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STABILIZATION OF SOIL MUD BLOCKS TREATED WITH COCONUT FIBERS

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***Abstract*-Soil having terrible bearing and shearing energy want stabilization to make it appropriate for production purpose. In this look at, coir (extracted from coconut) is used as herbal fibre for stabilization of soil. Stabilization the usage of herbal fibre is a cost-powerful and green method to enhance homes of soil. Chemical-primarily based totally or artificial fibres damage our environment so; the usage of herbal fibre is an initiative to maintain stability in nature. This looks at well-known shows round the reinforcement of soil through coir fibre and the comparison among engineering homes earlier than and after stabilization. The look at is completed to assess the results of coir fibre on shear energy of soil through carrying out direct shear check and unconfined compression check on one-of-a-kind soils samples. Disturbed samples are gathered from one-of-a-kind production web sites at Gorakhpur respectively. In laboratory, testing of liquid limit, unique gravity in conjunction with grain size distribution is completed for the category of soil. For one-of-a-kind percent of coir fibre, the Proctor Compaction check changed into completed. Further at top-of-the-line moisture content (OMC), direct shear check and unconfined compression check are completed for one-of-a-kind fractions of coir fibre. The experimental effects with and without coir fibre reinforcement are in comparison to acquire top of the line amount of fibre reinforcement (% of soil sample) required to stabilize a vulnerable soil in conjunction with the inference approximately impact on bearing ability and shear energy.**

Keywords- Coir, Reinforcement, fibres, OMC, shear energy, bearing ability

1. INTRODUCTION

The foundation is extremely necessary in the field of civil engineering to successively provides bigger strength to the soil. The utilization of fibres in soil is comparable to the behaviour of plant roots, which contributes to the stability of soil by adding strength to the near-surface soils within which the effective stress is low. Therefore, laboratory and a few in place check results have light-emitting diode to positive conclusions, proving the potential use of fibres for the reinforcement of soil mass. The idea of fibre reinforcement was developed in ancient times, a lot of than 5000 years a gone, once ancient civilizations used straw and fodder to bolster mud blocks. However, short natural and artificial fibre soil composites have recently gathered attention within the field of geotechnical engineering. The first purpose of reinforcing soil mass is to enhance its stability to extend its strength to resist deformations and shear failure. Because it was mentioned, soil reinforcement may be a procedure wherever natural or synthesized additives are accustomed to improving the properties of soils. In gift time, many reinforcement techniques are obtainable for stabilizing problematic soils. Here, during this study, soil stabilization has been through with the assistance of fibres obtained from outer shell of coconut (waste material). The objective of this study is to concentrate on improvement of the shear strength parameters.

2.MATERIAL USED

A. EXPANSIVE SOIL

Expansive soils because the name implies are the soils that expands in wet as a result of, they contain clay minerals that facilitate them to soak up water. These soils produce issues in bearing load of structure. The disturbed soil sample of expansive soil utilized in this investigation collected from the Gorakhpur. The properties of this land are obtained from Specific gravity and Atterberg limit. The results concluded that the soil is clayey in nature.

FIG.1 *soil*

B.FLY ASH

The Fly Ash collected from the thermal power plant near Sahjanwa.
It is sieved through the 2mm sieve to remove external matters. For this study, the soil samples were prepared with the proportions of fly ash 10% of soil respectively

Fig. 1 *Fly ash*

C.COCONUTS FIBRES

Previous studies and researches have shown that coir fibres with 1.5 cm length work well in soil stabilization process. So, the fibres were extracted from the waste coconut shell and made finer. Then these fibres were cut into approximate length of 1.5 cm. Three different samples were prepared by mixing different proportions of coconut fibre into the soil sample containing 10% fly ash by weight. The different proportions of coir fibre content mixed were 1%, 1.5%, 2% fibres of sample respectively.

