Effect of Bagasse ash on CBR values of Silty sand

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Abstract- *The soil is heterogeneous mixture consisting of different percentage of coarse and fine grained fractions. There is a wide variation in the behavior owing to the complex geological process during the formation. In geotechnical engineering application, the mechanical behavior of soil namely strength and compressibility plays major role. These soils are very often referred as silty sand. It is necessary to improve the strength of Silty-stand. Conventional stabilization techniques are not effective when the water content is high. Therefore, different additives may be used. A series of Modified compaction was conducted for unsoaked conditions and the samples were cured for 0. 7 and 14 days in desiccators at 100 percent relative humidity. It is observed that, increase in MDD with increasing in percentage of Bagasse ash, reaches maximum dry density of 2.338 gm/cc at 30% Bagasse ash content and is also observed that with further increase in the Bagasse ash percentage, there is a decrease in MDD and increase in OMC. Also CBR test were conducted on silty sand with optimum content of Bagasse ash and resulted in increase with curing period upto76% at 14 days.*

I. INTRODUCTION

Infrastructure projects such as highways, railways, water reservoirs, reclamation etc. requires earth material in very large quantity. In urban areas, borrow earth is not easily available which has to be hauled from a long distance. Extensive laboratory works have been carried out by various researchers and have shown promising results for application of Silty sand after stabilization with additives such as sand, cement, lime, Bagasse ash, etc. Bagasse ash is freely available for projects in the vicinity of Thermal Power Plants; it can be used for stabilization of soils for various uses. The present investigation describes the study carried out to investigate the improvement in the properties of Silty sand with Bagasse ash in varying percentages.

Bagasse ash by itself has little cementetious value, but in the presence of moisture it reacts chemically and forms cementetious compounds and contributes to the improvement of strength and compressibility characteristics of soils. It has a long history of use as an engineering material and has been successfully employed in geotechnical applications. Brandl, (1992) studied on alteration of soil parameters by stabilization with lime and reports that after adding lime; structural transformation and flocculation begin immediately. This causes a rapid change of atterberg-limits. Ramesh et al., (2002) studied the effect of muddanaur fly ash on Index and compaction behavior of expansive soil and reported that on addition of fly ash improves the properties of the soil. Ramesh and Venkataraja Mohan, (2013) studied the index properties of alkalis treated expansive and non expansive soil contaminated with acids and reported that when black cotton soil is treated with different percentage of calcium carbonateparticles by exchange of the monovalent cat ions by divalent calcium ions. However with curing the liquid limit for black cotton soil increases for 7 days curing due to flocculation of clay particles and decreased slightly for 30 days of curing

II. Materials used in the Present Investigation

Silty sand collected form a local site in pandhurpur.
Bagasse ash from Thermal power plant.

III. Tests conducted

Heavy Compaction Tests as per IS:2720 (part 7) – 1980] "Determination of water content – Dry density Relation using Light compaction

California Bearing Ratio IS 2720 : (part 16) -1979] "Laboratory Determination of CBR

III. Experimental Programme

The experimental work carried out on Silty-sand have been carried out as per the IS codes of practice. The tests conducted include heavy compaction test and CBR test. In unsoaked conditions the samples were cured for 0, 7 and 14 days in desiccators at 100 percent relative humidity.

IV. RESULTS AND DISCUSSIONS

The present investigation describes the study carried out to investigate the improvement in the properties of Silty sand with Bagasse ash in varying percentages. The results are tabulated in Table 1. Figure 1 and 2 shows the variation of compaction and CBR values of silty sand with various and optimum percentages of Bagasse ash respectively.

Table 1. Compaction characteristics and CBR values of Silty-sand treated with Bagasse ash

Combination	Compaction Characteristics		C.B.R Values (%)			
	O.M.C (%)	M.D.D (gm/cc)	Settlement	0 Days	7 Days	14 Days
BA Alone	17	1.96				
S.S. Alone	8.2	2.14	2.5	46	46	46
S.S. + 10%B.A	13.98	2.289				
S.S. + 20%B.A	15.09	2.285				
S.S. +30%B.A	10.33	2.338	2.5	56	63	78
S.S. + 40%B.A	15.5	2.276				
S.S. + 50%B.A	13	2.252				

V. EFFECTS OF BAGASSE ASH ON COMPACTION

Bagasse Ash is varied from 10% to 50% with Silty Soil the density goes on increasing upto 30% beyond which the density decreases . So 30% of Bagasse Ash with silty soil is considered as optimum value.This is due to flocculation and availability of lime content in Bagasse Ash ,there by increase in resistance by compactive effort. Further increase in Bagasse Ash decreases the density deu to increase in diffuse double layer thickness.

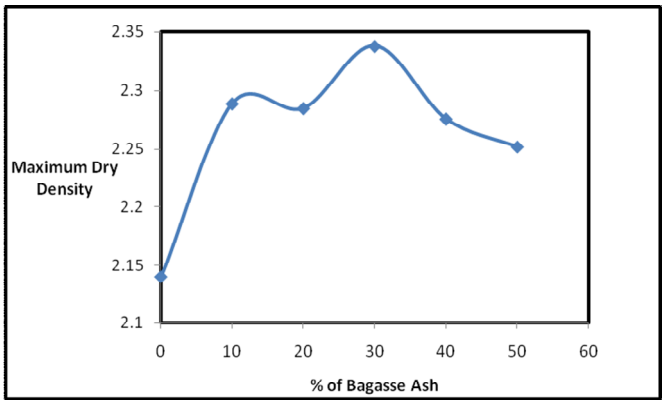

Figure 1. Variation of Maximum Dry density of Silty sand with various percentage of Bagasse Ash

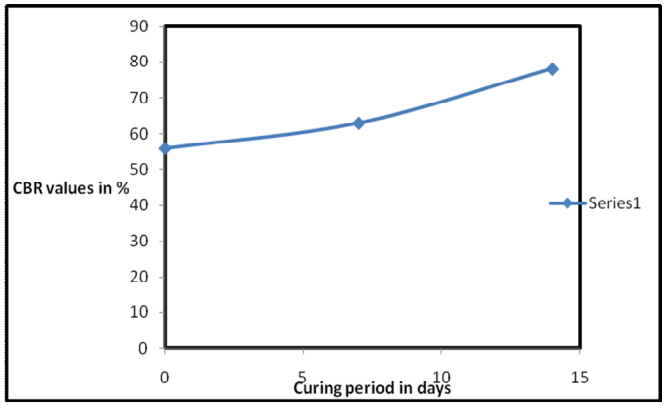

Figure 2. Variation of Maximum CBR values of Silty sand with optimum percentage of Bagasse Ash

Effects of Bagasse Ash on CBR values :-

By addition of optimum percentage of Bagasse Ash i.e, 30% CBR value of Silty Sand increased with the curing period marginally . From 4.4 % to 5.6% with 14 days curing

VI. CONCLUSION

Increase in Bagasse ash content the compaction characteristics of silty sand goes on increasing upto 30% of Bagasse ash, further addition causes density of silty sand to decrease. So 30% Bagasse ash is considered as optimum content to stabilize silty sand. California Bearing tests were conducted on silty sand with optimum percentage of Bagasse ash at curing periods 0, 7 and 14 days. With curing period California Bearing ratio values increased in unsoaked condition. But the results may vary in soaked conditions.

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