
SOIL STABILIZATION WITH RICE HUSK ASH AND LIME SLUDGE

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ABSTRACT

Soil stabilization is the process through which we enhance the index and engineering properties of soil. Enhancement include increasing weight bearing capacity, tensile strength, and overall performance in subsoil .There are various methods which we can used for stabilization of soil, which are as- Chemical , Physical, Biological etc.

In Chemical stabilization of soil we can use cement, lime etc. but these are costliest method so we can also use rice husk to reduce the cost of chemical stabilization. Rice husk is the waste residue from the paddy crop. It gives rich amount of silica after burning and which can be used as chemical stabilizer of soil. Rice husk ash and cheaply available lime is mixed with the clay soil in order to improvement of engineering and index properties.

In this investigation we take the 10% and 15% proportion of lime and rice husk ash by weight of soil. We perform various tests in order to find the optimum proportion.

INTRODUCTION

Soil stabilization is the method by which we can improve the index properties as well as engineering properties of the soil. We can use rice husk ash as soil stabilizer which occupy the voids created by the coarser particles if soil contain medium or coarser sandy particles, which leads to enhance the shearing and bearing capacity due to increasing in chemical bonding. Soil stabilization may be achieved by using chemical or pozzolanic materials such as- fly ash, rice husk ash, saw dust, blast furnace slag etc. As rice husk ash and lime has extreme potential of enhancing index as well as engineering properties of soil, that's why we consider rice husk ash and lime in this investigation.

RICE HUSK

Rice husk is the waste agricultural material which is obtained after the milling of paddy crop. Rice husk is rich in silica and its proportion is about 67% to 90%. It is consider as pozzolanic material. Rice husk ash can be obtained by burning the rice husk in a kiln at a temperature about 6000 °C for 24 hours. Silica reacts with the lime and liberates the heat and forms cementations compounds.



Rice husk



Rice husk ash

LIME:-

In this investigation lime is used as binding material to increase the strength of soil. When the reaction taking place between lime and soil, there is exchange of cations which may results decrease in plasticity of soil subgrade.

In our project lime is mixed with soil and rice husk ash to enhance in strength of soil.



Lime

METHODOLOGY

The soil sample is collected from site and sieved through 0.075mm (75 micron). The preliminary laboratory tested are done to find out the properties includes, Liquid Limit, Plastic Limit, Direct Shear Test, Permeability, Etc. In the second phase the samples is mixed with 10% and 15% of rice husk ash + lime, and again above tests are carried out. And at last, analysis the results and comparison made.



Rice husk ash & Lime

MATERIAL USED

1. EXPANSIVE SOIL: - The soil we used in this investigation is collected from the GNIT, MULLNA campus, at a depth of 1.0m from ground level.
2. RICE HUSK – Locally available rice husk is used for this test.
3. LIME:- The commercial grade lime is used for this tests.

THE LABORATORY TESTS ARE PERFORMED

LIQUID LIMIT

Liquid limit may be defined as the water content corresponding to the arbitrary limit between the liquid and plastic state of consistency of a soil. The test is carried out by the Casagrande Apparatus. A paste of the specified soil sample is prepared by a certain water content and fill in the cup of the apparatus. A

groove is cut in the soil pat then the handle is rotated at a rate of 2 blows per second. The water content is determined to close the groove at 25 blows that gives the liquid limit.

