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Utilization of Waste Material in Road Sub Grade for Stabilization of Soil

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Abstract: ***Soil stabilization is a quite common process for nearly all the building projects. Broadly, all kinds of soil stabilization may be classified into two groups, i.e. mechanical stabilization and chemical stabilization.***
In mechanical stabilization, the grading of a soil is modified by mixing it with other sorts of soils of various grades. By doing so, a compacted soil mass may be achieved.
On the opposite hand, chemical stabilization is related to the modification of soil properties by the addition of chemically active materials. In soil stabilization, it's important to grasp the material properties involved within the mixture and also the outcome after mixing.
Moreover, it's important to seek out out how the material goes to perform after stabilization. At the identical time the consequences of the method on the nearby structures and surrounding conditions have to be evaluated. Accordingly, decisions may be taken on the choice of materials and therefore the corresponding doses

I. INTRODUCTION

A developing country like India that features a giant geographic area and population, demands large infrastructure i.e. network of roads and buildings. land is being utilized for numerous structures from standard house to sky scrapers, bridges to airports and from rural roads to expressways.

Most the structures are going to placed on numerous soil strata. Soil that consisting inorganic particles and organic matter like rock particles, sand, silt, and clay. it's shaped by the gradual disintegration or decomposition of rocks because of natural processes that features disintegration of rock because of stresses arising from enlargement or contraction with temperature changes.

Weathering and decomposition from chemical changes that occur once water, gas and CO2 step by step mix with minerals among the rock formation, so it's breaking right down to sand, silt and clay.

Transportation of soil materials by wind, water and ice forms totally different soil formations like those found in watercourse deltas, sand dunes and glacial deposits.

Temperature, rain and evacuation play necessary roles within the formation of soils as within the totally different environmental condition regions. underneath totally different evacuation regimes, totally different soils are shaped from an equivalent original rockformation.

II. OBJECTIVES

1) To study the reasons of failure of road
2) Testing existing soil and adding different material to improve its strength.
3) To study different types of materialavailable.
4) To improve quality ofsubgrade.
5) To alter the properties of soil to suit the trafficrequirements.
6) It is done to minimize the swelling due to wetting andshrinkage
7) To increase bearing capacity ofsoil.

A. Test to be Conducted

a) Moisture content.
b) Particle Size Distribution.
c) Liquid limit test.
d) Plastic limit

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e) Standard proctortest
f) CBR
g) ShearTest

III. MATERIAL

1) Flyash

Fly ash is a heterogeneous by-product material produced within the combustion process of coal employed in power stations. it's a fine grey coloured powder having spherical glassy particles that rise with the flue gases. As ash contains pozzolanic materials components which reach with lime to create cementatious materials. Thus ash is employed in concrete, mines, landfills and dams. The chemical composition of ash depends upon the kind of coal used and therefore the methods used for combustion ofcoal.

2) GGBS

(Ground Granulated Blast-furnace Slag) could be a cementations material whose main use is in concrete and could be a by-product from the blast-furnaces accustomed make iron. Blast-furnaces operate at temperatures of about 1,500°C and are fed with a carefully controlled mixture of ore, coke and limestone. The ore is reduced to iron and also the remaining materials form a slag that floats on top of the iron. A by-product from the blast-furnaces wont to make iron. This slag is periodically tapped off as a molten liquid and if it's to be used for the manufacture of GGBS it's to be rapidly quenched in large volumes of water. The quenching optimizes the cementations properties and produces granules kind of like a rough sand. This „granulated" slag is then dried and ground to a fine powder. Although normallydesignated as „GGBS"within the UK,it also can benoted as„GGBFS"or „slagcement".

3) Lime

Lime is one in every of the oldest binding materials utilized in several ancient architectural works. a decent quality lime should own the subsequent properties.

4) Rubber Tyre

Approximately 40 to 60 percent of a tire is rubber. A tire typically consists of 4 different forms of rubber: natural rubber, styrene-butadiene rubber, polybutadiene rubber and synthetic rubber. About 55 percent of a tire's rubber content is within the sidewall and tread, and firms use natural, styrene-butadiene and polybutadiene rubbers in these areas. synthetic rubber and halogenated synthetic rubber makeup the inner liner of a tire. The rubber mixture in an exceedingly standard-passenger- car tire is 55-percent caoutchouc and 45-percent naturalrubber.

IV. CONCLUSION

Fly ash and Ground granulated Blast furnace slag (GGBS) were mixed with the expansive soil to increase soil strength The geotechnical characteristics of the various combinations of samples were investigated through the compaction tests.

It was found that the addition of GGBS with fly ash has significant influence on the geotechnical characteristics of the soil. California Bearing Ratio (CBR) of the soil is obtained as and there substantial increase CBR value with addition of fly ash + GGBS. The reduction in the maximum dry density and optimum moisture content was attributed to water absorption of rubber tire. There is substantial decrease in OMC with addition of rubber tyre partials as compared toGGBS.

