

STABILIZATION OF BLACK COTTON SOIL BY ADDING FLY ASH

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Abstract This project is on improving the engineering property of black cotton soil by adding fly ash. As a population of our country is increases day by day and for their survive, better infrastructure needed and which is mainly depend on construction and construction is related to soil. In India their many regions where black cotton soil available which is good for agriculture point of view but it is bad for construction purpose. So it has been that the engineering property of soil can be improve by use a fly ash, which is easily available. The black cotton soil sample is taken from the agricultural land of the Nagpur Maharashtra. The fly ash collected from the “Koradi Power Plant”. Tested for the 10% , 20%, 25% and 30% of using fly ash.

Index Terms- Marble Powder, Different Test, Different Proportion Mix.

I. INTRODUCTION

Black cotton soil are rich in mineral. It is basically found in greyish and black in colour. It also contain some chemical composition. The rate of Monte morillonite is more in black cotton soil which causes expensiveness and crack in soil. The black cotton soil has swelling and shrinkage behaviour result of that it is associated with numerous problem which can be solved by stabilization process. The stabilization is widely connected with road pavement and foundation construction. In these study we try to investigate by using different percentage composition of lie to improve the strength and engineering properties. The use of fly ash as to minimise the disposal problem as well as save the cost of stabilisation.

We know the fact that water is biggest enemy of all structure water penetrates from top surface to the bottom surface of the foundation due to capillary action. The black cotton soil has very high permeability and which is not good for construction purpose.

II. MATERIAL AND METHODOLOGY

Black cotton soils are inorganic clays of medium to high compressibility and form a major soil group in India. They are characterized by high shrinkage and swelling properties. This Black cotton soils occurs mostly in the central and western parts and covers approximately 20% of the total area of India. Because of its high swelling and shrinkage characteristics, the Black cotton soil (BC soils) has been a challenge to the highway engineers.

cotton soil:-

Geotechnical **Black** properties of black cotton soil are given in Table 1

Table 1: Properties of expansive soil

Colour	Specific Gravity	Liquid limit (%)	Plastic limit (%)	Shrinkage limit (%)	OMC (%)	MDD (g/cc)	Free swell index (%)	Swelling pressure (kg/cm ²)
Black	2.65	40- 60	15 - 25	8 - 15	20-30	1.4-1.6	50 to 60	4-6

Fly ash:-

Fly ash additive in soil, fly ash is use due to

- Fly ash is costless and abundantly available all over the country.
- As fly ash is a by-product of thermal power plants, land area required for its disposition is a great problem in a densely populated country like India.
- Utilization of fly ash solves the problem of air and water pollution.

III. RESULT AND DISCUSSION

From the graph it is observed that the liquid limit of the soil decreases by adding fly ash up to 30%. This is due the effect of reduction essentially controlled by thickness of diffused double layer and shearing resistance at particles level. after increase in amount of fly ash the liquid limit of black cotton soil is observed to be marginal.

It is observed that the Plastic limit of the soil decreases by adding fly ash up to 30%. It is decreases due to the fly ash that the quantity of fly ash increases in the soil and the amount of soil flocculation decreases and the fine particles' of fly ash may be incorporated in the voids of the flocculated soil. The graph shows increasing shrinkage limit of black cotton soil by adding fly ash. This is due to the fact of flocculation of clay piratical present in fly ash which resulting in the reduction of friction between particle By Addition of Different Fly ash in black cotton soil, Free swell index decreases which indicate control swelling behavior of soil. Hence minimize of risk of failure It is seen that the Strength Increases on small percentage of 20% or 25% of fly ash. Further increasing fly ash percentage show n0 considerable increasing the strength. this is due to the probable disturbance of soil skeleton and consequent reduction in cohesion. The strength of soil is observed to improve. which is due to the pozzolonic reactivity of the free lime content of fly ash.

IV. CONCLUSION

- The following conclusion are observed on the basis of experimental investigation.
- The liquid limit of the black cotton soil decreases up to 30% and beyond 30% it is marginal.
- The Plastic limit of the BC soil decreases due to flocculation.
- The shrinkage limit of the BC soil increases through out 30% .
- Differential swelling index decreases and in decreases the risk of failure.
- UCS of BC soil increases by adding fly ash it attend peak value between 20% to 25% .

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