



STABILIZATION OF BLACK COTTON SOIL USING RBI GRADE 81

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Abstract

The most bothering issue in the developing countries like India is to utilize the available soil in the site. The most problematic soil in the Construction is Black Cotton soil. When it comes in contact with water, it swells and when it becomes dry it shrinks. Hence the entire in – situ soil is to be replaced which is a very complicated process. This can be avoided by conducting soil stabilization by making use of RBI Grade 81 powder.

RBI Grade 81 is a cementitious powder stabilizer which can be mixed in proper proportions to achieve desired results.

Here I have conducted California Bearing ratio test and Unconfined compression test on Black Cotton soil.

By making use of RBI Grade 81 stabilizer, excellent load bearing capacity is obtained.

Keywords - Black Cotton soil, California Bearing ratio test, Load bearing Capacity, Optimum Moisture Content, RBI Grade 81, Soil stabilization Unconfined compression test,.

I. INTRODUCTION

In my previous research paper e- ISSN: 2278 – 1684, I had discussed regarding the properties of RBI Grade 81 powder, uses, advantages as well as the tests conducted using RBI Grade 81 on black cotton soil, science and methodology involved, I had discussed regarding the Atterberg limits test and Modified Proctor test, therefore this is the continuation of my previous paper, here am discussing about the California Bearing Test and Unconfined Compression Test.

The most bothering issue in developing countries like India in the construction of roads is to utilize the soil available in the site properly, because all the soils cannot be used

for construction due to its poor engineering properties. In order to augment the engineering properties the available soil will be cured by using stabilizers like lime, Class C Fly ash, Portland bond, Pond Ash and Road Building International grade 81 (RBI Grade 81)

Soil Stabilization:

Soil Stabilization is termed as physical, chemical, biological or a combined technique of altering the existing natural soil so as to meet the engineering properties & fulfil the necessity. Soil stabilization is a set of earth work technology which improves the soil features in order to increase mechanical & load bearing properties through techniques like Soil improvement & Soil Consolidation

Soil stabilization technique is suitable for heavily soaked soils, stability & bearing capacity can be improved by mixing the binding agents with the existing soil.

The purpose of soil stabilization is to progress the California bearing ratio of existing soil by four to six times. Currently soil stabilization practice is used in making of roads in some areas of the world in both developed & developing countries.

II. COMPONENTS IN THE STABILIZATION PROCESS

The soil stabilization stresses on the use of stabilization materials such as binders for improving the geo – technical features like compressibility, strength, permeability & durability of fragile soils. It is concluded as ” Stabilization is done by using Soil minerals and binding agents”.

III. LITERATURE REVIEW

Anitha.K.R : studied on the effects on using any other stabilizer, The above research on kaolinite, red soil & lateritic soil that soaked & un soaked CBR research the impact of utilizing another stabilization item, RB1-81 on kaolinite, red soil, & Lateritic soil expands with respect to the rate how much the stabilizer also expands.

In b/n this research the CBR equipment was arranged according to the varied percentages of RBI grade 81 along with 1% of WC in addition to the optimum moisture content comprised with varied proportion of RBI grade 81. CBR test was conducted for 0, 7 & 11 days of curing. CBR test at 11 days were conducted following to extinguishing on 4 days, with sample that was treated to 7 days. On completion of every test the researcher concluded that un soaked CBR showed no much changes on red soil as well as the Lateritic soil but when it comes to the Kaolinite the expansion was up to the rate of sixteen times & also it was found that soaked CBR showed expansion for 16, 14 & 4 folds with respect to the standard degree of RBI Grade 81 prescribed for these above soils

IV. RBI GRADE 81 POWDER

RBI Grade 81 expanded as Road Building International Grade 81 is a major substance which was created for altering the various types of soil through a low-cost approach. RBI Grade 81 is eco-friendly, inorganic, hydration activated powder based stabilizer which combines along with the soil particles to create layers that are interconnected through a complex bury atom structure. Roads will become ready to use within 24hrs of the final Compaction resulting in a dust free surface.

