

Stabilization of Black Cotton Soil by Using Waste Plastic Bottle Strips

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Date of Submission: 25-06-2023

Date of Acceptance: 07-07-2023

ABSTRACT :-

In soil stabilization using plastic material is an ecological utilization since there is scarcity of good soil for construction purpose. expansive clay soil is the soil changes volume with the change in water content.

It is the nature of swelling and shrinking that is danger to structure built over them. this paper shows results of expansive clay soil with adding plastic bottle strips. The plastic bottle strips are added in three different mixing ratios (0.5%, 1% and 2%) by weight and different aspect ratio (5 mm x 7.5 mm x 10 mm x 15 mm x 15 mm x 20 mm). The result of experiment was significant improvement in shear strength, swelling and cracking of soil also reduced. Most developing countries facing the problem of improper plastic waste recycling. Results of study and experiments this material of expansive soil would be effective for ground improvement and in geotechnical engineering.

Keywords: Expansive soil, Clay soil, Plastic strips, soil stabilisation, unconfined compressive strength

I. INTRODUCTION:-

last few decades the world has seen a huge growth in population due to the population increasing the needs of people are increasing. Expansive soil comes in contact with moisture that show significant changes in volume. when It exposed to excess water it expand and in hot weather it shrink. Serious hazard occurs when expansive soil swelling and shrinking it turns affect the stability of structure.

Soil stabilization is process of improved soil properties. It is used to decreased characteristics of soil such as permeability and consolidation and increase the shear capacity. This method is usefull for highway and airfield construction project. In most african countries improper plastic waste disposal is becoming a environmental issue. This countries are currently covering landfills, water

bodies, clogging severage system disrupting ecological cycle and creating asthetically unpleasing environment. That causes to human being and plants. This paper shows way of recycling plastic of plastic bottles materials for stabilisation of expansive soil and improve required properties for costructionworks.

II. LITERATURE REVIEW

Soil stabilization using waste plastic strips:-

1. Plastic Strips is consumption day by day to rapid growth in population
 2. The plastic recycling of these plastic is very less and large quantity of plastic in landfills.
 3. The different test we conducted is natural moisture content determine attires limit specific grauity compressive strength
- Materials: Mainly two materials are used for this study representative clay type soil and plastic bottles. plastic bottles are collected from surrounding and bottles turns in small strips. Before cut it bottles were cleaned properly and cut into in three different sizes by using scissors.
 - Methods: particle size distribution, atterberg limit and specific gravity of soil test is the characterization of soil sample taken for this study. First sieved the soil sample and taken out any other impurities and unnecessary particles. Sieve analysis and hydrometer analysis were conducted to study the particle size distribution once the soil sample prepare, also plastic limit, liquid limit and plasticity index of soil were determine.

The sample description with OMC and CBR%

Sample Description	MDD (gm/cm)	OMC (%)	CBR (%)
Soil	1.56	20.1	1.0
Soil with 2% plastic	1.71	19.2	2.0
Soil with 4% plastic	1.79	18.2	10.60
Soil with 6% plastic	1.62	18.4	4.50
Soil with 8% plastic	1.63	17.1	4.30

Material mixing method and proportion

The plastic strips were added to the soil sample in three different percentage (0.5 %, 1%, and 2%) by mass of the soil. Ratio of mas of plastic to mass of the soil sample taken as percentage.

Methods of testing soil properties :

The plastic bottle strips were added to the soil sample in the treatment level described once the characterisation of the both material was complete . Test were carried out in order to study the effect of addition of the plastic bottle strips on clay soil the test are free swell test, standard proctor compaction test, direct test, unconfined compressive strength and california bearing ratio etc .

Test performed

1. sieve analysis
 2. Liquid limit
 3. Plastic limit
 4. Specific gravity
 5. Standard proctor test
 6. California bearing ratio (CBR)
1. Sieve analysis: sieve analysis is known as the method of determine the grain size distribution of soil that are greater than 0.075 mm in diameter.
 2. liquid limit: liquid limit is known as moisture content of water soil start to behave as liquid of fine grained soil can no longer remolded without cracking
 3. Plastic limit: plastic limit is known as water content change from plastic to a semi solid state.
 4. Specific gravity: It is defined as the ratio of the weight of a given volume of soil soil to the weight of a equal volume of distilled water is

known as specific gravity.

5. Standard proctor test: the proctor compaction test is known as compacting soil
- California bearing ratio: california bearing ratio is the strength of subgrade

III. CONCLUSIONS

The plastic straps is addition of plastic shires plastic will be use if the fabric be used as a soil stabilization of the soil the increase up to 4% plastic content is optimum soil improving the property of the soil make the soil suitable of road constriction

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