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## GROUND IMPROVEMENT BY USING WASTE PLASTIC BOTTLE FILLED BY FLY ASH

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**Abstract:** A large part of Central India is covered with black cotton soils. These soils have high swelling and shrinkage characteristics and shear strength is extremely low hence, there is need for improvement of these properties. Ground improvement is the technique which use for improving the physical Properties of soil, such as increasing shear strength, bearing capacity, etc. which have been done by use of admixtures. Soil stabilization has been done by plastic bottles filled by fly ash. Plastic bottles and fly ash increasing day by day leading to various environmental concerns. Therefore the disposal of plastic wastes without causing any ecological hazards has become a real challenge. This project involves the detailed study on the possible use of waste plastic bottles and fly ash for stabilization. This analysis has been done by conducting plate load test by truss reaction method on soil bed. Comparing result of on reinforced soil and unreinforced soil.

**Keywords:** black cotton soil, plastic waste bottle , fly ash , plate load test



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## INTRODUCTION

Soil improvement technique means the improvement of stability or bearing capacity of the soil by the use of controlled compaction, proportioning and/or the addition of suitable admixtures.

By soil improvement we can increase the shear strength of a soil and/or control the shrink-swell properties of a soil, thus improving the load bearing capacity of a sub-grade to support pavements and foundations. The most common improvements achieved for better soil gradation, reduction of plasticity index or swelling potential, and increases in durability and strength. These types of soil quality improvement are referred to as soil modification. Benefits of this technique are higher resistance values, reduction in plasticity, lower permeability, reduction of pavement thickness, elimination excavation, material hauling and handling, and base importation, aids compaction, provides all-weather access onto and within projects sites. As good soil becomes scarcer and their location becomes more difficult and costly, the need to improve quality of soil using new techniques is becoming more important. This technique using raw plastic bottles is an alternative method for the improvement of strength parameters of soil. It can significantly enhance the properties of the soil used in the constructions.

### I. Material and Methodology

#### A) Material

i. **Black cotton soil** The soil has a swelling property and settling properties due to the presence of montmorillonite mineral. In India, expansive soils are called as Black Cotton soil. The name "Black Cotton" as an agricultural origin. The characteristics of the test soil are as follows:

PROPERTIES	Calculated result
Liquit limit	47%
Plastic Limit	32.5%
Shrinkage Limit	14.5%
Specific Gravity	2.63
Optimum Moisture content	17.5
Maximum dry unit weight	1.52gm/cc

## B) Methodology

i. Plate load test : The experimental investigations discuss about the materials used for model foundation system, procedure adopted for plate load tests and the details of testing program

### Test Setup

The apparatus used for the model tests consists of a pit of size 1m (length) x 1m (width) x 1.5m (height), a loading frame, a hydraulic jack, a pumping unit, proving ring for measuring applied load and dial gauges for measuring settlement of footing. Dimensions of footing used for tests was square footing of size 300 mm x 300 mm made of thick steel plate.. The load was applied by means of hydraulic jack, Settlements were recorded by three dial gauges placed each corner on the plate. The complete test setup is as shown in Fig. 2.

## II. Results

The performance of plastic reinforced bottle bed was studied using various conditions on 300 x 300 mm plate. Each plate load test results were plotted and the ultimate bearing capacity was obtained by tangent method. Typical load- settlement curves for case 1 and case 2 are as shown in Fig... The bearing capacity ratio (BCR) was then determined for case, which is defined as the ratio of the ultimate bearing capacity of the footing on reinforced sand to that of footing on unreinforced sand.

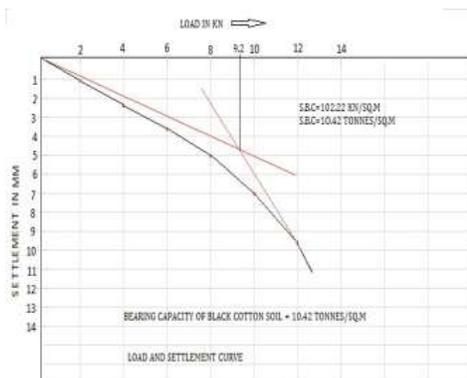
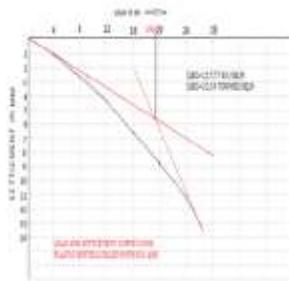


Fig . On Unreinforced soil



**Fig ; On Reinforced soil**

## CONCLUSION

This project use to reduce the quantity of plastic waste, producing useful material from non-useful waste materials. Our project result shows that after adding the plastic bottle in soil the bearing capacity ratio is found to be 2.12

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