Fig.3 *coir fibre*

3. SAMPLE PREPARATION

Coconut fibre has been obtained from the market. Soil is sieved and skilled 75micron. The coconut fibre was grated to smaller form, then combined with equal quantity of the soil at four (4) completely different mix magnitude relation by proportion weight of 100%:1%, 100%:1.5%, 100%:2% and 100%:3% severally of soil and grated coconut fibre 10% of ash by weight of soil is intercalary Water was basement on the stable soil whereas it's being mixed by hand till it forms a firm lump once squeezed within the hand and simply enough wetness appeared on the surface to relinquish a shiny appearance. The blocks of ordinary size 23cmx10.8cmx10cm Cast blocks are lined by sacking bag and unbroken below shade, water content/moisture content is maintained by sprinkling water frequently

Fig.4 *soil mud block*

4.TEST METHODS

A. PYCNOMETRIC TEST

The pycnometer method was used to find the specific gravity of soil. Specific gravity of air-dried soil sample was determined using Pycnometer of about 1 litre capacity. This test was conducted to classify the type of expansive soil. Weighing balance with an accuracy of 1g was used to weight the empty density bottle first then the weight of mass of soil in density bottle and then filled with water and weighted again. After that the bottle is emptied and dried then filled with water only and weighted.

B. MODIFIED PROCTOR TEST

The modified proctor test was performed as per IS 2720 part VII, 1980. The compaction tests were performed on fly ash-soil mix samples and fly ash-soil-coir mix samples. The air- and sun-dried sample of soil taken and weighted then the different percentages of fly ash added to this soil to prepare the required samples. The mixture is then wetted by adding water to it. This moist soil mass was compacted into five layers having equal mass using modified proctor rammer of 4.9kg. The MDD and OMC were evaluated from the test.

C.CALIFORNIA BEARING RATIO TEST

The CBR test were performed for 10% Fly ash by weight of soil and coir fibre in soil as per IS 2720 (part 16) 1987. The samples were casted in a mould of 150mm diameter and 175 mm height with compaction method. Three different samples of soil were prepared such as soil with optimum fly ash content and coir proportions 1%, 1.5% and 2% respectively. These samples were tested on CBR test apparatus for each variable percentage of fibre. The soil samples were soaked in water for 48 hours before conducting the test. All samples were perforated under varying loads at penetration rate of 1.25mm/min. until a penetration of 12.5mm was reached. The

load penetration curve was plotted for all the samples and CBR value is obtained.

D.CONSISTENCY TEST (ATTERBERG'S LIMITS)

To determine the Liquid limit, Plastic limit of soil tests was conducted with regard to IS: 2720 (Part V)-1985.Liquid limit is that the minimum water content at that soil features a tendency to flow and every one soil possess a negligible shear strength at the liquid limit, it's performed with the assistance of Casagrande's equipment within the lab. Plastic limit refers thereto water content at which soil sample would simply begin to crumble once rolled into a thread of roughly of three metric linear unit in diameter. physical property index is the vary of wet content over which a soil exhibits plasticity. It is adequate to the distinction of liquid limit and plastic limit.

5. CONCLUSION

Optimum Moisture Content increased with increase in the percentage of coir fibre to the soil. As the percentage of fly ash and coir fibre increases the Maximum Dry Density values of soil decreases along with it. It is because fly ash and coir both have a low density. Adding coir improves CBR values for soil and fly ash blends. But the increase in coir fibre percentages decreased the value of CBR beyond 1% coir fibre content. Using randomly distributed fibre in this research helped the soil behaviour to improve in terms of tensile strength as coir has good tensile strength

Mix Proportions	Liquid Limit	Plastic Limit
Soil+10% Fly Ash+1% coir	25.20%	9.78%
Soil+10%FlyAsh+1.5%coir	27.20%	13%
Soil+10% Fly Ash+2% coir	27.50%	10%

From the experimental study, it is concluded that 1% coir fibre and 10% Fly Ash in soil is optimum percentage to improve expansive soil properties. It is also very economical to stabilize soil using this method. It is also observed that the maximum CBR value is obtained at the 1% coir fiber in soil-fly ash mixture. It helps to reduce the cost of construction and make this method cost effective.

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