EFFECT OF COMPACTION CHARACTERISTICS OF STABILIZED SOIL USING STONE DUST AND CONCRETE WASTE

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ABSTRACT

Soil stabilization is the process of adding artificial materials to the soil to improve the properties. In this present study, the compaction characteristics of stabilized soil is analyzed with adding additives such as stone dust (SD) and concrete waste(CW). The soil is taken from Mamallapuram at Kanchipuram district. Study implies that adding stone dust improves clay soil properties. Stone dust and concrete waste are taken as those which are passed through IS SIEVE 600µ. Initially the index properties of soil are found out. The compaction character is found out Standard Proctor's Test. In this study, the additives are added in the trial ratios of SD and CW (1:1,1:2,2:1,1:3,3:1). From that we conclude that which ratio of SD and CW gave the good result and the same trial ratios is used to conduct the Unconfined Compressive Strength Test of Clayey soil. The failure pattern is observed. From the test, we observed the strength parameters for different trial ratios and conclude which ratio gives the good strength.

Keywords: *concrete waste, stone dust, stabilized compressive strength, density index properties.*

INTRODUCTION

In the developing world, the improvement in all aspects is required. All of them need a luxuries life with hi-tech material usages. Thus high rise buildings became more adaptable for the fast running world. Hence due to lesser land space, the improvement of soil became essential. Clay soil is a fine grained soil with size of about 0.002 mm or smaller. Its behavior depends on its composition and condition. The soil swells up during increase in water content and gets shrinks Tamilnadu etc. Generally there are CL,CH in the typical names of clay soil group.

They are classified as per the plasticity chart with corresponding liquid limit and plasticity index in the USCS. CL is the inorganic clays of low to medium plasticity. The soil is classified while the liquid limit is 50% or less and it has good to fair workability as a construction material. The type of soil chosen is CH, which represents the inorganic clay of high plasticity. Since it is a problematic soil which has a liquid limit greater than 50%. It has poor shearing strength when compacted and saturated. It has high compressibility when compacted. Both CH and CL soils permeability when compacted is impervious. Hence CH soil is chosen to improve its index properties and the strength of the soil by adding the mixture of additives. The additives are stone dust and concrete waste in which

the compaction test is done to found out the OMC and MDD of the soil.
Since it has low on drying. The bearing capacity of the soil is low so structure on it is unstable. It is mainly present in Maharashtra, Punjab,

MATERIALS USED

CONCRETE WASTE

The concrete waste is collected near the Girls hostel in the Dhanalakshmi Srinivasan college of Engineering and Technology .

STONE DUST

The stone dust is collected from the statue making centre in Mamallapuram in Kanchipuram district, Tamilnadu ,India. The sample is dried sample which is collected in dry condition. The additive is stored in plastic a bucket which is in grey colour.

EXPERIMENTAL WORK:

SPECIFIC GRAVITY

The test procedure is followed as per IS: 2720 (Part 3/sec 1) -1980.Three trials were made on each sample using density bottle and the average is taken as the value of specific gravity. The specific gravity of the soil sample is shown in below fig

The value of specific gravity is 2.85

ATTERBERG'S LIMIT

LIQUID LIMIT

To determine the liquid limit of the soil samples, liquid limit test was conducted USING casagrande apparatus as per IS 2720 (part 5) – 1985.The apparatus is shown below

The value of liquid limit is 56.4%

PLASTIC LIMIT

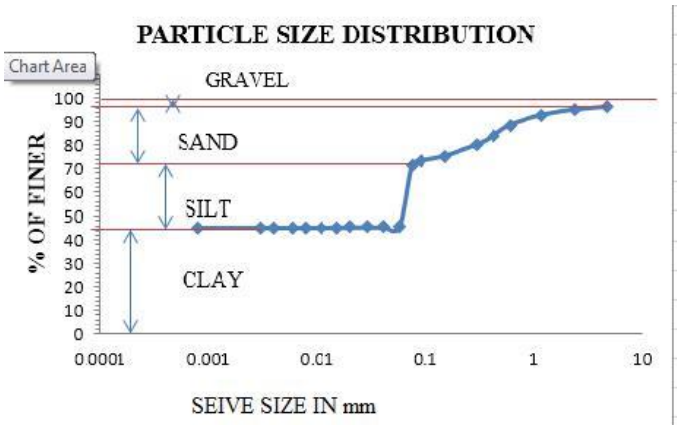
To determine the plastic limit of soil samples, plastic limit test was conducted as per IS 2720 (part 5) – 1985.

The plastic limit value is 20%

GRAVITY SIZE DISTRIBUTION

The grain size distribution is obtained by conducting sieve analysis (dry method) and hydrometer analysis. The tests were conducted as per IS: 2720 (Part 4) -1985.Sieve analysis was conducted to determine the percentage of gravel, percentage of sand and combined percentages of silt and clay. Hydrometer analysis was conducted to obtain percentage of silt and clay separately. The results obtained from sieve analysis and hydrometer analysis are shown below

COMBINED GRAPH:



From the graph, the soil passes through 75 micron is 71.50. This value is above 70% so the soil is fine grained soil.

