



Stabilization Of Black Cotton Soil By Using Rice Husk Ash.

Stabilization of road.

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Abstract: South region of india is widely covered with black cotton soil. These types of soils have properties of highly shrinkage . Also the load bearing capacity and shearing strength of such type of soil is low. To avoid these impact on soil in structure, we have to improve strength of soil for that we can add RHA (Rice Husk Ash) in black cotton soil by proportion of 4% and 8%.

I. INTRODUCTION -

Whenever construction is done on black cotton soil ,differential settlement occure due to its moisture content, swelling-shrinkage bahaviour. This failure result in cracks , settlement of pavement , undulation. To overcome these defects we have to make the pavement more stable .RHA is best substituent added in pavement to overcome these defects as it contains more silica and which act as a pozzolanic material. RHA is obtained by burning a rice husk at 6000 °C.

Methodology –Tests are carried on black cotton soil .These tests are (with their purposes)

- (1)Specific Gravity- To calculate phase relationshipof soil, such as the void ratio and the degree of saturation and to calculate density of soil solid test oof specific gravity is to be carried out.
- (2)**Grain Size Analysis** – Particle size distribution is carried out by grain size distribution. Particles of size 0.075 mm to 100 mm. are analysed by grain size distribution.
- (3)**Attergbag limits** - Atterberg limits is to check the transition if soil to clay .It determines the amount of moisture content in the soil.
- (4)Liquid Limit- To classify the nature of soil and determine the amount of plasticity in the soil Liquid limit test is carried out.
- (5)**Plastic limit**- The amount of water available in the siol so that when we remould the soil cracks will appear.

The Shrinkage Limit (SL) is the Volume of soil reamains constant in zero moisture content state.

(6)Standard Proctor Test- The Proctor compaction test is a laboratory geotechnical testing method used to determine the soil compaction properties, specifically, to determine the optimal water content at which soil can reach its maximum dry density.

(7)**CBR TEST** - The California Bearing Ratio or CBR test is performed in construction materials laboratories to evaluate the strength of soil subgrades and base course materials.

Properties of material to be used – (1)Black Cotton Soil

Sr.no	Properties of material	Result
1	Specific Gravity	2.35
2	liquid limit	51%
3	Plastic Limit	28.57%
4	Plasticity Index	21.43%
5	Standard Proctor Test (MDD)	1.71 gm/cc
6	CBR (OMC)	18.9%

(2)Rice Husk Ash –

Sr.No	Constituents Name	Percentage
1	Fe ₂ O ₃	0.21
2	SiO ₂	90.23
3	CaO	1.58
4	Al ₂ O ₃	2.54
5	MgO	0.53
6	Kao	0.39
7	Carbon	2.23

Methodology - size only The first step in methodology is testing is to be done on Black Cotton soil. Another step is add RHA by proportion of 4% and 8% with black cotton soil to improve bearing capacity and strength of soil.

(1)Specific Gravity -

<u>Soil with RHA (%)</u>	<u>Specific Gravity</u>
<u>0</u>	<u>2.36</u>
<u>4</u>	<u>2.26</u>
<u>8</u>	<u>2.24</u>

(2)Grain Size Analysis

Sr.no.	Sieve no	Mass of soil retained (gm)	Cummulative mass soil retained	Cumulative % of soil retained (%)	% finer (passing) (100-% of soil retained)
1	4.73 mm	63	63	12.6	87.4
2	2.63 mm	79	142	28.4	71.6
3	1.18 mm	118	260	52	48
4	1 mm	28	288	57.06	42.4
5	600	52	340	68	32
6	425	79	419	83.8	16.2
7	300	11	430	86	14
8	125	40	470	94	6
9	75	14	484	96.8	3.2
10	pan	13	497	99.4	0.6

Coefficient of Uniformity =7.6

Coefficient curvature =1

Coarse grained well graded soil

Liquid Limit –

<u>Sr.no</u>	<u>Soil with RHA in (%)</u>	<u>Liquid Limit</u>
<u>1</u>	<u>0</u>	<u>49</u>
<u>2</u>	<u>4</u>	<u>71</u>
<u>3</u>	<u>8</u>	<u>68</u>

Plastic Limit –

<u>Sr.no</u>	<u>Soil with RHA in (%)</u>	<u>Plastic Limit</u>
<u>1</u>	<u>0</u>	<u>28.50</u>
<u>2</u>	<u>4</u>	<u>42.65</u>
<u>3</u>	<u>8</u>	<u>41.56</u>

Standard Proctor test

<u>Sr.no</u>	<u>Soil with RHA in (%)</u>	<u>MDD</u>
<u>1</u>	<u>0</u>	<u>1.70</u>
<u>2</u>	<u>4</u>	<u>1.67</u>
<u>3</u>	<u>8</u>	<u>1.5</u>

CBR test

<u>Sr.no</u>	<u>Soil with RHA in (%)</u>	<u>CBR Value</u>
<u>1</u>	<u>0</u>	<u>0.510</u>
<u>2</u>	<u>4</u>	<u>1.35</u>
<u>3</u>	<u>8</u>	<u>1.98</u>

Conclusion-**(1) Specific Gravity-****(2) There is decrease in specific gravity by increasing RHA**

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