

A REVIEW PAPER ON STABILIZATION OF CLAYEY SOIL USING GEO-JUTE AND HUMAN HAIR FIBER

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Abstract - Generally clayey soil shows bothersome building properties like poor bearing limit and higher compressibility. Along these lines the improvement of soil at a site is imperative. There are numerous stabilizers to improve the quality of soil like jute, gypsum, fly debris, Rice-husk debris, Concrete, lime, utilized elastic tires and so on. In the present examination, we included jute and human hair as stabilizer to improve the properties of clayey soil. The goal of this examination is to improve the quality of the clayey soil by making soil-jute and hair blend. The dirt test are set up by including 0%, 0.5%, 1%, 1.5% of jute with length of 2cm and hair in changing rates, for example, 0.5%, 1%, 1.5%, 2%. Standard delegate test, unconfined compressive quality test, Atterberg's breaking point test, California bearing proportion test are directed to break down the Optimum dampness content (OMC), Maximum dry thickness (MDD), compressive quality of soil blend, list properties and additionally subgrade quality. By the expansion of jute and hair most extreme dry thickness, unconfined compressive quality, California bearing proportion esteems increments and ideal dampness content, fluid farthest point esteems diminishes.

Key Words: : Jute, Human hair fiber (HHF), UCC test, Proctor compaction test, CBR test, Atterberg's test, Clayey soil.

1. INTRODUCTION

A creating nation like India which has a huge topographical territory and population, requests tremendous framework for example system of streets and structures and so forth. Wherever land is being used for different structures from common house to high rises, extensions to air terminals, from rustic streets to roads, all the common building structures are situated on different soil strata. Soil can be characterized as a material comprising of rock particles, sand, residue, and earth. Transportation of soil materials by wind, water and ice structures distinctive soil arrangements. In India, soils are characterized into six bunches to be specific alluvial soil, marine soil, laterite and lateritic stores, far reaching soils, desert soil and stone stores. Soil adjustment is the procedure which includes upgrading the physical properties of the dirt so as to improve its quality, strength and so forth by mixing or blending it with added substances. The various sorts of techniques utilized for soil adjustment are: Soil adjustment utilizing concrete, Soil adjustment utilizing lime, Soil adjustment utilizing bitumen, Concoction adjustment and another developing innovation of adjustment that is adjustment of soil by utilizing Geo materials and Geo engineered strands. Essential and optional covers structure cementitious composite material when they interact with the water or within the sight of pozzolanic material responds with water. The ordinarily utilized covers are Cement, Lime, Gypsum, Jute, Hair, Flyash and so on. The above materials can be utilized alone or in mix. This Thesis utilizes Jute and hair with clayey soil.

2. MATERIALS USED

Right now material utilized as stabilizer is jute and Hair fiber. The tests were directed by including jute and hair in

shifting rates to the parent soil. Additionally it is tentatively demonstrated that the dirt changes its property by including jute and hair as soil stabilizer.

2.1 Jute

Jute is a long, delicate, sparkling vegetable fiber that can be spun into coarse, solid strings. Jute is one of the most moderate normal filaments and is second just to cotton in sum created and assortment of employments of vegetable filaments. The jute is dealt with synthetically, the compound surface medications give mechanical interlocking between the fiber and polymer by expanding the surface harshness of jute filaments. Likewise, the surface change additionally give numbers of concoction bonds shaped in the interface by expanding the quantity of practical gatherings on fiber surface.



2.2 Human Hair

The human hair is gathered from the two cantinas and hair beautician shop. It is a non-biodegradable material, while it is straightforwardly arranged into soil the dirt get dirtied. The HHF is a best balancing out operator to use as a dirt

stabilizer. Right now study we are going to utilize this material as a solid fortified material which is utilized to upgrade the subgrade quality for clayey soil which is very delicate in nature.

2.3 Soil

About 200 kg of marine mud was gathered from sea shore and it is altogether hand arranged to dispense with the all vegetative issues, rocks and stones. At that point the clayey soil was sieved through 4.75mm strainer in order to expel the gravel fraction. At that point the dirt was broiler dried for 24 hours before execution of different geotechnical tests.

Table-1: Properties of soil

Sr. No.	Properties	Values
1	Specific gravity	2.40
2	Plastic limit	33.33%
3	Liquid limit	45.5%
4	Plasticity index	12.17%
5	Maximum Dry Density	1.250g/cc
6	Optimum Moisture Content	25%
7	California Bearing Ratio	5.0%
8	UCC	0.286
9	Soil classification	SC
10	Differential free swelling	60%

3. Literature Review

3.1 Anzar Hamid (2017), explained that the whole burden coming over the asphalt is at last borne by the subgrade. Presently a-days, numerous methods are used to settle the subgrade soil, utilization of characteristic strands being one of them. Regular filaments are modest, effectively accessible and eco agreeable. So as to balance out the subgrade soil, jute filaments in various lengths (30mm, 60mm and 90mm) and extents of 0.25%, 0.5%, 0.75% and 1% were utilized as the strengthening specialists in the present examination. The California Bearing Ratio test was led on all the examples and the outcomes have been displayed in the paper.

