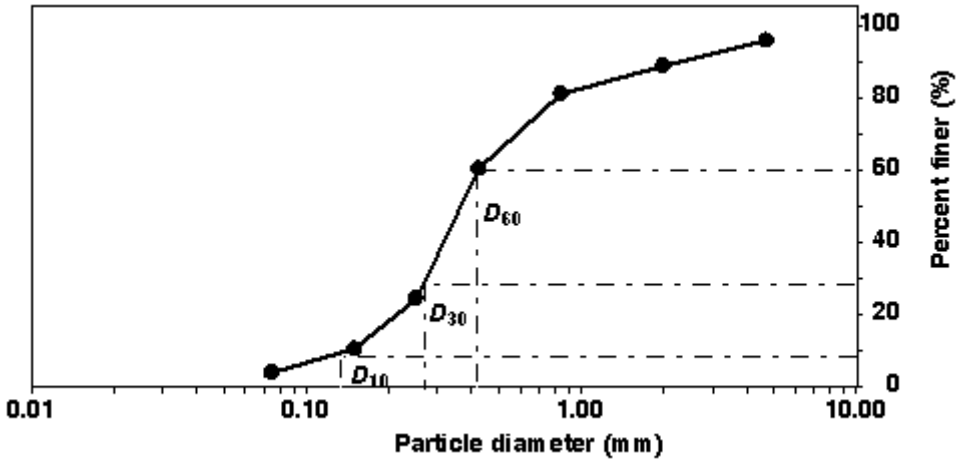
VII. STANDARD PROCTOR OF SOIL



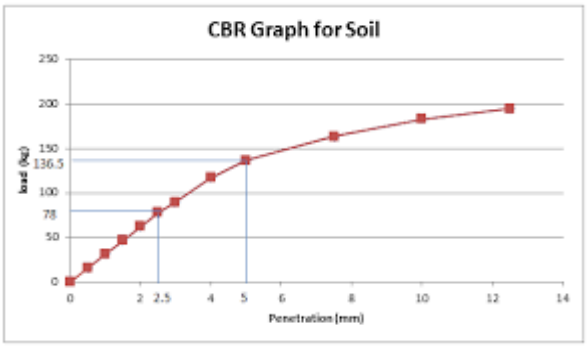
VIII. MODIFIED PROCTOR OF THE SOIL



IX. SIEVE ANALYSIS OF SOIL



CALIFORNIA BEARING RATIO OF SOIL



X. CONCLUSIONS

In our day to day life the plastic material products such as bottles, polythene carry bags usage has become more, because of which today we find that more wastage is of the plastic material. Hence in order to get the best out of this wastage. The plastic stripes were made out of this plastic wastage and are used in making the payment and it is found that there is an increase in the strength of the soil. California Bearing Ratio test was carried out to find the maximum dry density and optimum moisture content. The CBR was conducted for soil mixed with plastic strips. The CBR test is conducted for the red soil and black cotton soil, adding the 0.7% of plastic stripes to red soil and 0.5% for the black cotton soil it is found that the strength of the soil is increased resulting the bearing ratio of 2.9 for red soil and 3.3 for the black cotton soil. As it economic in nature and hazard free it is the one of the best solution for re-utilization of the plastic wastage.

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