STABILIZATION OF EXPANSIVE SOIL BY WASTE FIBER

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***Abstract* :- Soil is very important part of engineering materials almost every construction build there but some9 type of soil should not bear the load so we need to improve there properties. The new technique of soil stabilization can be effectively used to meet the challenges of society to remove waste material The main objective of this study is to investigate the use of waste fiber material in geotechnical application and to evaluate the effect of waste polypropylene fibers on shear strength of soft clay by carrying out shear strength test of different soil samples so the effectiveness of fiber as a replacement for deep foundation**

Keywords: Black cotton soil, waste fiber (polypropylene), Liquid limit, Plastic limit, Compaction test

Introduction: Soil deposits in nature exist in an extremely erratic manner producing thereby an infinite variety of possible combination which will affect the strength of the soil and the procedures to make it purposeful. For any land-based structure, the foundation is very important and has to be strong to support the entire structure. In order for the foundation to be strong, the soil around it plays a very critical role. So, to work with soils, we need to have proper knowledge about their properties and factors, which affect their behavior. The process of soil stabilization helps to achieve the required properties in a soil needed for the construction work. From the beginning of construction work, the necessity of enhancing soil properties has come to the light. Ancient civilizations of the Chinese, Romans and Incas utilized various methods to improve soil strength etc., some of these methods were so effective that their buildings and roads still exist. In India, the modern era of soil stabilization began in early 1970's, with a general Shortage of petroleum and aggregates, it became necessary for the engineers to look at means to improve soil other than replacing the poor soil at the building site. Soil stabilization was used but due to the use of obsolete methods and also due to the absence of proper technique, soil stabilization lost favor. In recent times, with the increase in the demand for infrastructure, raw materials and fuel, soil stabilization has started to take a new shape. With the availability of better research, materials and equipment, it is emerging as a popular and cost-effective method for soil improvement. Here, in this project, soil stabilization has been done with the help of randomly distributed polypropylene fibers obtained from waste materials. The improvement in the shear strength parameters has been stressed upon and comparative studies have been carried out using different methods of shear resistance

1.1 METHODS OF STABILIZATION

Soil stabilization a general term for any physical, chemical, biological, or combined method of changing a natural soil to meet an engineering purpose.[1] Improvements include increasing the weight bearing capabilities and performance of in-situ subsoil, sands, and other waste materials in order to strengthened

1.2 MECHANICAL STABILIZATIONS

In method, soils of different gradations ate mixed together to obtain the desire properties of soils. These done by some machinery. This may be done at the site or at some other place from where it can be transported easily

1.3 CHEMICAL STABILIZATION

Soil and cement is the intimate mixture of soil and cement mixed with sufficient water add compaction and hydration. Lime stabilization is useful to modify highly plastic clay.Cacl,Bitumen, Fly ash Geofiber, Plastic Polymers

1.0 METHODOLOGY

Specific gravity:- The specific gravity of soil particles (G) is defined as the ratio of the mass of a given volume of solids to the mass of an equal volume of water at 4° C The specific gravity G of the soil = (W2 – W1) / [(W4–1)-(W3-W2)]

Liquid limit:-It is the arbitrary limit of water content at which the soil just passes from the plastic state to the liquid state. Casagrande said to be the water at which 25 blows to the liquid limit cup will make two halves of a soil pat in he cup, separated by groove, join for a length of about 12mm

Plastic limit:- It is the arbitrary water content at which the soil tends to pass from the plastic state to the semi-solid state of consistency. Its done of the plastic limit is that is the minimum water content at which the soil can be rolled into a tread of 3mm diameter without crumbling. This is obtained by repeated trails

Plasticity index:-It is the numerical difference between liquid limit and plastic limit and it indicates the plastic range of the soil

Plasticity index= Liquid limit – Plastic limit

Compaction test :- Established log curve between maximum and dry density to find optimum moisture The experimental setup consists of (i) cylindrical metal mould (internal diameter- 10.15 cm and internal height-11.7 cm), (ii) detachable base plate, (iii) collar (5 cm effective height), (iv) rammer (2.5 kg). Compaction process helps in increasing the bulk density by driving out the air from the voids. The theory used in the experiment is that for any compactive effort, the dry density depends upon the moisture content in the soil. The maximum dry density (MDD) is achieved when the soil is compacted at relatively high moisture content and almost all the air is driven out, this moisture content is called optimum moisture content (OMC). After plotting the data from the experiment with water content as the abscissa and dry density as the ordinate, we can obtain the OMC and MDD.

2.0 MATERIALS

Soil:- present study we take soil sample from Ratibad Bhopal make three sample

Stabilizing Material:- In this work the stabilising material is used waste fiber material (polypropylene) which is added orientally

Behavior parameters	**Values**
Fiber type	Single fiber
Unit weight	0.91 g/cm^3
Average diameter	0.034 mm
Average length	10 mm

For the mixing all the soil samples are compacted with there maximum dry density(MDD) & optimum moisture content(OMC) with proctor test

The fiber content add by this equation

$$\rho_f = \frac{W_f}{W}$$

Where, ρf= ratio of fiber content

W_f= Weight of fiber

W = weight of the air-dried soil

3.0 RESULT

The test result are given below the table

	Sample 1	Sample 2	Sample 03
Specific Gravity Of Soil Without Fiber	2.494	2.592	2.60 2
Specific Gravity Of Soil With Fiber	2.604	2.645	2.6
Liquid Limit Of Soil Without Fiber	30.33 %	38.05 %	35.54%
Liquid Limit Of Soil With Fiber	.34.56 %	38.44%	37.80 %
Plastic Limit Of Soil Without Fiber	28.10%	28.7 %	28.8%

Plastic Limit Of Soil With Fiber	23.35 %	24.14 %	2.03 %

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4.0 CONCLUSION

- Specific gravity:- The mixing of fiber is 0.35% the specific gravity may be increase 0.26% when see that the specific gravity is directly proportional to strength of soil so more specific gravity gave more strength of soil
- Liquid limit:- Similarly liquid limit with fiber and without fiber has differ from 16.10%
- Plastic limit :- In plastic limit it reduce 28.10% to 23.35% so its decrease 10%
- Shrinkage limit value decrease when the fiber is added

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6.0 AUTHOR BIOGRAPHY

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6.0 Liquid Sssoil ialso reduces. It reduces from 28.35% to 23.8% decrease in plastic limit is 10% , This result shows .i increase in shear strength , Cohesiveness and consistency of soil mass.

The value of the shrinkage limit in reinforced soil is less than that of unreinforced soil. Hence with the use of 6.1.1.1.1.1.1.1 polypropylene fiber shrinkage reduces.