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VI. RESULT

Testing of Soil with added waste material -

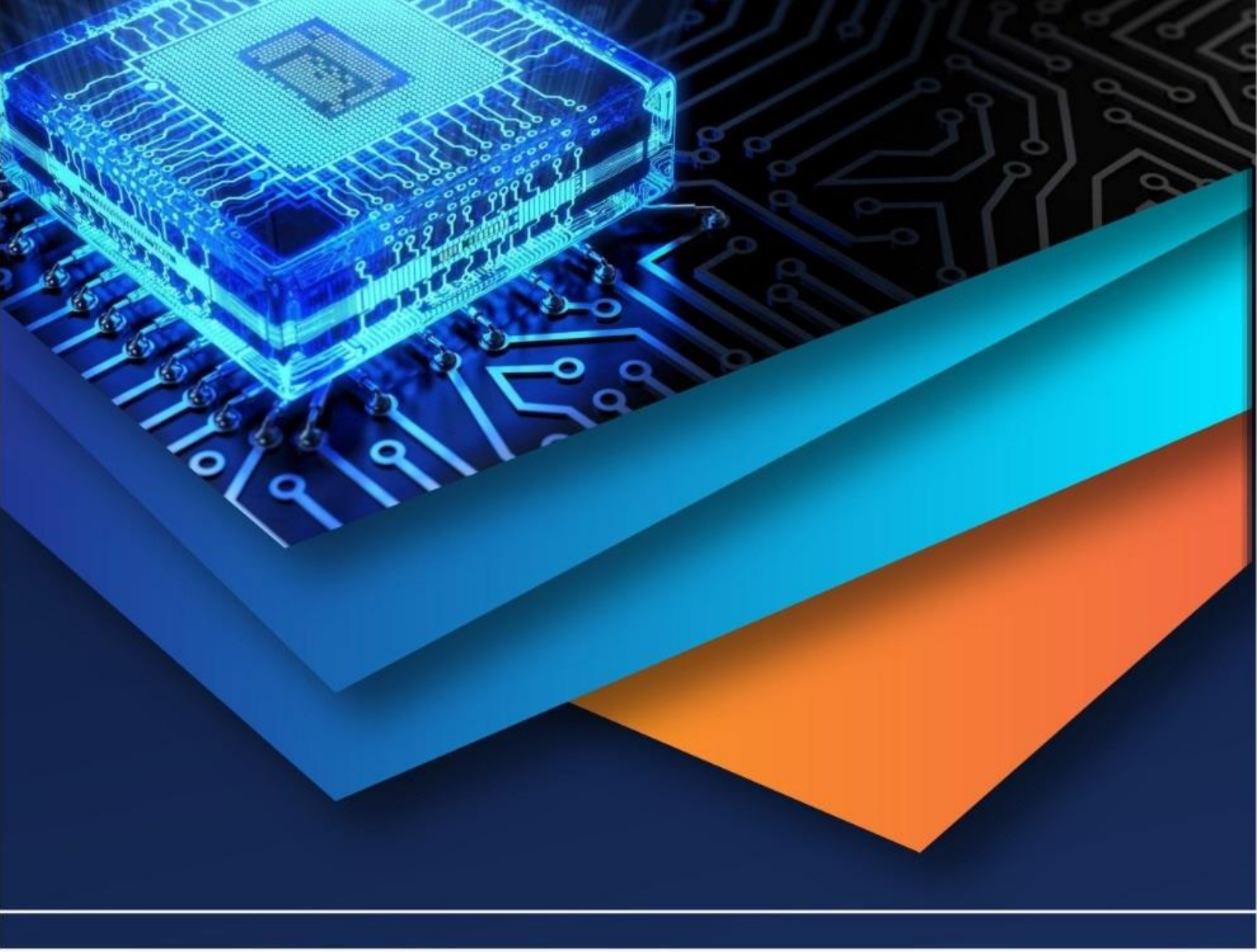
SR. NO.	TESTS	RESULT Existing soil	Result Soil + Flyash + GGBS	Result Soil + flyash+ lime Core	Result Soil + flyash + rubbertyre
1.	DETERMINATION OF MOISTURE CONTENT	WATER CONTENT = 31.69%			
2.	GRAIN SIZE DISTRIBUTION BY SIEVE ANALYSIS	POORLY GRADED SOIL WITH LITTLE FINES.	Use fly ash PASSING 1.18 GGBS pass 1.18.	Use fly ash PASSING 1.18 Lime core pass 1.18.	Use fly ash PASSING 1.18 Rubber tires pass 2.36
3.	STANDARD PROCTOR TEST	WATER CONTENT =17% MAXIMUM DRY DENSITY =1.81 GM./CC	18.5	19.6	10.3
4.	PLASTIC LIMIT	PLASTIC LIMIT = 65 % PLASTICITYINDEX IP=5%	70	61	56
5.	LIQUID LIMIT	LIQUID LIMIT =70%	75	69	63
6.	CBR TEST	CBR = 1.5	7.7	6.3	3.4
7.	Shear test	0.008	0.19	0.11	0.07

Table no 13 Soil with added waste material test Result

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