

A Review: Stabilization of Black Cotton Soil using RBI Grade-81 for Pavement Construction

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Abstract— Black cotton soils were stabilized with various proportion of RBI Grade-81 i.e. at 1, 2, 3, 4, 5, 6 & 7%. RBI Grade-81 possess no plasticity. Plasticity index of clay fly ash mixes decreases with increase in RBI Grade-81 content. The liquid limit and plastic limit of the soil- RBI Grade-81 mixture varied with the changing RBI Grade-81 content. The CBR values of black cotton soil with RBI Grade-81 mixes, tested under soaked & unsoaked conditions & there results were observed, with examination of results it is found that the RBI Grade-81 has a decent potential to be utilized as an added substance for enhancing the building properties of far black cotton soils.

Key words: Black Cotton Soil, RBI Grade-81, Pavement Construction

I. INTRODUCTION

India has the population of 125 million (approximate) over the area of 3287240 sq. km needed vast network of structures and roads. The land available for construction is less because of increasing urbanization. Every land is being utilized for various structures from an ordinary building to sky scrapers, from bridges to airports and from village road to expressway. Soil being the cheapest and readily available construction material, has been popular with the civil Engineers, even though it has poor engineering properties. Engineers often face the problem of constructing facilities on or with soils, which do not possess sufficient strength to support the loads imposed upon them either during construction or during the service life of structure. Because of the poor engineering properties, the design of structures on such soils has been a cause of concern for various construction agencies. The poor engineering properties of soil have forced engineers to improve the properties of soil by various stabilizing techniques. Stabilization of soil is an effective method for improving the strength, stiffness and workability of the soil. There are various methods that could be used to improve the performance of poor quality soils. These methods ranging from replacing the existing soil with a good quality soil to methods that involve treatment with chemical stabilizers. The choice of stabilizer depends mainly on type of soil and degree of improvement desired.

II. PROPERTIES OF BLACK COTTON SOIL

Black cotton soil is a type of expansive soil it is a highly clayey soil, grayish to blackish in colour and spread over a wide area of the world, mostly found in the arid and semi-arid region. In India it covers about 20% of land area and includes approximately the entire Deccan Plateau, Maharashtra, Madhya Pradesh, Tamil Nadu, Karnataka, Andhra Pradesh and part of Gujarat and Uttar Pradesh. It exhibits low bearing capacity and high volume change due to the presence of montmorillonite clay mineral. The liquid limit and plasticity index value ranges from 40 to 100 percent and 20 to 60

percent respectively. BC soil has a low shrinkage limit between 10 to 15 percent and high OMC of 25 to 30 percent. All these properties of soil makes it to be highly sensitive to moisture changes, highly compressible and plastic in nature. The strength of soil is extremely low and has a very low bearing capacity.

III. USE OF RBI GRADE-81 STABILIZER

RBI Grade-81 is an odorless beige powder, which is insoluble in water, non UV degradable and chemically stable. It forms dust free surface. It is durable, permanent and hardens fast. It is aesthetical and environmental friendly. The volume stability of the soil is increased significantly with the addition of low dosages of RBI grade-81. It reacts with soil by hydration reaction and strength of soil treated with it increases with age.

IV. LITERATURE REVIEW

Anitha. K.R et. al.,(2009) studied the effect of a new stabilization product RB1 Grade-81 on kaolinite soil, red soil, & Lateritic soil. The soils were tested for atterberg's limit, compaction test and CBR. The kaolinite soil, Red soil and lateritic soil were mixed with different percentage of RBI Grade-81 (i.e. 0%, 2%, 4%, 6% and 8%) for preparation of specimen. The CBR value of soil at different percentage of RBI was determined at OMC+1% water content and curing was done for 0 days, 7 days and 11 days. After curing the specimen was soaked for 4 days to conduct soaked CBR test. The study revealed that with the addition of RBI with kaolinite soil, Red soil and lateritic soil both soaked and unsoaked CBR were increased. On the basis of experiments the author's concluded that the unsoaked CBR did not changed very much for red soil and lateritic soil but for kaolinite soil it increased 16 times. The soaked CBR increased 16 times, 14 times and 4 times with the addition of optimum percentage of RBI Grade-81 recommended for red soil, lateritic soil and kaolinite soil respectively.