3.2 Dr. T. Kiran Kumar(2016), tests result demonstrates that CBR properties of soil increments with the increment in fiber content. It was additionally seen that expanding the rate of fiber further builds the CBR estimation of strengthened soil and this expansion is generous at fiber substance of about 3%. This noteworthy increment in CBR estimations of soil fortified with Jute fiber can be utilized to significantly demonstrating huge improvement in the designing conduct.

3.3 Aamir Farooq(2017), explained that ongoing exploration could be valuable in finding the various methods for using waste materials in most proficient manners like rice husk debris, fly debris, utilized tires, and so forth. So

substitution of common soils totals furthermore, concrete with strong mechanical side-effect is profoundly alluring.

3.4 Zafar Iqbal Ahanger(2018), In this investigation the dirt examples were set up at its most extreme dry thickness comparing to ideal dampness content in the CBR form with and without support. Standard size of molds has been utilized. From the research center tests the impact of jute fiber content on thickness of soil (ideal dampness substance and most extreme dry thickness) was watched for each length and distance across of jute fiber. The California Bearing Ratio test was directed on all the examples and the outcomes have been exhibited.

4. CONCLUSIONS

It is derived from the examination that in locales where marine mud is experienced, the development of structures and streets are exceptionally dangerous on geotechnical grounds as the dirt is exceptionally compressible, having low shear quality and is defenseless for volumetric shakiness. The jute fiber has the capability of being utilized to fill in as a channel texture too as a texture support to balance out and secure powerless subgrades. The designing properties of jute are reasonable for division, fortification, seepage and filtration work and can be appropriately utilized in surviving

Geotechnical issues of frail soil. In view of test outcomes

what's more, examination directed on soil test the accompanying end were given, it might be inferred that human hair and jute fiber can be utilized as a characteristic support specialist for adjustment of marine dirt. Human hair has great quality properties, minimal effort, high durability to biodegradability.

- The most extreme dry thickness of marine earth is found to be expanded by including jute and hair fiber. The Most extreme dry thickness of parent soil is 1.250g/cc. Most extreme dry thickness of consolidated jute and hair fiber blended soil was 2.40g/cc. It is acquired at the scope of 0.5% jute and 1% hair. The rate expanded by 92%.The relating dampness content was 24%, it shows that ideal dampness substance of soil diminishes.
- The fluid furthest reaches of marine mud is 45.5% which is not appropriate for development reason. By the expansion of 1.5% hair and 1% jute, as far as possible was diminished upto 28.932%
- The unconfined compressive quality of parent soil is 0.30KN/.From the outcome, it shows the unconfined compressive quality of marine mud expanded to 0.854 KN/cm².
- It is reasoned that CBR estimation of soil increments with the consideration of jute and hair fiber. When the substance of filaments is expanded, the CBR estimation of soil further increments and this

expansion is momentous at fiber substance of 1.5% hair and 1.5% jute. The augmentation of CBR esteem is from 5% to 9.98%. Along these lines it will give subgrade quality.

- Adding jute and hair in the middle of layers of soil fortifies its interlocking capacity among soil particles, in this manner, giving a solid attach to it.

REFERENCES

- **ANJANADEVI K.A** (2019)SOIL STABILIZATION USING JUTE AND HUMAN HAIR FIBER B.TECH Student, Department of Civil Engineering , ILM College of Engineering and Technology, Kerala, India 5M.TECH, Assistant Professor, ILM College of Engineering and Technology, Kerala, India
- **Aamir Farooq, Prof. (Dr.)Rajesh Goyal** (Aug 2017) STABLIZATION OF SOIL BY USE OF GEO-JUTE AS SOIL STABILIZER Post Graduate Student at Modern Institute of Engineering and Technology Mohri Shahabad Ditriect Kurukshetra
- **Anzar Hamid, Huda Shafiq** (2017) Subgrade Soil Stabilization Using Jute Fibre as a Reinforcing Material , Bachelor of Engineering (Civil Engineering) Islamic University of Science & Technology, Awantipora, Kashmir, J&K IJEDR | Volume 5, Issue 1 | ISSN: 2321-9939
- **Yagya Sharma ,Dr. D. G. M.Purohit** (2017) Improvement of Soil Properties by Using Jute Fibre as Soil M.E. Student, M.B.M. Engineering College, J.N.V. University,
- **Dr. T. Kiran**(2016) Kumar A CRITICAL REVIEW ON APPLICATIONS Associate Professor, Civil Engineering, K.S.R.M College, Andhrapradesh, India OF NATURAL JUTE FIBRES A CASE STUDY
- **Kumar Singh** (2016) Improvement in CBR **Amit** of Expansive Soil with JuteFiber Reinforcement ,Civil Engineering Department, Jabalpur Engineering College (JEC), Jabalpur, (M.P.) India
- **Sivakumar Babu, G. L. and Vasudevan, A. K.** (2008) "Strength and stiffness response of coir fiberreinforced tropical soil". ASCE Journal of Materials in Civil Engineering, Volume 20 Issue 9, PP.571-577.
- **Pandit Vinod, Vyas Krishna, Borate Rohan, Adhikar Roshan, Pankaj Verma, Priyanka Ahire;** (2016). "Effects of Jute Fiber on Compaction Test". IJMTER, e-ISSN No.:2349-9745.