Study of Improvement of Clayey Soil by Using RBI Grade-81 and Stone Dust in Sub grade and minimize the Thickness of Flexible Pavement

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Abstract— In this work, an attempt has been made to carry out an experimental work, based on various results with different amount of additives ranging from 0% to 4 % (RBI Grade-81) and 10% to 50% (Stone Dust). The additives used are RBI Grade-81 and Stone Dust. Different properties of soil are determined for the soil. The important soil parameters are determined by incorporating different percentages of RBI Grade-81, Stone Dust and (RBI Grade-81+ Stone Dust). Then a more economical wise and CBR value wise 40% of Crushing Dust and 2% of RBI Grade -81 is suitable for pavement thickness.

Keywords: CBR, Expensive Soil, RBI Grade-81, Reinforcement Soil, Stone Dust and Soil Stabilization

I. INTRODUCTION

A. General:

The moisture in the soils shows variations due to climatic changes change in water table, watering of gardens and lawn, presence of trees and shrubs and leakage from water and drainage pipes. The repeated loading triaxial test is performed within the elastic range of the soil in order to determine the resilient modulus. On the other hand, the permanent deformation deals with the cyclic loading of materials beyond the elastic limit or sometimes up to failure of the specimens in order to evaluate the rutting performance

To solve the problem with stone dust, investigation should be done for alternate uses of stone dust. Improvement of engineering properties of stone dust with the help of cementations stabilizer RBI Grade 81 is studied in this research work. This stabilized stone dust will be helpful as pavement materials for roads, especially in areas nearer to alumina industries. 1.5

B. Objectives:

The objective of the work is to stabilize the Black cotton soil, the waste material generated from alumina plant by mixing it with RBI Grade 81 obtained from Alchemist Technology, for improving the engineering properties which can subsequently be utilized for various engineering and geotechnical applications like as a filling material for embankments, as a sub-base material for pavement and replacement of poor sub grade soil etc. The objective of this work can be summarized as follows:

- The CBR test was performed on the soil samples and value of CBR was recorded using RBI Grade-81.
- The CBR test was performed on the soil samples and value of CBR was recorded using crushing dust.
- Find optimum value of RBI Grade-81 and crushing dust.
- RBI grade-81 and crushing dust (optimum %) added in the soils for the purpose of stabilization and the changes in the value of CBR were recorded.

