

Experimental Evaluation of Mineral Admixtures As A Pavement Construction Material In Clay Soil

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Abstract- The main aim of this study is to investigate on the properties of clay soil when treated with pond ash (pa), rice husk ash (Rha) and cement. To determine the strength of treated clay soil with pa, rha, cement the following tests were performed they are the modified proctor compaction tests and California bearing ratio (cbr), firstly we need to prepare the specimens with different percentages of admixtures by replacing the clay with Pa and Rha with 30%-45% and 5%-20%, after the preparation of specimens optimum moisture content (Omc): maximum dry density (Mdd) and cbr value has to be evaluated

Keywords- California Bearing Ratio (CBR); Pond Ash (PA); Rice Husk Ash (RHA); Optimum Moisture Content (OMC); Maximum Dry Density (MDD)

I. INTRODUCTION

With The Rapid Urbanization And Globalization The Growth Of Industries Has Been Increased, These Industries Are Very Much Essential For The Nation's Gdp, But At The Same Time These Industries Waste Creating More Problem For Disposal Of Its Waste .If We Dispose The Fly Ash Waste In To Environment It Will Pollute Air, To Avoid That It Is Mixed With Water In Pond .But It Is Not A Permanent Solution Because It Is Taking More Land Area. So, the Best Solution of This Waste Is to Use Pa and Rha in Civil Engineering Works, these materials were also called as admixtures .in India around 150 million sq meters of land is covered with million tonnes of pond ash deposits, this will contaminate the ground water bodies

II. TEST PROCEDURE AND MATERIALS

2.1. Soil:

The index properties of the soil have to evaluate primarily, after knowing about the properties blending of admixtures to the soil has to be carried out. The index properties of soil are listed in Table 1.

Properties of Soil Table.1

colour	gray
shape	Round
Specific gravity	2.1
OMC %	24%
MDD (kg/m ³)	11.3

2.2. Pond Ash

Pond ash is a power plant industries waste ,in this study the engineering properties of pond ash has to be used in civil engineering works, the physical properties of pond ash is showed in table 2

Physical Properties of PA Table 2.

Specific Gravity	2.6
Liquid limit%	39
Plastic limit %	15
Omc %	16.7
MDD (kn/m ³)	18.1

2.3. Rice Husk Ash

Rice husk ash properties will depend up on its burning temperature and its physical properties were listed in table .3

Physical Properties of Rha Table 3.

Specific gravity	1.9
Omc %	58
MDD (kg/m ³)	8.1

2.3 California Bearing Ratio Test

One of the major important factor foe defining the pavement thickness is the California bearing ratio value. The California bearing ratio value of a pavement sub grade will decide pavement thickness with reference to the number of cumulative standard axles of vehicles. The optimum RHA value for the clay mixture is 10%, because of increase in CBR values when RHA content is 10%,if that RHA content

increases up to 15% there is no significant change in the CBR values.



Figure.1 California Bearing Ratio

2.4 Proctor Compaction Test

This Test Was Performed as per IS 2720 Part 8 (1983), the test equipment consists of base plate, collar, mould and rammer. First the accessories has to cleaned and dried then after apply the grease to the mould, take the mass of a mould with base plate excluding the collar. Then collar has to be fitted to the mould after that soil had to be filled in to the mould up to the 1/3rd height. the compaction has to be done to the soil by giving the 25 blows by the rammer with a free fall of 310mm,these blows has to be evenly distributed over the soil surface in the mould. Again 2/3rd height of the mould filled with the soil this is considered as the second layer and again the same procedure is repeated, similarly 3rd third layer has to be filled and compacted. Bulk density of the soil is calculated from the mass of the soil and the volume of the mould, dry density is computed from water content and bulk density.

