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Stabilization of Black cotton soil with Tyre Waste

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ABSTRACT

Black cotton soil which covers the major portion of Indian sub continent poses challenging problems to infrastructural development in the region. The soil is generally weak and has less stability against the application of load. These soils are used in sub grade of pavement and also in construction of structures. The swelling and shrinkage property of black cotton soil makes it difficult for construction. Soil stabilization is one such method which will be adopted to improve the properties of soils. Many additives such as fly ash, mine waste, cement, lime have been used in the past to stabilize the soils. In this study an attempt is made to stabilize the soil using tyre waste.

Results of the study reveal that the engineering properties of soil can be improved by the addition of tyre waste and also solves the problem of disposal of waste.

Keywords—CBR, Rubber Crumb, OMC & MDD

I. INTRODUCTION

Black cotton soils are inorganic clay of medium to high compressibility and covers the major portion of India. Due to the rich proportion of montmorillonite mineral it becomes the weakest among all the other soils. The soil is characterized by high shrinkage, low bearing capacity and swelling properties. Hence the Black cotton soil has been a challenge to the geotechnical engineers. Soil stabilization improves the engineering properties of soils and thus making it more stable. It is the process of improving engineering properties and making the soil more stable. Soil stabilization can be categorized under two main categories, mechanical and chemical stabilization. Mechanical stabilization is the method of improving the properties by changing its gradation while chemical stabilization includes mixing of admixtures to improve soil properties.

With the ongoing rise in use of motor vehicles, hundreds of millions of tyres are discarded each year through the world. As it is a non biodegradable material disposal is a huge problem. In order to eliminate the negative effect of these depositions and in terms of sustainable development, there is great interest in the recycling of these non-hazardous solid wastes.

II. METHODOLOGY

2.1 Material used

2.1.1 Soil

The primary material used in the study is black cotton soil and the sample is procured from Devar-Hipparagi, Vijayapura. The soil is collected from a depth of 2 feet from ground level and the sample is air dried and used for the present study.

Table 1. Index Properties of Black cotton soil

Specific gravity	2.03
Liquid limit	55.40%
Plastic limit	22.49%
Plasticity index	32.9%
Particle size distribution	Well graded soil

2.1.2 Tyre Waste (Rubber crumb)

The tyre waste is collected from tyre recycling shop from Bangalore, converted into rubber crumbs and stored in polythene bags. Sample passing through 4.75mm IS sieve is used for the experimental investigations with the specific gravity of 1.25.

III. PRIOR APPROACH

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Umar Jan etal in 2015 gives the observation from their study that OMC and MDD decreases with the increase in shredded tyre and the optimum value was found to be 8% and the size of shredded tyre used was 25X50mm.

Neeraja in 2016 conducted experiments on black cotton soil mixed with shredded tyre waste in varying percentages and observes relative strength gain.

Piyush et.,al (2017) carried out some laboratory experiments and concludes as shredded rubber fibre can be used as a good reinforcing material.

IV. OUR APPROACH

Soil is characterized by index property tests as per the specifications of IS 2720 (1985). Compaction and CBR tests were conducted for black cotton soil and soil mixed with various proportions of rubber crumb (i.e 4%, 6%, 8%, 10%, 12%)

