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SOIL STABILIZATION FOR PAVEMENT USING LIME AND HYPOSLUDGE

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ABSTRACTINTRODUCTION

In this study, the investigation of viability of using Hypo sludge an industrial waste generated from the paper mill in soil stabilization. The experimental study examines the potential use of hypo sludge and lime in soil stabilization. Soil sample was collected and stabilized with 2-10% of lime and hypo sludge. The atterberg's limit, compaction factor test, California bearing ratio test (CBR) were carried out. From test results it is concluded that in all the two additives, 10% addition is found to be optimum for stabilization of clay soil and from CBR test 8% is found to be optimum.Use of hyposludge for soil stabilization in construction of pavement will benefits urban growth and will improve transportation functionality.Industrial waste generation is greatly reduced that leads to reduce environmental pollution.

A well stabilized soil is essential for the proper function of our road, bridges, dams, runways, etc. Soil stabilization occurs during first stages of a project. The degree of soil stabilization could easily determine the life of structure.Due to the non homogeneous nature of soil, it is common to find soils of different types, stability, compaction, and moisture content within one project. Stabilizing soils is often required before using the soil as a sub-base material.Base materials such as gravel and sand are placed upon the soil before the addition of an asphalt or concrete finished

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surface. Utilization of lime, cement or fly ash is widely used to chemically transforming unstable soil into structurally sound foundation.

LITERATURE STUDIES

Amer Ali Al-Rawas,A.W.Hago and Hilal Al-Sarmi(2004)

"Effects of Lime, Cement &Sarooj (artificial pozzolon) on the swelling potential of expansive soil", presented at conference on soil stabilizing agent, Oman, Vol.7, pg.123-157.The undergone a detailed study on effect of lime, cement and sarroj (artificial pozzolan) on the swelling potential of an expansive soil from Oman. Here the soil sample was mixed with several additives at the percentage of 3,6 and 9 by dry weight of soil and lime was added at fixed percentage such as 3 and 5,plus different percentage of cement were also mixed with soil.

ErdalCokca (2001)

" Use of Class C Fly ash for the Stabilization of an Expansive Soil" Journal of Geo technical and Geo environmental Engineering,Vol.127,pg. 568-573.Effect of Fly ash on expansive soil was studied by ErdalCokca, Fly ash consists of often hollow spheres of silicon, aluminum and iron oxides and unoxidized carbon. There are two major classes of fly ash, class C and class F. The former is produced from burning anthracite or bituminous coal and the latter is produced from burning lignite and sub bituminous coal. Both the classes of fly ash are pozzolans, which are defined as siliceous and aluminous materials.Thus expansive soils can be potentially stabilized effectively by cation exchange using fly ash. He carried out investigations using Soma Fly ash and Tuncbilek fly ash and added it to expansive soil at 0-25%.Specimens with fly ash were cured for 7days and 28 days after which they were subjected to Odometer free swell tests.

MATERIAL SELECTION

HYPO SLUDGE

For our experimental use hypo sludge is collected from SASHASAYEE PAPER MILL, Erode. The sample of the sludge will is dried at temperature of 105 °C until the net weight will be constant. The dried sample will be then ground in a ball mill for 30 minutes to reduce the size of large and uneven particle in to powder form and then

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directly use. Hypo sludge contains lime properties.

The paper producing industry generates various wastes coming out from the various processes. From the preliminary waste named as hypo sludge, Major initiatives are needed in India to use these large volumes in construction industry especially in pavement construction and other infrastructure projects.Use of hyposludge in construction of pavement will improve transportation functionality and ecological sustainability and results in improved traffic safety and reduced life-cycle cost. Use of Hypo Sludge in construction of pavement will benefit urban growth, public health and surrounding communities by encouraging smart growth by integrating and guiding future growth. It is also needed to reduce the cost of pavement for rural development in India.There is a great need for the roads sector to build a sustainable and Environment - friendly road infrastructure for low volume rural roads.It has been observed that it would be economical to use industrial wastes in the construction of low volume rural roads. Paper mill sludge is a major economic and environmental problem for the paper and board industry.

LIME

Soil classified according to the Highway Research Board (HRB) also known as Public Road Administration (PRA) as A-1, A-2, A-3, A-4 should be considered as potentially capable of being stabilized with lime. Lime used here is hydraulic lime. Hydrated lime is very effective in treating heavy, plastic clayey soils.

Lime has been mainly used for stabilizing the road base and sub grades. Normally 2 to 10% of lime may be required for plastic soils.Lime stabilization is done by adding lime to the soil. It is useful for stabilization of clayey soils.

COMPRESSIVE STRENGTH RESULTS

PERCENTAGE OF MARBLE POWDER	7 DAYS STRENGTH IN CUBES	28 DAYS STRENGTH IN CUBES
0%	18.36	23.41
5%	18.59	26.96
10%	20.88	28.44
15%	18.07	20.30
20%	14.96	19.25

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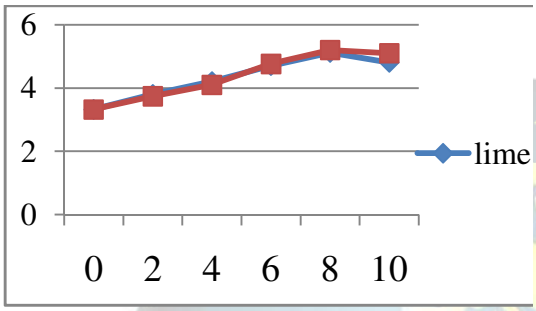
TENSILE STRENGTH RESULTS

The following figure shows variation % of additive added and CBR value when additive is added from 0 to 10%.



SCOPE OF THE WORK

Stabilization with additives is more suitable and effective in stabilizing fine grained soil such as silty clay. Paper producing industry generates various wastes, that is used for soil stabilization in pavements that leads to reduce environmental pollution.The present study is aimed to fine the optimum content of lime and hypo sludge for stabilizing the soil. The properties of soil such as atterberg's limits, optimum moisture content, dry density and CBR value were determined.

CONCLUSION

The Present Study describes the laboratory test conducted to examine the potential of using Lime and Hypo sludge. Additives were added in the range of 2% to 10% in soil sample. Various test such as Atterberg limits, compaction factor test and CBR value were conducted in the soil. The test result leads to the following conclusion:Soil stabilization using Lime and Hypo sludge is an effective mean for enhancing the engineering performance of clay soil.The soil was identified as A-4 as per HRB classification. It is clayey gravel as the gradation as good.Treatment of soil with Lime and hypo sludge showed significant improvement in Maximum Dry Density inCompactionfactortest.Improvement in CBR by the addition of additives in the soil sample. The CBR value has an optimum value at 8% addition of Lime and Hypo sludge in clay soil.It is observed that in determination of Atterberg limits and OMC, addition of higher percentage of 10% of Lime and Hypo sludge is found to be optimum.This is an economical waste management solution..

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