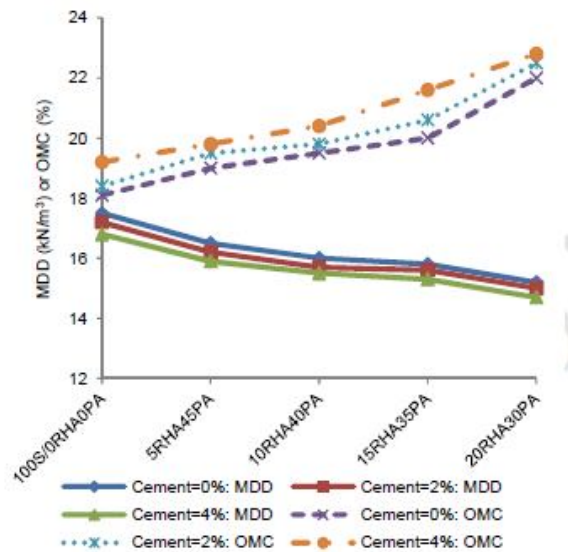


Fig.2 Maximum dry density and optimum moisture content versus different mixture combinations for different percentages of Cement

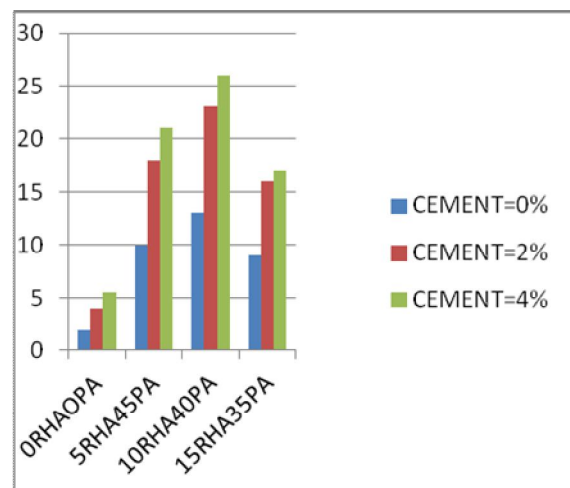


Figure 3 .Variation Of Soaked C.B.R With Combination of Rice Husk Ash and Pond Ash

Figs. 3 shows the values of unstabilized and stabilized CBR values with the combination of pond ash and rice husk ash .the values shows that the combination of cement, pond ash, rice husk ash gives much strength and the gradation of three materials have high blending, around 10% and PA content around 40% are the optimum for the improvement of strength of the mixture

III.CONCLUSION

In this paper the compaction test and CBR tests were conducted to assess the nature soil when mixed with pond ash ,rice husk ash and cement. When compared to unstabilized soil, the stabilized is having the high strength in terms of CBR,

maximum dry density and optimum moisture content. (1) An increase in RHA or PA dosage causes a reduction in MDD and enhancement in OMC.

REFERENCES

- [1] Karthik.S, Ashok kumar.E, Gowtham.P, Elango.G, Gokul.D, Thangaraj.S “Soil Stabilization By Using Fly Ash”. IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE)
- [2] Pratik Somaiya, Yashwant Zala, Rushikesh Dangar “stabilization of expansive soil using fly ash”.
[//www.researchgate.net/publication/280153059_stabilization_of_expansive_soil_using_fly_ash](http://www.researchgate.net/publication/280153059_stabilization_of_expansive_soil_using_fly_ash)
- [3] N.Krithiga, D.Pujitha, T. Palayam, A.revathy “soil stabilization using lime and fly ash”.SSRG international journal of civil engineering-ICRT CETM April -2017
- [4] Udayashankar D.Hakari, S.C.Puranik “Stabilisation of Black Cotton Soils Using Fly Ash, HubballiDharwad Municipal Corporation Area, Karnataka, India” Global Journal of researches in engineering Civil And Structural engineering Volume 12 Issue 2 Version 1.0 February 2012
- [5] Tejashri A. Kulkarni, Pallavi A. Padalkar, Chetan G Joshi “Stabilization Of Soil By Using Fly Ash & Lime” ICCSM-17,ISBN:978-93-86171-34-4
- [6] Gyanen. Takhelmayum, Savitha.A.L, Krishna Gudi “Laboratory Study on Soil Stabilization Using Fly ash Mixtures” International Journal of Engineering Science and Innovative Technology (IJESIT) Volume 2, Issue 1, January 2013
- [7] Is: 2720-Part XVI (1987) Laboratory Determination Of CBR, Bureau Of Indian Standard, New Delhi, India.
- [8] Is 2720- Part V (1985), “Determination Of Liquid And Plastic Limit”, Bis, New Delhi, India.
- [9] Is: 2720-Part IV (1983) , Laboratory Determination Of Grain Size Analysis
- [10] Is 2720 (Part Viii)-1983 Determination of Water Content –Dry Density Using Heavy Compaction