Experimental Study on Stabilization Soil By Using Waste Shredded Rubber Tyre And Plastic Material

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Abstract- *Construction of engineering structures on weak or soft soil is considered as unsafe. Improvement of load bearing capacity of the soil may be undertaken by a variety of ground improvement techniques. In the present investigation, shredded rubber and plastices from waste has been chosen as the reinforcement material and cement as binding agent which was randomly included into the soil at three different percentages of fibre content, i.e. 5% 10% and 15% by weight of soil. The investigation has been focused on the strength behaviour of soil reinforced with randomly included shredded rubber fibre, plastices*

Keywords- Waste Rubber tyre, shear strenth, cbr load test

I. INTRODUCTION

Expansive soil (Black cotton soil) is mostly found in the arid and semiarid regions and it cover very large area of the world. The It covers nearly 30% of the land in India and includes approximately the entire Deccan Plateau. Andhra Pradesh, Karnataka, Maharashtra, Parts of Gujarat and Western Madhya Pradesh. The name "Black Cotton" as an agricultural origin. Most of these soils are black in color and are good for growing Cotton. These soils can be used as a construction material when it possesses engineering properties such as high strength, low settlement and high durability.

Difficulty is often experienced while working with such soils particularly in its field compaction. Black cotton soil experiences volumetric changes due to changes in water content and suction. Black cotton soil is a type of expansive soil with high plasticity and can maintain water throughout the summer season. However swelling occurs during rainy seasons and shrinkage occurs on evaporation of water during summer seasons.

Due to its peculiar characteristic of high plasticity, excessive swelling, shrinkage and low strength when wet, the soil is regarded unsuitable for construction material. Heavy financial investments are required to be made for construction of roads, canals and embankments due to non-availability of suitable soil.
However in developing country like India, due to industrial development there is increase in a demand for energy which has resulted in construction of considerable thermal power plants. At the moment there are total 87 working thermal power plants in India. This development has resulted in production of byproduct like fly ash in large quantity .The disposal of fly ash requires large holding ponds, lagoons, landfills etc.

RUBBER TYRE

The waste rubber tyre size 20mm sieve retaine.

PLASTIC WASTE

Plastic is considered as one of the major pollutant of environment as it would not decay or can't be destroyed so implementing this for some good purpose helps to reduce itseffect also. This implies that stabilization using waste plastic strips is an economic method where use of waste materials as plastic and other cheaply available material of plastic can be used which is found accessibly.

II. METHODOLOGY

This project follows the steps given below:

- Collection and study the material properties require for making a soil.
- Soil stabilization of strength parameters like California bearing ratio,and unconfined compressive strength

III. MATERIAL PROPERTIES

Soil Color

1. Organic matter content; the more organic content the darker the soil color

2. Soil color and soil temperature: dark colored soils absorb more heat so they warm up quicker and have higher soil temperatures.

Soil color and parent material

Table No:1 Properties of Black Cotton Soil

S.NO	PARAMETER	VALUES
1	Specific gravity	2.26%
2	Liquid limit	27%
3	Plastic limit	48.20%
4	Plasticity index	12%
5	MDD	3.36kg/cm^3
6	OMC	1.33kg/cm^3
7	CBR	2.96

Table No:2 Properties Physical and Chemical of Waste plastic

S.NO	CHEMICAL PROPERTIES	VALUES
1	Polyethylene	60%
2	Polystyrene	23%
3	Polyvinyi chloride	13%
4	Others	4%

Table No:3 Properties Physical and Chemical of Rubber Waste

S.NO	CONSTITUENTS	VALUES
1	Rubber	54%
2	Carbon Black	29%
3	Textile	2%
4	Oxidize zinc	1%
5	Sulfur	1%
6	Additives	13%

IV. EXPERIMENTAL INVESTIGATIONS

UNCONFINED COMPRESSIVE STRENGTH

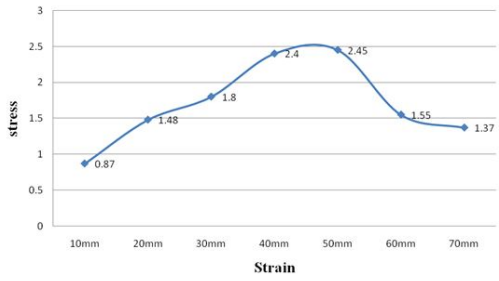
The unconfined compressive strength (is the load per unit area at which the cylindrical specimen of a cohesive soil falls in compression .

