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A Review on Factors Influence Soil Properties and CBR Enhancement with Lime and Recron 3S Fiber

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ABSTRACT: When soil is inaccessible, it must be stable. Soil stabilization increases load-bearing capacity and decreases compressibility. Engineers must know soil permeability. Past contamination influences soil hydrology. Soil stability lowers water absorption. Solid particles that roll or slide pack denser. Soil stabilization reduces subgrade compressibility. There are two techniques to address poor subgrade soils. First, distant infill may replace deficient soils. Especially if it's a foreign filler. Stabilization strengthens soil. Stabilize in numerous ways. Early examples include cement, lime, and asphalt. Rising population, inadequate load capacity Erosion slows traffic compaction, reducing Bearing Ratio. This lowers project costs. This thesis will increase CBR utilizing lime and Recrown 3S fibre on Haryana soil samples. CBR increases. After testing without Recron-3S or lime, admixtures improved both. Investigations provide essential goals. These soils are graded, have Atterberg limits, optimal moisture content, and maximum dry density. Lime and Recrown 3S impact fibre properties. The study's results on how admixtures effect soil quality is disputed. These admixtures' soil appropriateness has been evaluated. This study focuses on Haryana's most common soil types, namely low plastic silts from Bhiwani and CL soil (low plastic soil from Rohtak). These results only relate to a certain soil and admixture, but they may be applied to any with equivalent qualities. This investigation will investigate the soil's "grading," "Atterberg's restrictions," "specific gravity," "OMC," and "CBR value." Each admixture is added at 4%, 6%, and 9% by mass.

KEYWORDS: Soil Properties, CBR Enhancement, Recron 3S Fiber

I. INTRODUCTION

1.1 IMPORTANCE OF TRANSPORTATION

Economic, industrial, social, and cultural progress of a nation are all enhanced by the activities of those involved in the transportation industry. Transportation is critical to a region's economic growth and general development. It's a visual representation of people and things travelling from one location to another. In brief, transportation is required at all phases of production, from raw materials to finished goods, such as food, clothing and industrial items. The ability of a counter to be transported is a sign of its economic and social progress. Land transportation refers to moving people or products by roads, trains, or pipelines.

1.2 THE NEED FOR LOW LAND CBR DEVELOPMENT

Subgrade support for larger axle loads has increased as a result of advancements in technology. Consequently, their technical qualities are altered to fulfil the specifications of the design briefs. Whether or whether to take the next step is up to you.

- i) Changes to the design ensure that the product meets the required quality requirements.
- ii) Better materials are employed in lieu of the existing ones on the site, i.e.
- iii) In order to satisfy the criteria of the design standards, a new improved material is created by altering the soil's qualities.

It's hard to impose constraints on design requirements in a situation like this, yet it's uneconomical to replace the whole soil when big amounts are involved. As a result, the only approach to improve these soils' engineering behavior is to stabilize them in a manner that increases their CBR.

1.3 STUDY TOPIC AND ITS IMPORTANCE

The soil properties that can be improved by adding lime and Recrown 3S fiber are the focus of this article "Soil Research to Improve CBR With Lime and Recrown 3S Fiber". Two different Haryana counties provide pollution to this project.

The lower CBR value determines the thickness of the stone-coated crust. The cost of road construction can be significantly reduced by stabilizing clay soil with a low CBR value. For example, in an area of less than 2%, a layer of 850 mm pavement is required, and in an area of less than 10%, 540 mm of paved concrete is required.

1.4 OBJECTIVE OF THE STUDY

For the purpose of improving CBR using lime and Recrown 3S fiber, research titled "Study of the Characteristics of Soil" will be carried out on soil samples gathered from different locations in Haryana. After testing them without admixtures, it is discovered that the properties of Recron-3S fiber and lime are enhanced when these admixtures are added. As a result of the research, the following are the primary goals:

- 1) "Gradation, Atterberg limits" and "optimum moisture content and maximum dry density" are all assessed for these soils.
- 2) Lime and Recrown 3S fiber admixtures are used to change the characteristics listed above.
- 3) These admixtures have a significant impact on soil properties, and the results of the research are contested in this regard.
- 4) These admixtures' suitability for the soils they're intended for has been determined.

1.5 SCOPE OF THE STUDY

Soils that are widespread across Haryana are chosen for research, including ML soil (low plastic silts from Bhiwani, CL soil (low plastic soil from Rohtak). Despite the fact that these findings only apply to a specific soil type and specific admixture, they may be applied to any soil and admixture. with comparable properties. A variety of soil properties, including "gradation, Atterberg's limits, specific gravity, OMC, MDD and CBR value," are scrutinized throughout this inquiry. At 4 percent, 6 percent, and 9 percent by mass, dry soil is combined with these admixtures individually.

1.6 STABILIZATION OF SUBGRADE SOIL

There is a need for soil stabilization when the soil that may be accessed is not adequate for the intended use. Stabilization aims to increase soil load bearing capacity and decrease sub-grade soil compressibility.