II. RESULT AND CONCLUSION

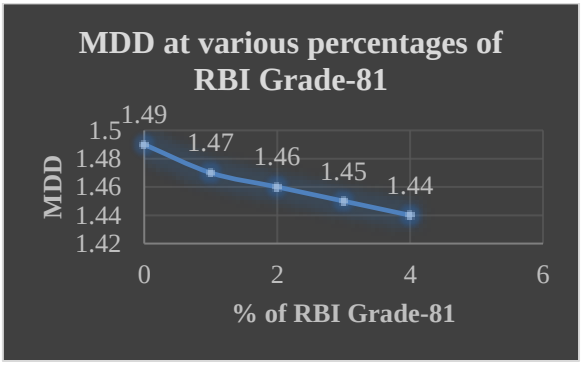

Fig. 1: Maximum Dry Density using RBI Grade-81

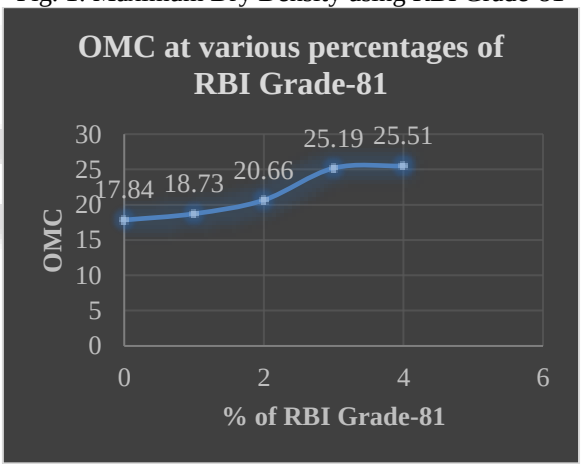

Fig. 2: Optimum Moisture Content using RBI Grade-81

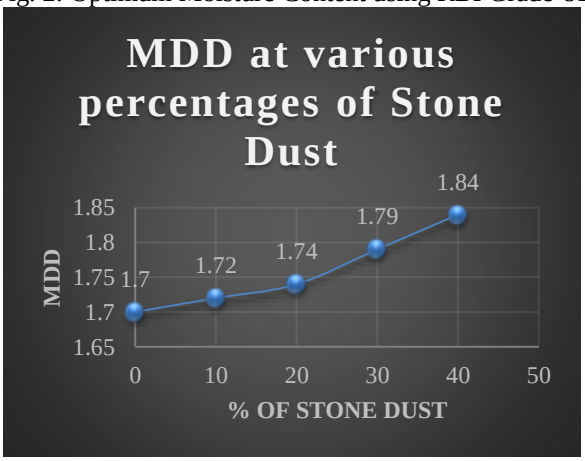

Fig. 3: Result of Maximum Dry Density using Crushing Dust

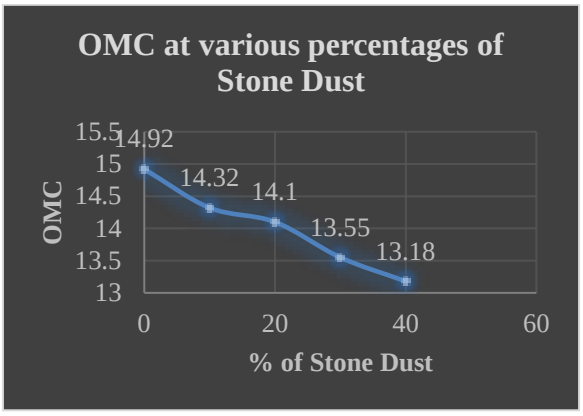

Fig. 4: Result of Optimum Moisture Content using Stone Dust

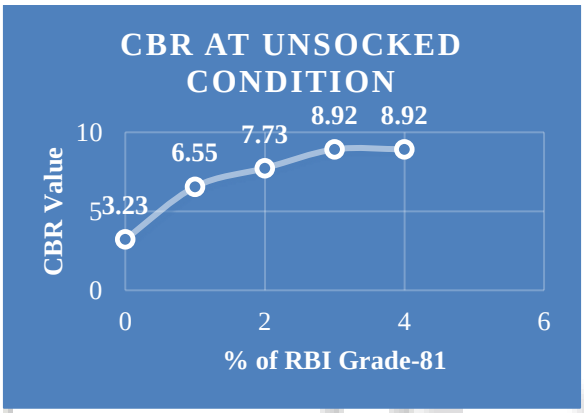

Fig. 5: Result of CBR using % of RBI Grade-81

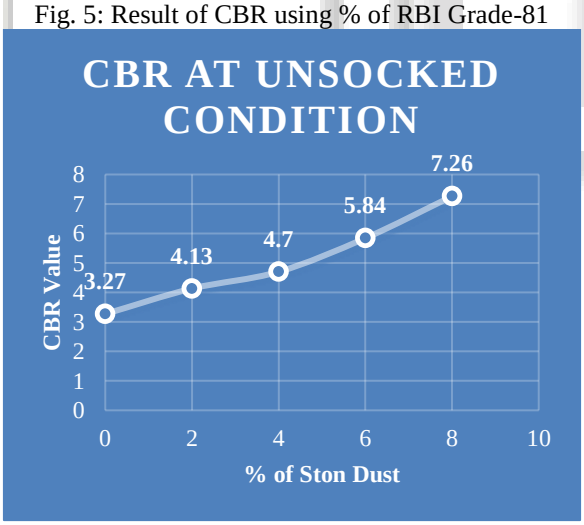

Fig. 6: Result of CBR using % of Stone Dust

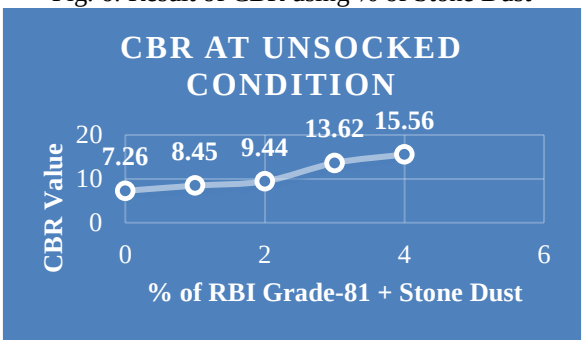

Fig. 7: Un-Soaked CBR test result using % of Crusher dust and RBI Grade-81

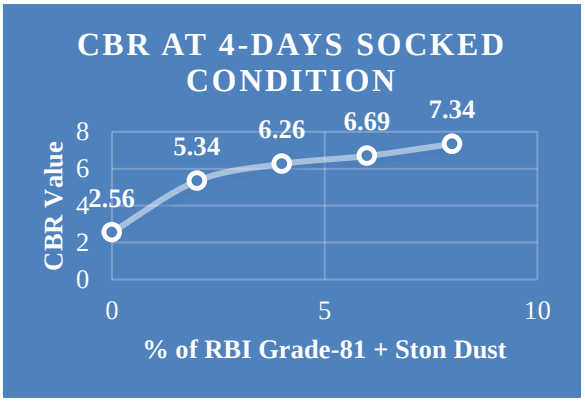

Fig. 8: 4-days Soaked CBR test result using % of Crusher dust and RBI Grade-81

III. Conclusion

Based on the results obtained and comparisons made in the present study, the following conclusions can be drawn:

A. Atterberg Limit Tests & OMC and MDD

- The liquid limit of the soil is 51.6%.
- The plastic limit of soil 20.22%.
- The plasticity index of soil 31.38%.
- The compaction characteristics of soils vary significantly at low RBI grade-81 content. The optimum moisture content increases (17.84% to 25.51%) and maximum dry density decreases with (1.49% to 1.44%) decreased RBI grade-81 content.
- The compaction characteristics of soils vary significantly at low Crushing Dust content. The optimum moisture content increases (14.92% to 13.18%) and maximum dry density decreases with (1.7% to 1.84%) decreased Crushing Dust content.

IV. California Bearing Ratio (CBR) Test

- The value of CBR increased from 3.23% to 8.92%for different percentages of RBI grade-81 used in the soil sample in un-socked condition.
- The value of CBR increased from 3.23% to 6.55%for different percentages of Crushing Dust used in the soil sample in un-socked condition.
- At 40% of Crushing Dust use in concrete optimum value results provide (CBR Value 7.26).
- The value of CBR increased from 7.26% to 15.56% for 40% Crushing Dust and different percentages of RBI Grade -81 used in the soil sample in Un-socked condition.
- The value of CBR increased from 2.56% to 7.34% for 40% Crushing Dust and different percentages of RBI Grade -81 used in the soil sample in 4-days socked condition.
- At 40% of Crushing Dust and 2% of RBI Grade -81 use in Soil Stabilization results provide more economical.
- Then a more economical wise and CBR value wise 40% of Crushing Dust and 2% of RBI Grade -81 is suitable for pavement thickness.

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