

# Enhancing the Soil Soundness by Supplanting with Clay Brick Powder

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**Abstract**—Soil is the base of everything like our products develops from the earth, plants originating from the soil and as a structural architect we realize that how much soil is essential for our field. When we make any structure, firstly the soil is to be investigated that what qualities are displayed in soil such that it can endure our structure stack. There are various distinctive sorts of soil which have varied characteristics, a few soils having more noteworthy quality and some have lower. If the quality of soil is lower than prerequisite, priority is given to improve the quality of the soil as per structural necessity. Some tests were carried out in the laboratory to understand the soundness behavior of the soil before and after modifications are Cone penetration test, Proctor test, Permeability test, C.B.R test (California bearing ratio test). In this study it is expected that the quality of the soil can be improved up to some extent by using brick powder as soil stabilizer

**Keywords:** Silty, Soil, Permeability, CBR, Cone penetration test.

## 1. INTRODUCTION

The upper layer of earth which is dark or dim darker material ordinarily comprising of a blend of natural remains of mud and fragmented particles. Sandy soil has larger particles than the silty soil. Basically soil has low quality and high permeability hence adding brick powder in the soil can improve the quality of soil and direct porosity. The outline properties of soil depend on the various concentrations like minerals, water table, soil water condition and so on which contrast as per zone to zone in view of which the needed properties cannot be achieved. Deciding this issue a technique called alteration, which means to upgrade the earth properties in a positive manner to achieve satisfactory performance of the soil in the field.

Soil Stabilization is a system or strategy its went for expanding or keeping up the steadiness of soil mass and concoction adjustment of soil to upgrade their building properties Stabilization considers establishment of plan added substances and admixture rate to utilized as a part of request to

accomplish stabilization process can incorporate higher protection value, reduction in plasticity, lower permeability, reduction of asphalt thickness, elimination of removal material pulling and holding. Balanced out soil works as a working stage for the venture. It additionally water proofs the dirt and to enhance soil quality. Adjustment lessens soil volume changes because of temperature and it enhances soil work-capacity and also solidness. This strategy diminishes tidy in workplace and redesigns minimal materials. Adjustment dries wet soil.

## 2. OBJECTIVE

This research to increase the strength of soil by adding brick powder. Brick powder is easily available at construction site. In compare of other methods this methods is more effective, economically cheap and easily available. We use broken parts of bricks to increase the strength of soil it is good for the environment and they are no harmful substance present in the brick powder. Brick powder moderates the permeability of soil, increase the strength of soil maintain dryness etc.

## 3. METHODOLOGY

In the first stage the various properties of soil such as structure, texture, consistency, bulk density, permeability, plastic limit, and shrink age limit were studied.

### 3.1 Cone Penetration Test

Cone penetration test is performed on the soil sample to understand its physical properties to resist the dynamic loading. The procedure followed for the cone penetration test can be referred in the code IS 4968-1.



Fig. 1: Cone penetration

**3.2 Proctor test**

Take dried soil sample with specific moisture content. Mix it properly. Fill the mixture in the mould of 1000mm<sup>2</sup> in 4-5 layers. Each layer should be compacted with 25 blows of proctor hammer. Then weight the soil.



Fig. 2: Proctor test

**3.3 Permeability test**

Prepare the soil sample. Then fill the soil sample in to the permeability mould. Mark the water level with time intervals. Then find the permeability in different time intervals.



Fig. 3: Permeability test

**3.4 CBR test**

Prepare the dried soil .Mix the soil properly. Fill the mixture in to the proctor mould box. Each layer should be compacted with 56 blows in 5 layers.