It is defined as an inorganic chemical stabilizer which transforms the engineering properties of soil. This method is an advanced, inexpensive & environmentally beneficial technology in the history of soil stabilization. It is a cementitious powder stabilizer which is grey in color & non-flammable & also acts as waste binding. Hydration reaction is the basic principle on which RBI Grade 81 works. The soil's volume stability increases to a great extent when RBI Grade 81 is added in small

dosages. when RBI Grade 81 reacts along with soil particles creating an inter – particle matrix binding soil particles together making a rigid mass.

V. ADVANTAGES OF RBI GRADE 81

- Cost effectiveness
- Environmental friendly
- Enhances engineering properties of soil
- No maintenance is necessary
- Appropriate for any type of soils
- Suitable for all the weather conditions
- Enhancement in load bearing capacity □
Optimum Water content
- Savings of natural resources.
□Productivity Savings

OBJECTIVES:

- The major objective of the project is to make use of RBI Grade 81 as an alternative to the Cement in the construction industry due to its strength, stability and durability stabilization technique using RBI grade 81.
- Resources are getting exhausted in nature, its capacity also slowly becoming less.
- Large quantity of soil is utilized in the road construction but enough quantity of soil of particular quality is not available easily. Hence huge number of trees are cut off resulting in deforestation, soil erosion & loss of fertile soil which hinders the agricultural productivity. □

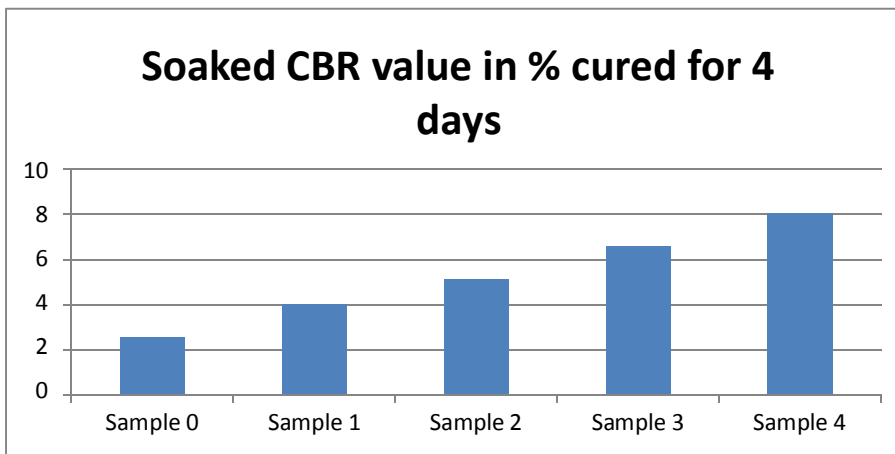
In order to avoid the replacement of the in – situ soil.

PROBLEM CONTEXT:

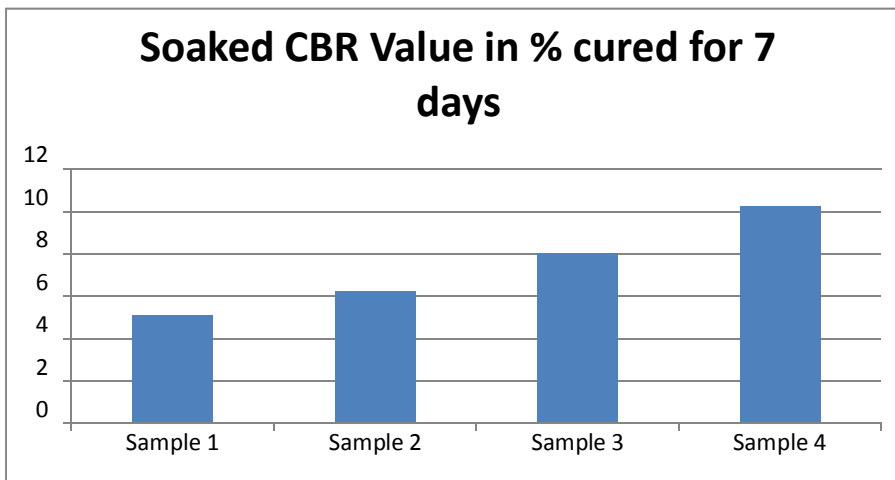
- Conventional materials are limited.
- Conventional materials are not suitable for all types of soils □
Conventional materials are very expensive.
- Replacement of in – situ soils are required.
- Soil exchange is necessary.
- Negative impact on environment.
- Maintenance is more for conventional techniques.
- Expansive soils like lateritic soils & black cotton soils are problematic soils.

