

Use of Lime & Concrete Waste Material for Stabilization of Black Cotton Soil in Rajkot

Mehul M. Chavda¹ Karan S. Chauhan² Jatin R. Dharaiya³

^{1,2,3}Assistant Professor

^{1,2,3}Department of Civil Engineering

^{1,2,3}Shri Labhubhai Trivedi Institute of Engineering & Technology, Rajkot, India

Abstract— In present scenario, engineer face difficulties in construction over black cotton soil. The major Problem in black cotton soil is poor bearing capacity & stability. There are different method are available to increase to stability of soil by lime, cement grouting, dewatering, etc. We can use concrete waste material and lime for stabilization by improving some soil properties.

Key words: Lime, Concrete Waste, Liquid Limit, Plastic Limit, Maximum Dry Density

I. INTRODUCTION

Soil stabilization is the process of improving the properties of the soil, so increase the stability of soil. Some place a bearing capacity of the soil is very less and this type of soil improving by the soil stabilization. In soil stabilization includes compaction, consolidation, drainage, etc. The soil stabilization are restricted to the processes which alter the soil material itself for improvement the properties of soil. Purpose of soil stabilization, a cement material or a chemical is added in natural soil. Stabilization is most use for improve natural soil for the construction of highway, dam, building and bridge. By the soil stabilization, reduce the permeability and compressibility of soil mass in earth surface and structure. Stabilization is use for increase the shear strength of soil structure. The main principal of soil stabilization is controlling the grading of soil and aggregates in the construction of base and sub-base of the highway and foundation of structure. Soil Stabilization is incorporates the various methods implement for modifying the properties of a soil and improves the engineering properties and performance of soil. Soil stabilization is use for make an area trafficable within a short duration for military and all emergency purpose. Soil stabilization is used for dust control and protection of erosion of soil surface. The main aim is the creation of a soil material or system that will hold under the design use conditions and for the designed life of the engineering project.

II. OBJECTIVE

To achieve the objective, the soil has been arbitrarily reinforced with concrete waste and lime. So the suitability of concrete waste material is considered to enhance the properties of soil. A experiment are performed such as liquid limit test, plastic limit test, Procter test and California bearing ratio test(CBR) on the soil sample of our campus. By the adding the concrete waste material and lime admixture, the improvement of soil property like liquidity and plasticity behaviour, and by the CBR test is carried out to access the suitability of this composite for a road sub grade material.

III. MATERIAL

A. Lime

It should be emphasized that the properties of soil-lime mixtures are dependent on many variables. Soil type, lime type, lime percentage and curing conditions (time, temperature, and moisture) are the most important. Different forms of lime have been effectively used as soil stabilizing agent for many years. Though, the most normally used products are hydrated high-calcium lime, monohydrated dolomite lime, calcite quicklime, and dolomite quicklime. Hydrated lime is used mainly often for the reason that it is much less caustic than quicklime; though, the use of quicklime for soil stabilization has increased in recent years mainly with slurry-type applications.

B. Concrete Waste

Where the demolition of the building and the other structure are collapse very high availability of the concrete waste material. And other resources from the many experimental perform on the concrete where the waste materials are available.

