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Soil Stabilization using Demolished Fly Ash Brick

Girraj Sharma[1], Dr. Sanjay Tiwari[2]

[1]*PG student,* [2]*Professor, Civil Engineering Department, Madhav Institute of Technology and Science, Gwalior, (M.P.) India*

Abstract: ***Silt is a granular material having size between sand and clay, which originate from quartz and feldspar mineral. Silt may occur as a soil (whenever blended with sand or clay) or as sediment when blended in suspension in water body for example, a stream. It is likewise exist as soil deposits at the base of a water body, as mudflows from landslides. Silt has a medium specific area with a commonly non-sticky, plastic feel. Silt more often has a floury feel when dry, and sticky feel when wet. Sediment can be outwardly seen with eye, showing a sparkly appearance. It additionally can be felt by the tongue as granular when put on the front teeth. The study aims to explore the possibility of using fly ash brick as a soil stabilizing agents to improve the engineering properties of soil of type clay with intermediate compressibility (C.I). Different tests were conducted on various percentages of fly ash brick independently and in combination. Tests carried out were (i) Liquid Limit, (ii) Plastic Limit, (iii) Compaction, (iv) California Bearing Ratio (CBR) and (v) specific gravity. It was found that stabilizing agents improves the engineering properties significantly. Using the CBR values obtained for different quantity of admixtures, the pavement was designed following IRC SP 20 guidelines.***

Keywords: Silt; Granular material; Soil Stabilizing agent; Fly ash brick; IRC SP20.

I. INTRODUCTION

Soil stabilization is a procedure for improving the designing properties of soil and making it increasingly stable. Soil adjustment is procedure to improve their physical properties. By adjustment porousness of soil can be decline. The shear quality of soil control the swelling properties of soil by which the heap bearing limit of sub-grade soil improve. There are different strategy for adjustment and different admixture, for example, bond, bitumen, lime, fly Ash and so on.

II. METHODOLOGY

A. The soil sample is collected
B. The type of soil is identified
C. Find out the atterbergs limit
D. Proctor test is done for find OMC and MDD
E. Specific gravity of soil is found
F. CBR test is conducted in the soaked condition
G. Atterbergs limit find out for 10% ,20% and 30% fly ash brick
H. Proctor test is done for 10%,20%and 30% fly ash brick
I. Specific gravity find out for 10%,20% and 30% fly ash brick
J. CBR is conducted for 10%,20% and 30% fly ash brick

III. RESULTS OF RAW SOIL

Engineering classification of soil:

1) Soil has a L.L.= 14.47%
2) plastic limit= 13%
3) MDD. =1.78g/cc
4) OMC 12%
5) CBR 2.53%(at 5mm penetration)
6) Sp gravity =2.66
7) Plasticity index of soil = L.L – P.L
= 14.47% -13%
= 1.47%.

From modified plasticity chart, soil is classified ML i.e. silt with Low compressibility.

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IV. RESULTS OF SOIL & FLY ASH BRICK MIXTURE

A. Liquid Limit

The LL of soil when fly ash brick used as admixture in different composition such as

1) 10% fly ash brick and soil (L.L)=24%
2) 20% fly ash brick and soil (L.L)=27.77%
3) 30% fly ash brick and soil (L.L)=31.66%