Table 1: Results of the CBR Test conducted in the lab:

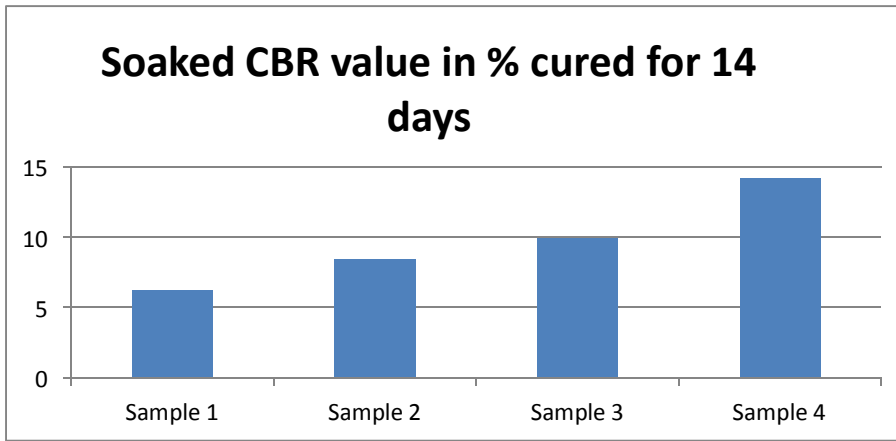
Soil sample	% of Soil stabilizer RBI Grade 81	Soaked CBR value in % cured for			
		4 days	7 days	14 days	28 days
Sample 0	0%	2.55	-	-	-
Sample 1	1%	4.03	5.13	6.24	6.97
Sample 2	2%	5.14	6.23	8.41	10.97
Sample 3	4%	6.59	8.04	9.89	12.52
Sample 4	6%	8.05	10.25	14.21	19.72