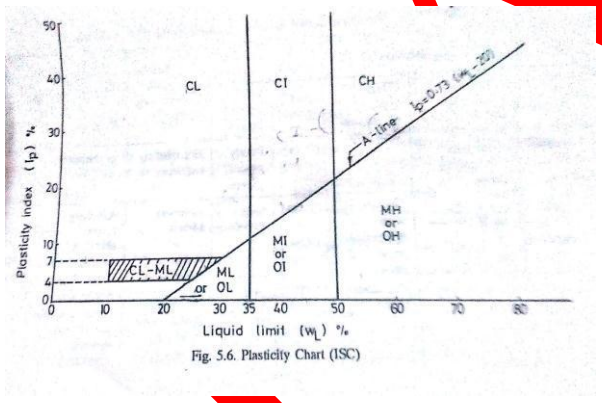


Fig. 5.6. Plasticity Chart (ISC)

From the liquid limit test, the soil is greater than 50%. So the soil having the high compressibility. From the A-line chart we classified that the soil is CH (inorganic clay of high plasticity).

STANDARD PROCTOR'S COMPACTION

TEST

The optimum water content and maximum dry density of the samples are obtained by conducting

Standard Proctor's Compaction Test as per IS:

2720(part 7) -1980.The test apparatus is shown.

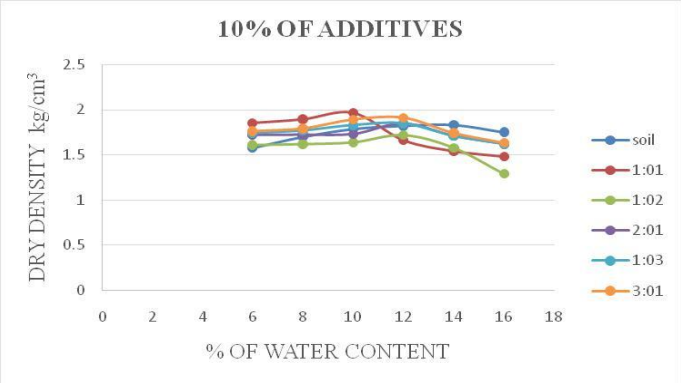
2.ENGINEERING PROPERTIES

Engineering properties of soil comprises of physical properties index properties strength parameters , permeability characterizes consolidation properties modulus parameters, dynamic behavior etc. while index properties particle size gradation, consistency limits are just part of them.

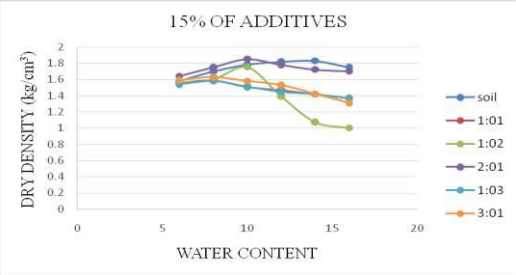
i) STANDARD PROCTOR TEST (IS 2720 (PART -7) 1980)

The Proctor compaction test is a laboratory method of experimentally determining the optimal moisture content at which a given soil type will become most dense and achieve its maximum dry density.

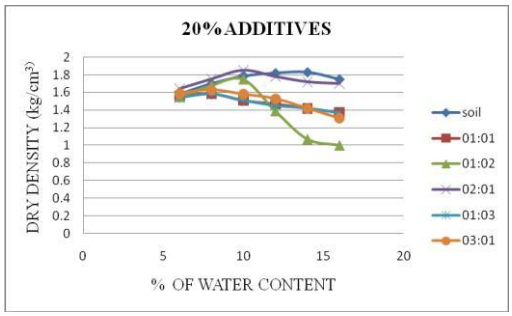
10% OF ADDITIVES:

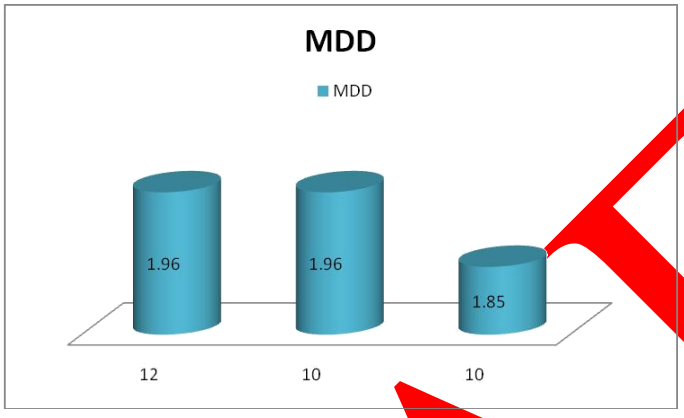


15% OF ADDITIVES:



20% OF ADDITIVES





RESULT AND DISSCUSSION:

The above test were conducted for each proportion with respective percentages and the graph is plotted. We obtained the reduced OMC and MDD is increased. The 10% and 12% of adding additives gives the same MDD with different OMC. We have taken the 10% because of reduced OMC.

CONCLUSION:

The collected soil sample is fine grained-Inorganic clays of high plasticity(CH). It has low bearing strength, shrinkage, swelling character and low maximum dry density . The concrete waste and stone dust are added to improve the maximum dry density and it imports the high bearing strength. In the above study, the concrete waste and stone dust are added in different mix proportions with different ratios(10%,15%,20%:1:1,1:2,2:1,1:3,3:1). In 15% mix proportion 1:2 ratio we obtained the maximum dry density as 1.96 and corresponding optimum moisture content is 10%.

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