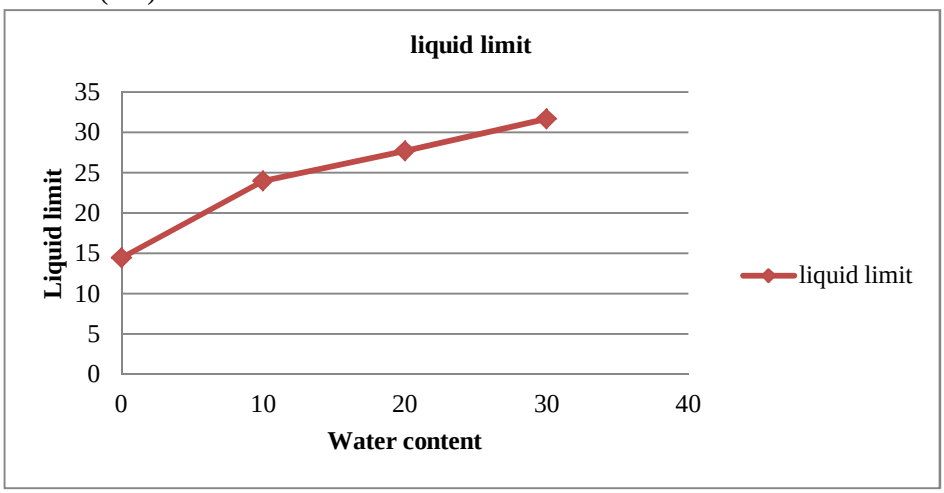


Figure.1 Effect of different percentage of fly ash brick on Liquid Limit of Soil

B. Plastic Limit

The P.L of soil when fly ash brick used as admixture in different composition such as

1) 10% fly ash brick and soil (P.L)=20%
2) 20% fly ash brick and soil (P.L)=22%
3) 30% fly ash brick and soil (P.L)=25%

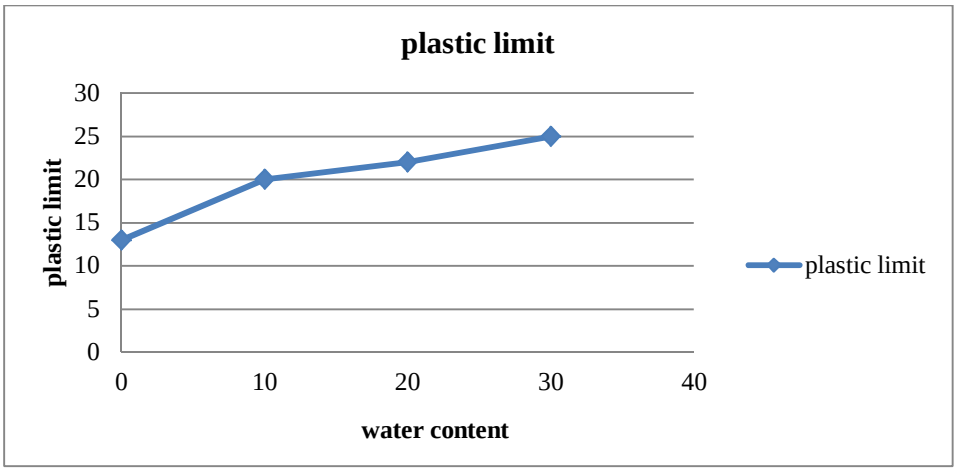


Figure.2 Effect of Admixture on Plastic Limit of Soil

C. Plasticity Index

The P.I of soil when fly ash brick used as admixture in different composition such as

1) 10% fly ash brick and soil (P.I)= 4%
2) 20% fly ash brick and soil (P.I)= 5.77%
3) 30% fly ash brick and soil (P.I)= 6.66%

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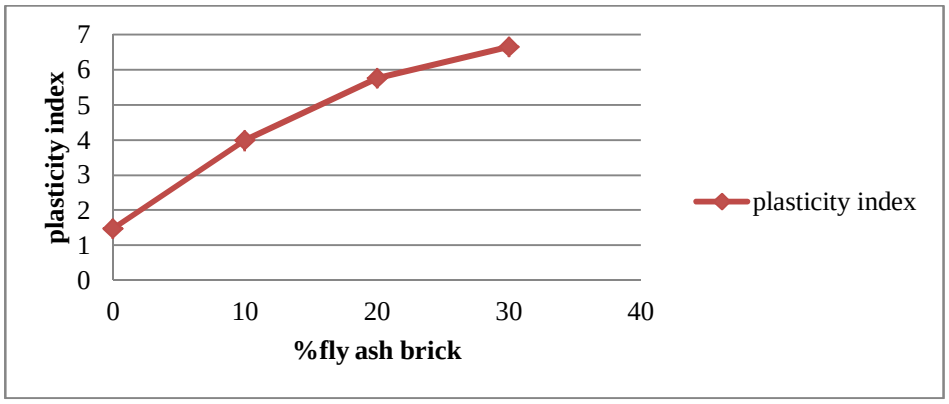