K.V. Madurwar, et. al., (2013) conducted a study on effect of sodium silicate and RBI Grade-81 on black cotton soil to improve its engineering properties. The test results showed that Liquid limit decreased and plastic limit increased with the addition of admixture, thus resulting in reduction of plasticity index. The UCS and soaked CBR values increased with increase in RBI Grade-81, counsel its suitability pretty much as good stabilizer. However with the increasing dose of glass UCS and CMBR price bated, that indicating the limitation of glass to be used as a stabilizer. Once the run Grade-81 was additional to the soil the free swell index price was bated however with the addition of glass it had been hyperbolic.

B. M. Patil, K. A. Patil, (2013) studied the result of RBI Grade-81 and moorum to stabilize the soil. The run Grade-81 and moorum were mixed with soil in numerous

proportions and tested for OMC, MDD and soaked cbr. The soaked cbr of untreated soil was a pair of 5.6%. Once the soil and run were mixed within the proportion of 98:02 & 96:04 the soaked cbr values were hyperbolic to four 8.9% & 8.79%. Once soil was mixed with moorum within the proportion of 90:10 & 80:20 the soaked cbr values were hyperbolic to a pair of 4.1% and 2.84%. The soaked cbr values for the mixture of soil, moorum and RBI Grade-81 within the proportions of 88:10:02, 78:20:02, 86:10:04 & 76:20:04 were found to be three 4%, 4.56%, 10.23% & 14.76%. The conclusion created on the idea of check results was that the cbr price of soil are often improved by victimization moorum and RBI Grade-81 as stabilizer.

Tejinder Singh and Navjot Riar, (2013) investigates the result of run Grade-81 to stabilize the soil with the assistance of Atterberg's limit test, standard Proctor check and cbr test and analyze the value distinction between standard technique and price of pavement created victimization two hundredth, 4%, 6 June 1944 and eight run Grade-81. The CMBR price of untreated soil was 2.14% that has hyperbolic to twenty-eight 9%, 60.82%, 105.01% and one hundred thirty five 5% with the addition of twenty-two, 4%, 6 June 1944 and eight run Grade-81 when seven days of hardening amount and four days of soaking amount. When the check, they terminated that run Grade-81 is extremely effective in helpful the extremely plastic soil. This soil is often thought of as stabilized sub base. They conjointly terminated that expense of pavement reduced with run Grade-81. The pavement price found to be minimum among all alternative cases, once it created with soil and a pair of run Grade-81. The value of pavement by standard technique was nearly three lacs that become just about half with the addition of 22 RBI Grade-81.

REFERENCES

- [1] Anitha, K.R., Ashalatha, R. and Johnson, A., 2009. Effects of RBI Grade Different Types of Sub grade Soil. In Proc. 10th National Conference on Technological Trends (NCTT09), India (pp. 289-296).
- [2] Patil, B.M. and Patil, K.A., 2013. Improvement in properties of subgrade soil by using moorum and RBI grade 81. CONTRIBUTORY PAPERS, p.283.
- [3] Madurwar, K.V., Dahale, P.P. and Burile, A.N., 2013. Comparative study of black cotton soil stabilization with RBI Grade 81 and sodium silicate. International Journal of Innovative Research in Science, Engineering and Technology, 2(2), pp.493-499.
- [4] Singh, E.T. and Riar, E.N., 2013. Strengthening of subgrade by using RBI grade 81 a case study. IOSR Journal of Mechanical and Civil Engineering, 8(6), pp.101-106.
- [5] <http://www.anywaysolutions.com>.
- [6] <http://www.RBIgrade81.com>.
- [7] <http://www.pmgysy.nic.in/RBI>.
- [8] IS: 2720 (Part 3) Sec 1, 1980, Methods of Tests for Soil - Determination of specific gravity, Bureau of Indian Standards, New Delhi.
- [9] IS: 2720 (Part 5) 1972, Methods of Tests for Soil - Determination of Atterberg's limits, Bureau of Indian Standards, New Delhi.
- [10] IS: 2720 (Part 7) 1980, Methods of Tests for Soil - Determination of water content-dry density relation using light compaction, Bureau of Indian Standards, New Delhi.
- [11] IS: 2720 (Part 8)-1983. "Method of Test for Soil (Determination of Optimum moisture content and Maximum dry density for modified proctor test)"
- [12] IS: 2720 (Part 10) 1991, Methods of Tests for Soil - Determination of unconfined compressive strength, Bureau of Indian Standards, New Delhi.
- [13] IS: 2720 (Part 16) 1987, Methods of Tests for Soil - Laboratory determination of California bearing ratio, Bureau of Indian Standards, New Delhi.