$$Qu = P/A$$
$$C = qu/2$$

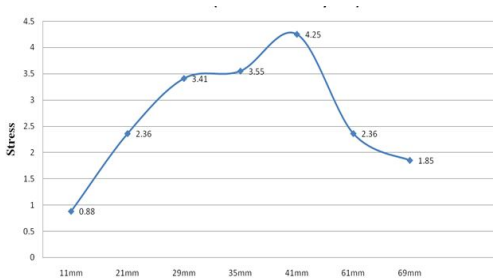
P= axial load at failure, A= corrected area , where is the initial area of the specimen

The undrained shear strength (s) of the soil is equal to the one half of the unconfined compressive strength.

UNCONFINED COMPRESSIVE STRENTH



Ucc strength black cotton soil



Ucc strength black cotton soil(15%rubber +15%plastic material)

CBR TEST ON SOILS

The California bearing ratio test is penetration test meant for the evaluation of subgrade strength of roads and pavements. The results obtained by these testsare used with the empirical curves to determine the thickness of pavement and its component layers. This is the most widely used method for the design of flexible pavement. This instruction sheet covers the laboratory method for the determination of C.B.R. of undisturbed andremoulded /compacted soil specimens, both in soaked as well as unsoaked state.

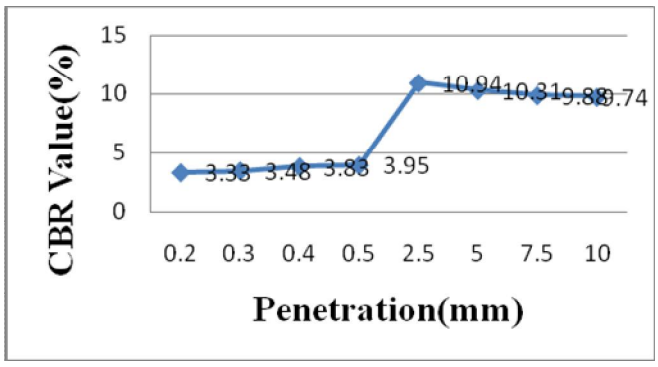
C.B.R. = Test load/Standard load X 100

Prepare the remoulded specimen at Proctors maximum dry density or any other density at which C.B.R> is required. Maintain the specimen at optimum moisture content or the field moisture as required. The material used should pass 20 mm I.S. sieve but it should be retained on 4.75 mm I.S. sieve. Prepare the specimen either by dynamic compaction or by static compaction

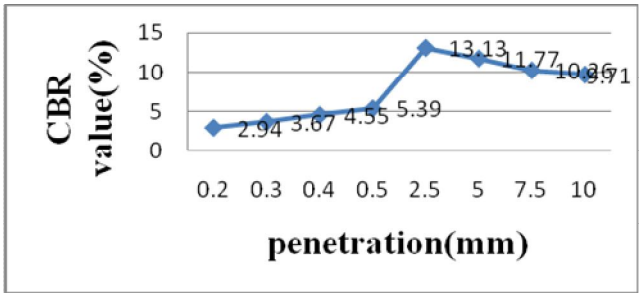
Standard load used in CBR test

Penetration (mm)	Test load (kg)
0.1	1370
0.2	2040
0.3	2585
0.4	3129
0.5	3538
2.5	1370
5.0	2055
7.5	2630
10.0	3180
12.5	3600

CBR BLACK COTTION SOIL



CBR BLACK COTTION SOIL(15% RUBBER WASTE+15%PLASTIC MATERIAL)



V. CONCLUSION

1. By adding shredded rubber & plastic material in the soil by percentage (5%,10%,15%) where comparatively value increase in liquid limit of soil by adding by 5% replacement in black cotton soil & red soil.
2. Maximum dry density, unconfined compressive strength and California bearing ratio of black cotton soil & red soil increases with an increase in percentage of addition of shredded rubber and plastic material by 15% replacement.
3. So we suggest for improving soil stabilization by replacement of 15% rubber + 15% plastic in black cotton soil & red soil .
4. Use of plastic waste recommended to reduce the quantities of plastic waste, which creates the disposal problem. Successful application of plastic waste could help to reduce the amount of plastic waste which is disposed of to landfills and contribute to sustainable development by providing low cost material to the resource intensive geotechnical industry
5. Shredded rubber tyre chips can be considered as a good reinforcement material.

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