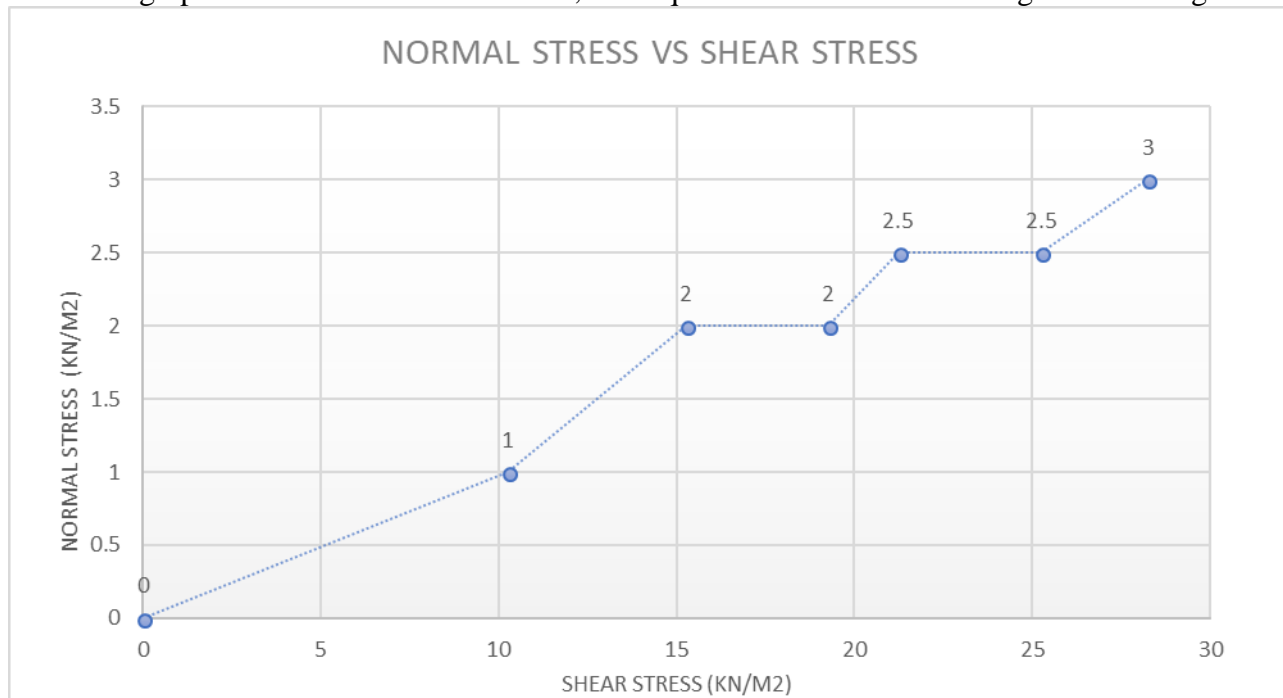
DIRECT SHEAR TEST

Direct shear test is an easy and commonly used for shear test of soil. Shear box apparatus is used to perform this test. The apparatus consist of two piece shear box of square cross-section. The bottom portion of the box is fixed in position in a container. The rollers are assembled below the container through which container can be pushed forward at a constant rate by gear jack. A proving ring is attached at the upper half portion of the box and the upper half push against the ring. The compacted soil sample is placed between the two porous stone placed in two halves of the box. The upper box with the compacted soil specimen placed over the lower portion of the box as the joint between the two portions of the box is at level of the centre of the specimen. Normal load is applied to the upper portion and shear force is applied to the lower portion through the gear jack. The deformation of the proving ring indicates shear force. The change in the volume during this process is measured by the mounted dial gauge at the top of box.

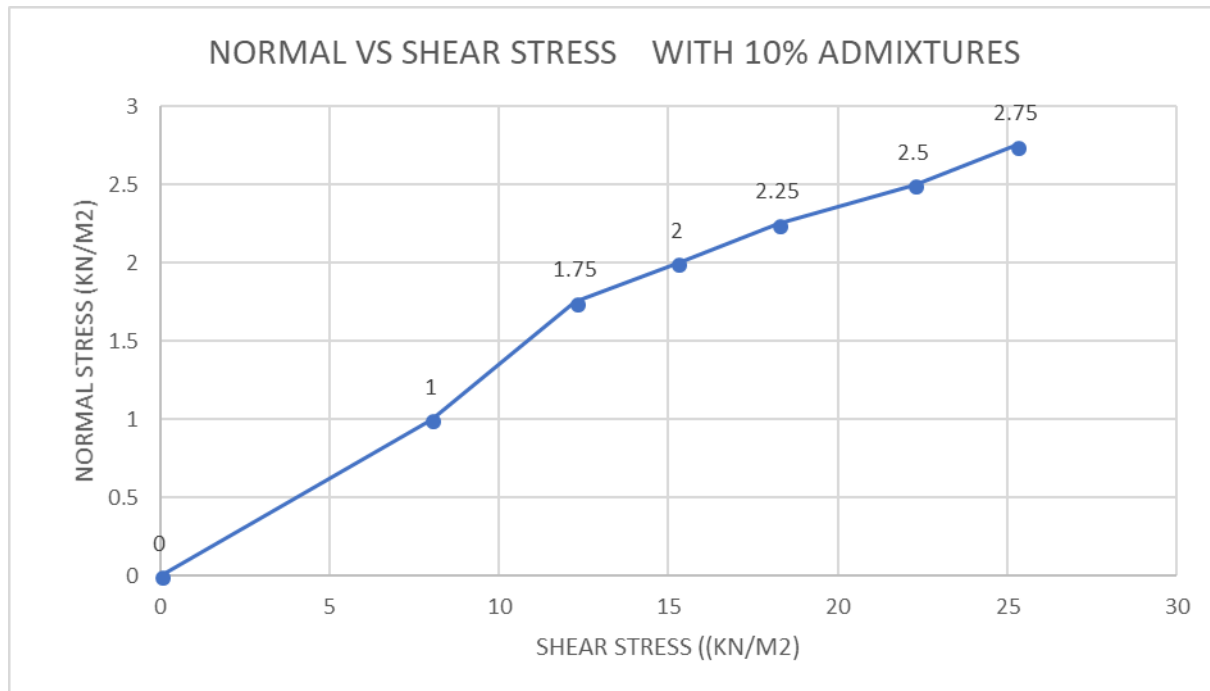
DESCRIPTION	LIQUID LIMIT %
SOIL SAMPLE ALONE	27%
SOIL+10%(RICE HUSK ASH+LIME)	33%
SOIL+15%(RICE HUSK ASH+LIME)	35%

The sheer force (F) and the normal load (N) is determined from the reading of the dial gauges and it is plotted on a graph . Such plotted graph shows the failure envelope of the soil under test condition. Failure envelope plotted as function of the shear stress and nominal stress.

From this graph we can find out shear stress, consequent nominal stress and angle of shearing resistance.



SIMPLE SOIL SAMPLE



SOIL SAMPLE + 10% RICE HUSK ASH & LIME

CONCLUSION

1. Liquid limit increases with the increase in amount of lime and rice husk ash.
2. Liquid limit decreases with the increase in amount of lime sludge and rice husk ash.
3. Optimum moisture content of soil increases with increase in the amount of lime and rice husk ash.

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