Soil permeability is a critical feature for engineers working in the field of civil engineering. Hydraulic stability of soil masses is determined by the degree to which soils have been previously contaminated. Soil stabilization is necessary to reduce the permeability of the ground.

Compressive forces reduce the volume of the soil mass.

Solid particles are rolled or slid from one location to another in this process, resulting in a compact packing. Sub-grade compressibility may be reduced with the use of soil stabilization.

It is possible to deal with weak sub-grade soils in one of two ways. Weak soils may be replaced with solid soils in the first system, especially if the filling material is borrowed from a remote location. Stabilization is the second way to improve soil structures. Stabilization can be achieved using a variety of methods and processes. Cement, lime, asphalt, and other high-quality materials are some of the first examples of this process. Low ground load capacity and rising California Bearing Ratio due to soil erosion, leading to slow compaction of a specific design traffic. This reduces the total cost of the highway construction project.

II. LITERATURE REVIEW

KUMAE ET AL. (2008) Soil made of black cotton was supplemented with a synthetic polyester that had a specific gravity. Unrestricted compression of fibers, lime, and flash on geotechnical elements of expanded soils was tested in this study. The soil is also enriched with fly ash and lime. The results show that fiber is more effective when the soil is

kept in a solid place rather than compressed. "

CHANDRA ET AL. (2008) In this study, polypropylene fiber has been shown to be effective. 0.3mm wide polypropylene fibers are added to three different types of soil: clay, mud, and sand. Fiber was cut into 15-mm, 25-mm, and 30-mm pieces with aspect ratios 50, 80, and 100. Ground fiber content ranged from 0.75% to 3% by dry weight. Unstructured and rigid soil tests showed 3.82, 4.83, and 9.73 Mpa pressures respectively. "

PATODI, S.C., and KULKARNIY, C.B. (2012) A matrix containing 3.3% Recron and 0.7 percent Steel Fiber was discovered by the author:

- > Resilient in terms of post-peak ductility and strength
- > Toughness, resilience to impact, and resistance to wear and tear
- > For a better all-around result.
- > Benefits of enhancing CBR

Soil compression is improved with the addition of polypropylene fiber, Recron 3S fiber, and silica smoke to the soil after 28 days, according to research. To improve soil performance, Recron and Silica fume were injected with the smallest possible dose. Compared to the control mix, the strong separation strength of all fiber blends increased by 3% to 4%. The Soil Fiber volume component delivers enhanced CBR or power values in line with the control mix, depending on the author's findings. Soil compression is improved with the addition of polypropylene fiber, Recron 3S fiber, and silica smoke to the soil after 28 days, according to research. Soil performance improved by simply adding a small amount of Recron and Silica fume over time. The strength of the separation is increased by 3-4 percent in all fiber compounds compared to the control compound. The author of this study found, based on the findings, that adding soil Fiber to the control mix improves CBR or energy values.

VISWANANDHAN 2009 Reducing the swelling of the wet-cohesive soil was the aim of this study, which used random strands to demonstrate the influence on the fragmentation of the clay barrier when exposed to different solutions. Polyester fibers known as recrons 3 were used in the investigation. Using recron 3s has been shown to be a very effective strategy. It acts as a force to prevent cracks in the clay barrier caused by separate settlements.

SHARAN ALOK (2011) Compressed pool ash containing fiber Recron 3s inclusions is emphasized in this work, which examines the geo-engineering features of lake ash with direct shear testing. UCS and CBR assays the percentage of pond ash fiber in the mixture ranged from 0% to 1% of dry fiber weight. For this test, 6mm and 12mm threads were used. Fiber content has improved the nonlinear integration of reinforced specimens. Also, 12mm strands have been shown to be stronger than 6mm strands. "

III. CONCLUSION AND SCOPE FOR FURTHER RESEARCH

The soil properties of typical Haryana soil samples have been analysed to determine whether lime and Recron 3S fiber may improve the soil's CBR. ML soil from Bhiwani, CL soil from Rohtak, and sand-silty-sand from Jind were all employed in the research (SM soils). Lime and Recron 3S fiber have been added to the soils in different proportions to see how they affect the soil's properties. The test findings lead to the following conclusion:

3.1 CONCLUSION

- a) Additional OMC may be obtained by incorporating these compounds into these types of soils, which reduces their high dry density. Increasing the amount of these compounds reduces high density and increases OMC.
- b) Studies show that sand makes up 27.2 percent, 18.6 percent, and 52.7 percent of the soil in these three areas. This soil is classified as ML, CL, or SM. ML soil has a plasticity index of 5.9%, CL soil has a plasticity index of 7.5%, and SM soil has a non-plasticity index.
- c) The addition these admixtures reduce MDD the most in CL soils, whereas it has the least effect on SM soils.
- d) Lime and Recron 3S fibre diminish the soil's liquid limit and plastic index. The amount of PI and LL in the soil decreases as the amount of these admixtures in the soil increases.



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