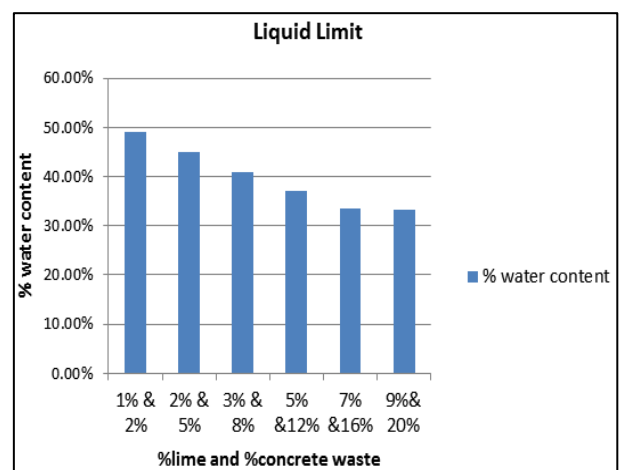
IV. EXPERIMENTAL PROGRAM

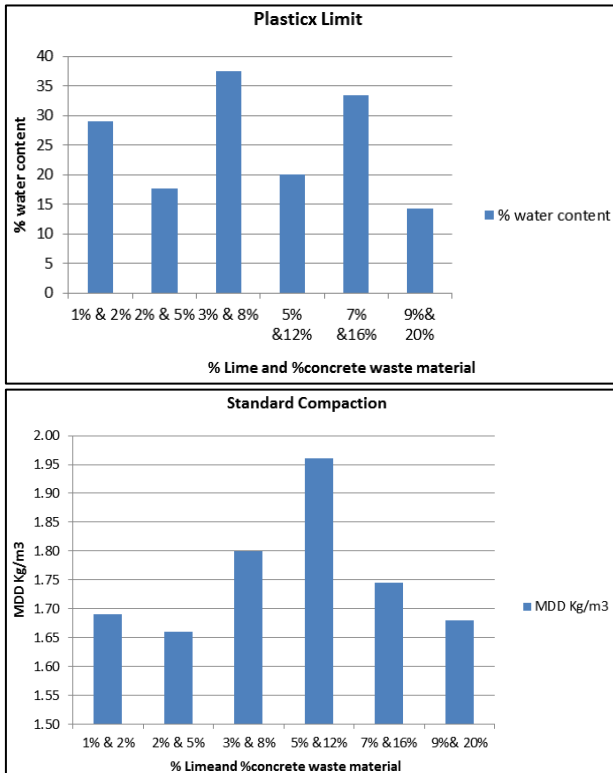
As per IS code 2720 for soil testing , find the properties of black cotton soil by different test like, Seive analysis, Liquid limit, plastic limit, Standard compaction test, Box shear test, CBR, etc. Test series for soil test with the use of lime and concrete waste material is given below in table 1.1

Material	Percentage					
Lime %	1%	2%	3%	5%	7%	9%
%concrete waste material	2%	5%	8%	12%	16%	20%

Table 1.1

V. EXPERIMENTAL RESULT





[5] Mandeep Singh, Anupam Mittal, "A review on the soil stabilization with waste materials", ISSN: 2248-9622 from IJERA.

VI. CONCLUSION

- 1) Use of lime and concrete waste is economical and eco-friendly.
- 2) Liquid limit is decreased up to 33.16% with the use of 9% of lime and 20% concrete waste material.
- 3) Plastic limit is decreased up to 14.18 % with the use of 9% of lime and 20% concrete waste material.
- 4) Maximum dry density is achieved of 1.96kg/m³ with the use of 5% of lime and 12% concrete waste.
- 5) Above Result shows that Soil stabilization increase as liquid limit & plastic limit are decreased while maximum dry density is increase.

REFERENCES

- [1] Cheng-Fang Lin, Shun-Shin Lo, Heng-Yuh Lin, Yichin Lee, "stabilization of cadmium contaminated soils using synthesized zeolite", journal of hazardous materials 60(1998)217-226.
- [2] De BritoGalvao, T., Elsharief, A., And Simoes, G."Effects of Lime on Permeability and Compressibility Of Two Tropical Residual Soils." J. Environ. Eng. 130, Special Issue: Waste Containment Barrier Materials(2004)., 881–885.
- [3] Achmad Fauzi, Wan Mohd Nazmi Wan Abdul Rahman, Zuraidah Jauhari, "utilization waste material as stabilizer on kuantan clayey soil stabilization", from MUCET 2012, procedia engineering 53(2013)42-47.
- [4] Prof.J.M.Raut, Dr.S.P.Bajad, and Dr.S.R.Khadeshwar," stabilization of expansive soils using fly ash and murrum", an ISO 3297:2007 certified organization, ISSN: 2319-8753.