Fig. 4: California Bearing Ratio Test

**4. RESULTS**

In cone penetration test by ordinary soil we get the percent of water (23.59%)

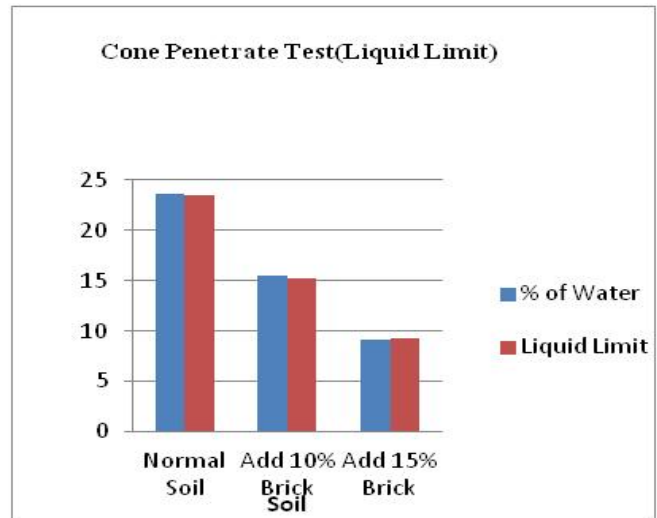


Fig. 5: Cone Penetration Test

By include 1 % Brick Powder we get 15.34% of water and include 2% brick powder we get 9.09% of water. The fluid furthest reaches of ordinary soil, include 1% block powder, Add 2% Brick powder we get 23.47%, 15.167%, 9.33% of water content

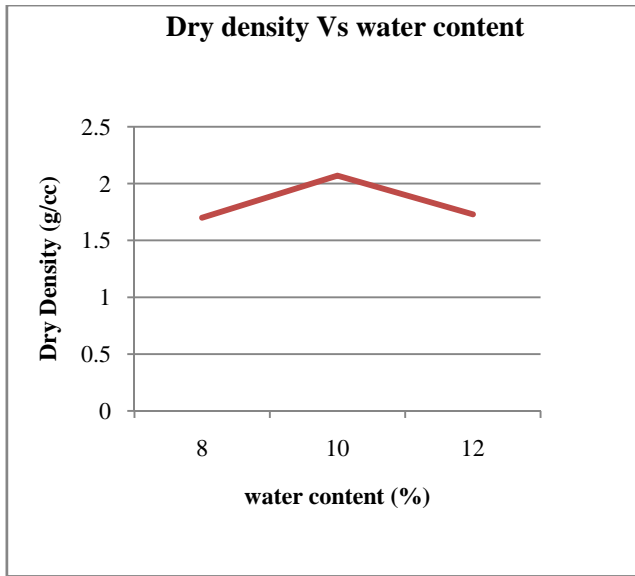


Fig. 6: Dry Density Test

In porosity test by Normal soil ,including 10 % block powder, Adding 12% block Powder we get the penetrability  $9.615 \times 10^{-3}$ ,  $1.07 \times 10^{-2}$ ,  $1.052 \times 10^{-2}$  (mm/sec). In Proctor Test by Normal Soil at water (%) 8%,10%,12% we get the heaviness of water 12.5,15.4,18.4. what's more, get dry thickness 1.70,2.07,1.73(g/m<sup>3</sup>).

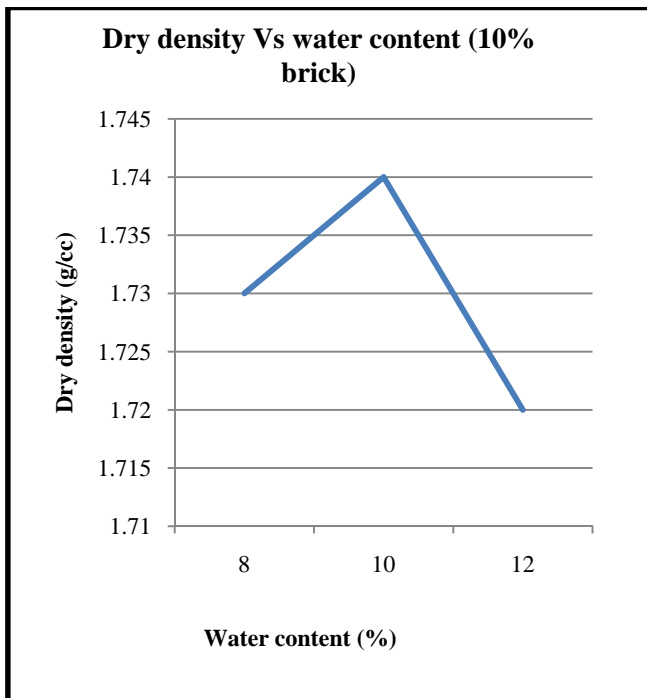


Fig. 7: Density vs. Water content

At the point when include 10% Brick Powder at water % 8, 10, 12 so we get the heaviness of water 16, 16.6, 18.3%, and we get the dry thickness 1.73, 1.74, 1.72%.