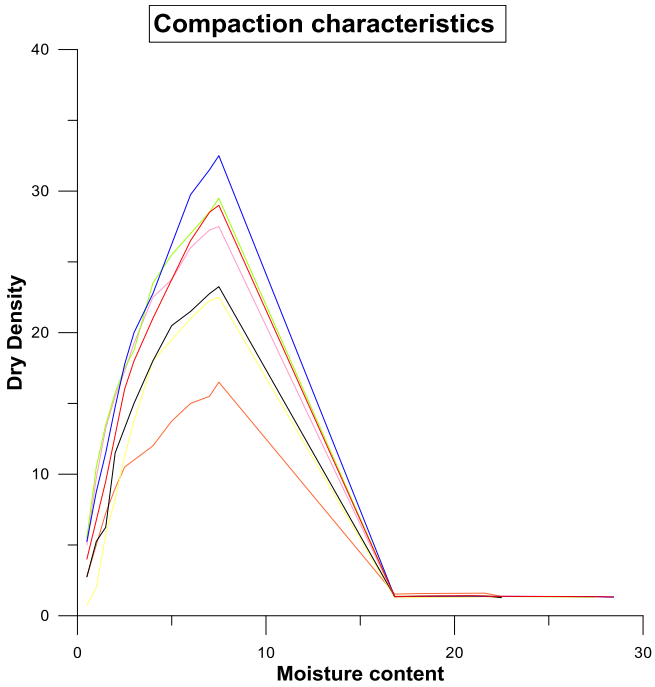
V. RESULTS

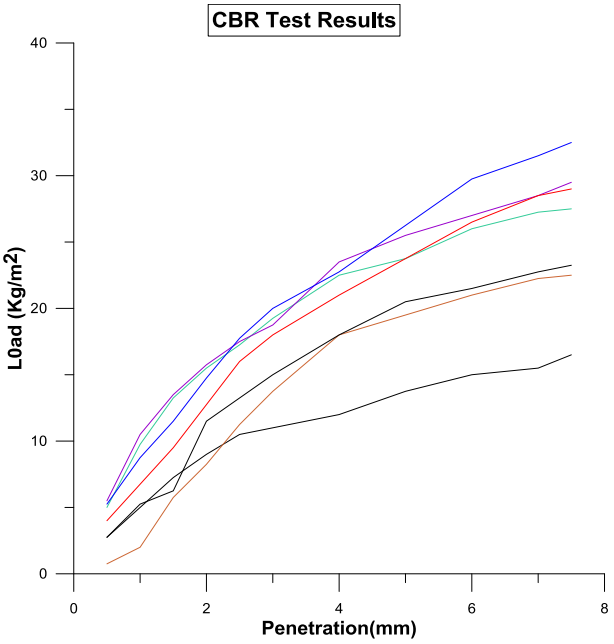
Table 2: Compaction characteristics

Description	Black cotton Soil	Soil+4% rubber crumb	Soil+6% rubber crumb	Soil+8% rubber crumb	Soil+10% rubber crumb	Soil+12% rubber crumb	Soil+14% rubber crumb
OMC (%)	21.62	28.83	25.9	23.4	22.9	22.31	22.03
MDD (g/cc)	1.595	1.397	1.350	1.412	1.41	1.39	1.383

Table 3: California bearing ratio values

Description	CBR
Black cotton Soil	0.76%
Soil+4% rubber crumb	0.94%
Soil+6% rubber crumb	0.99%
Soil+8% rubber crumb	1.26%
Soil+10% rubber crumb	1.28%
Soil+12% rubber crumb	1.30%
Soil+14% rubber crumb	1.16%





V. CONCLUSION

From the results it can be concluded that the tyre waste in the form of rubber crumb can be effectively utilized as a stabilizer in the pavement construction.

1. From the standard compaction test results it can be observed that the maximum dry density reduces with increase in percentage of rubber crumbs and this could be due to the light weight of rubber crumbs.

2. From the CBR test it is observed that CBR value increases with the percentage increase in rubber crumbs, this increment in CBR value can be observed up to the addition of 12% of rubber crumb to the black cotton soil, further reduces the CBR value. Hence it can be concluded that 12% is the optimum value of rubber crumb that can be added to the soil for stabilization.

3. The problem of disposal of tyre waste can also be addressed by the intelligent utilization of waste as a stabilizing material in the road construction.

REFERENCES

[1] Zaidan A. & Zaidan Dhman. (2011). *The effect of Customer Relationship Management (CRM) concept adoption on customer satisfaction.* Available at: http://library.iugaza.edu.ps/thesis/94338.pdf

[2] Arti Mudaliar & Ayushi Mathur. (2015). Women empowerment through microfinance. *International Journal of Arts, Humanities and Management Studies, 1*(2), 58-65.

[3] Bikash Dutta. (2015). Rural development through self help groups: An overview. *Indian Journal of Applied Research, 5*(4), 70-78.

[4] Wilkie, W. L. (1994). *Consumer behavior*. (3rd ed.). New York: John Wiley and Sons.

[5] Saunders C.S. (2014). Point estimate method addressing correlated wind power for probabilistic optimal power flow. *IEEE Transactions on Power System, 29*(3), 1045-1054.