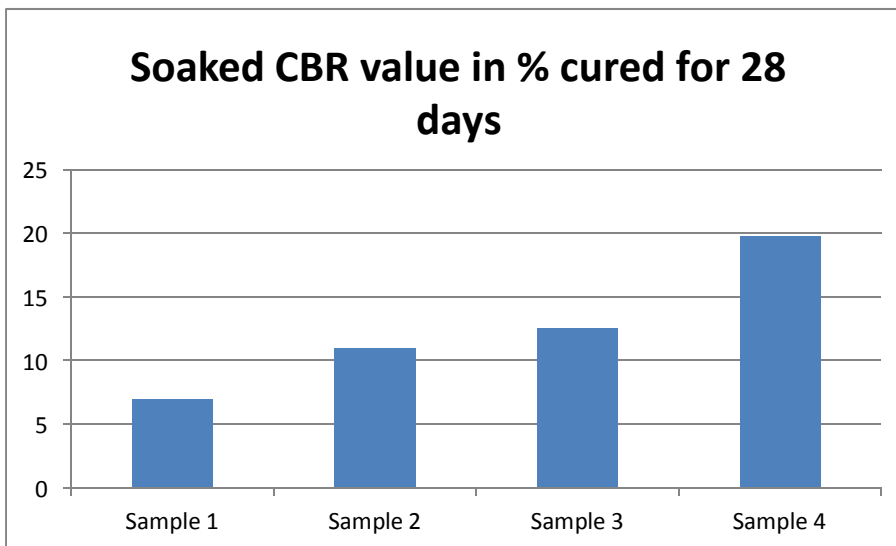
Graph 1: soaked CBR value for 4days



Graph 2: Soaked CBR value for 7days



Graph 3: Soaked CBR value for 14 days



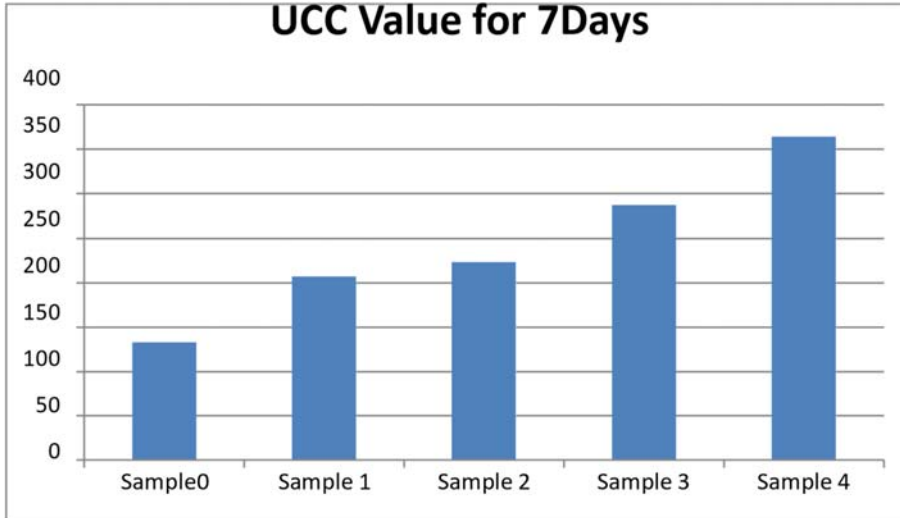
Graph 4: Soaked CBR value for 28days

UCC Values and “E” values obtained for various days for different soil samples collected:

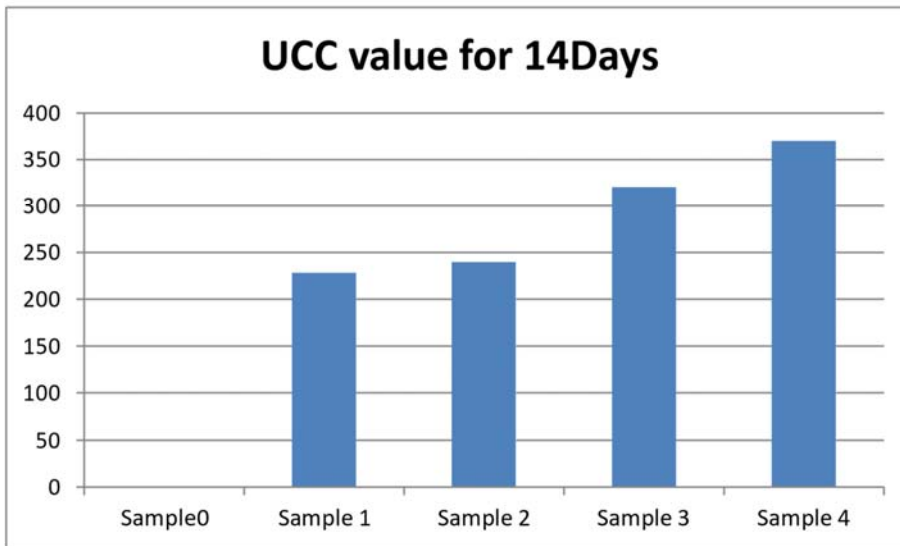
Table 2 Unconfined Compression Test results on addition of RBI Grade 81 stabilizer:

Soil sample	UCC Value			E		
	7Days	14Days	28Days	7Days	14Days	28Days
Sample0	133.1	-	-	3921.0	-	-
Sample 1	206.95	228.38	236.2	5392.1	5532	5972.3
Sample 2	223.1	239.41	258.13	5490.3	6181	6265
Sample 3	288.1	319.8	329.1	6658.7	6933	8815
Sample 4	363.99	370.1	373.3	6850.9	7938	9102

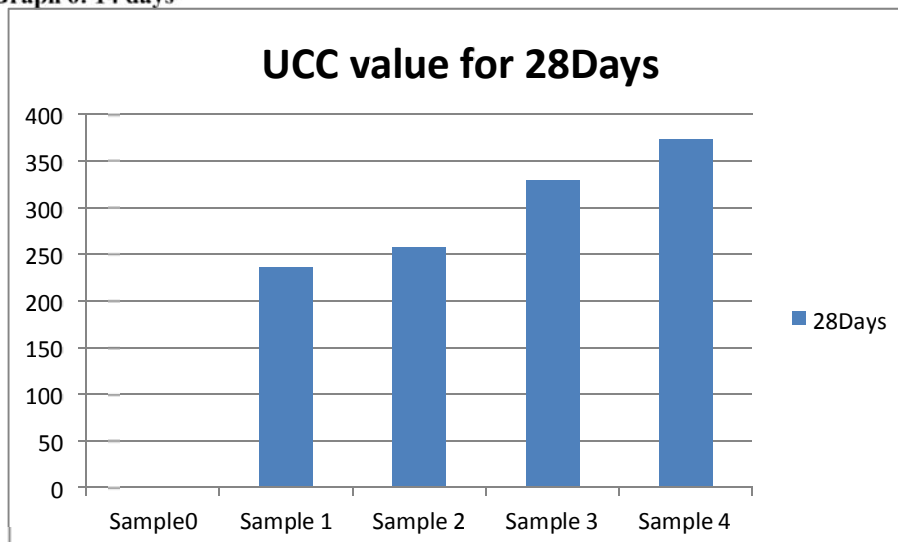
Graph plotted for different number of days of UCC value:



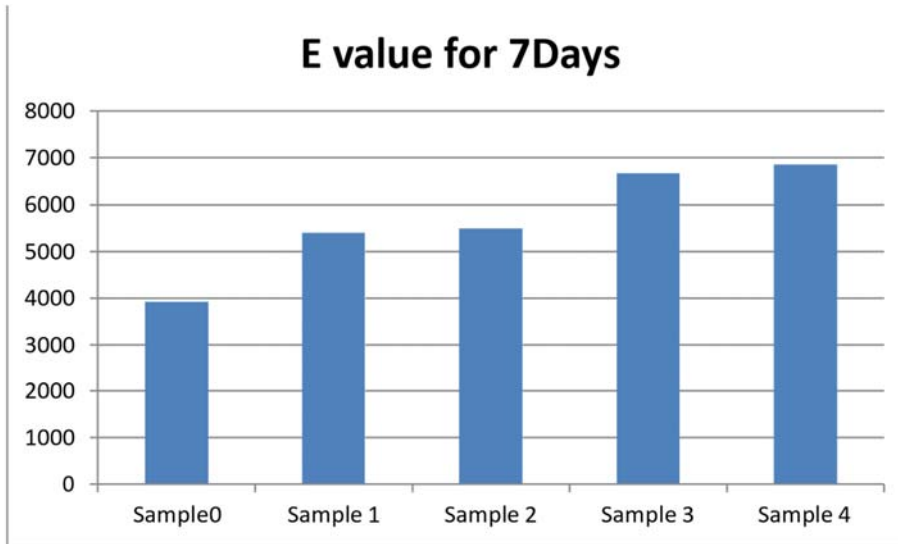
Graph 5: 7 days



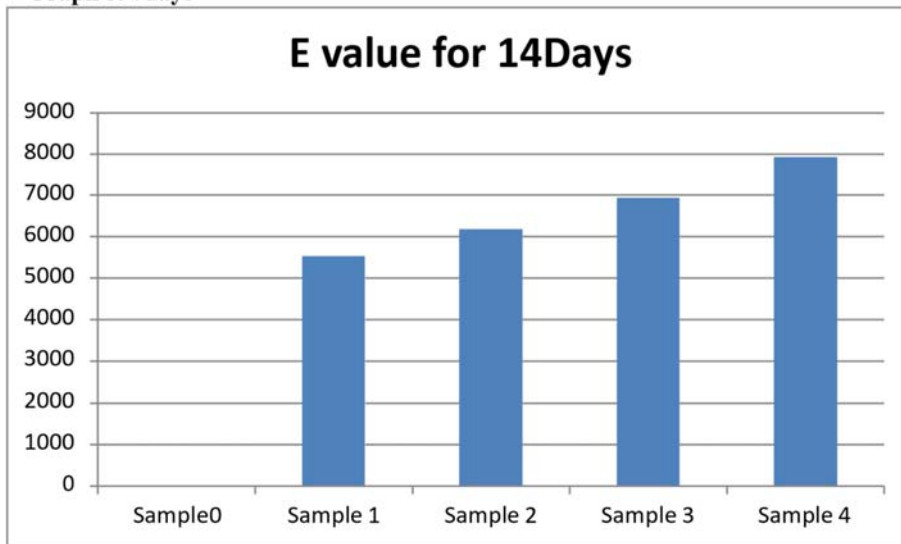
Graph 6: 14 days



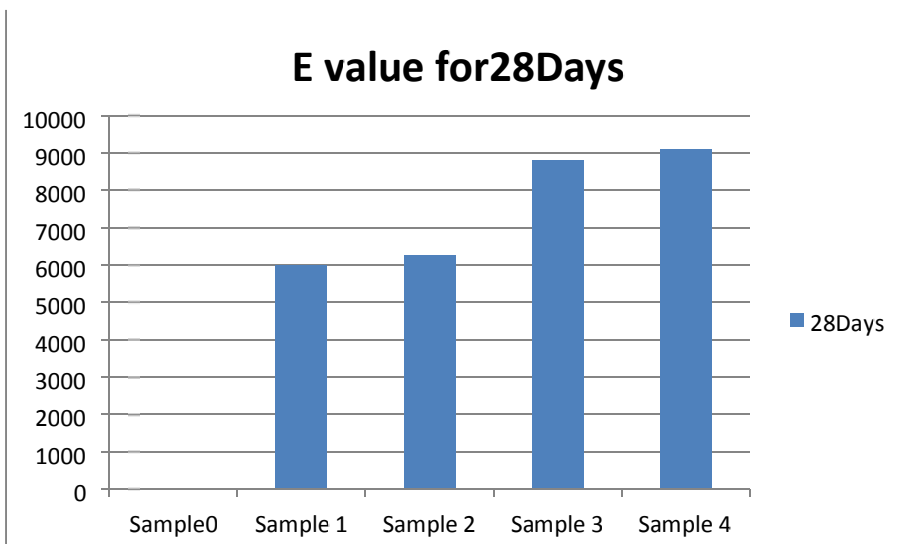
Graph 7: 28days



Graph 8: 7days



Graph 9: 14days



Graph 10: 28days

VI. CONCLUSIONS

- Stabilized soils after treatment is utilized for constructing sub grade, sub base & base coarse.
- There was a significant improvement in strength on addition of stabilizer under unsoaked conditions.
- When the dosage of stabilizer is increased there is an increase in CBR value
- It is found that when all the tests like California bearing ratio test, unconfined compression test, we found a drastic and considerable increase in CBR values, E values & UCC values, which in turn greatly enhances the soil properties.

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