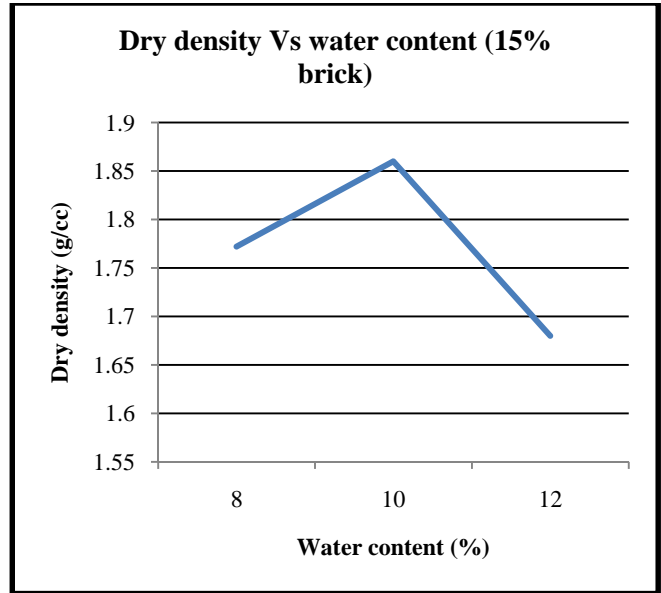
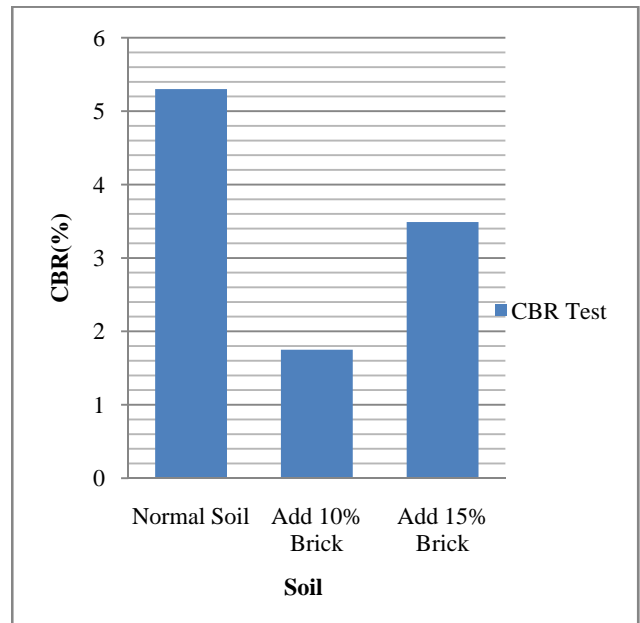


Fig. 8: Density vs. Water content

At the point when include 15% Brick Powder at water % 8, 10, 12 so we get the heaviness of water 18.9, 20.6, 23%, and we get the dry thickness 1.772, 1.65, 1.68%.



In CBR test we get the CBR esteem from Normal soil is 5.2%. What's more, when we include 10% block Powder WE get 1.75% CBR and at 15% Brick we get CBR esteem 5.4 %.

## 5. CONCLUSION

Expansion of added substances, for example, blocks powder. We included block powder 10% and 15% of soil weight by which we get high estimation of porousness, most extreme dry thickness and more CBR esteem so we can utilize block powder so block powder is the least expensive added substances at the site it is effectively accessible. It increment the quality of soil and in this exploration we take distinctive diverse level of block powder in sand (10%&15%) so we get the best possible length so block powder is appropriately use in soil for expanding quality.

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