Figure.3 Effect of Admixture on Plasticity Index of Soil

D. MDD

The MDD of soil when fly ash brick used as admixture in different composition such as

1) 10% fly ash brick and soil = 1.73 g/cc
2) 20% fly ash brick and soil = 1.84 g/cc
3) 30% fly ash brick and soil = 1.88 g/cc

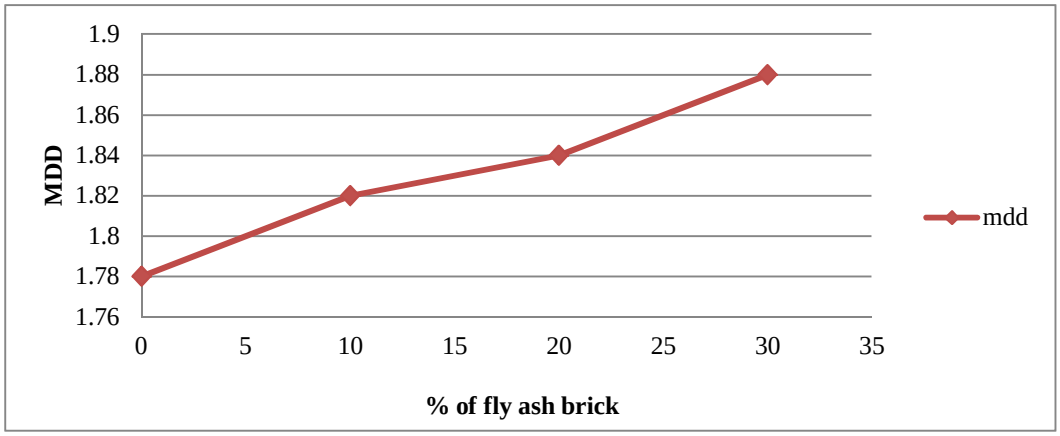


Figure.4 Effect of Admixture on MDD of Soil

E. OMC

The OMC of soil when fly ash brick used as admixture in different composition such as

1) 10% fly ash brick and soil = 13%
2) 20% fly ash brick and soil = 14%
3) 30% fly ash brick and soil = 16%

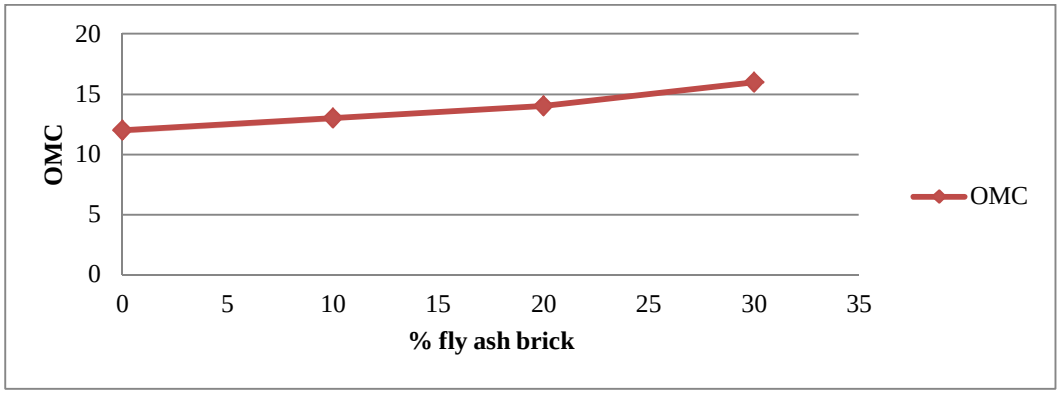


Figure.5 Effect of Admixture on OMC of Soil

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F. Specific Gravity

1) 10% fly ash brick and soil = 2.44
2) 20% fly ash brick and soil = 2.4
3) 30% fly ash brick and soil = 2.15

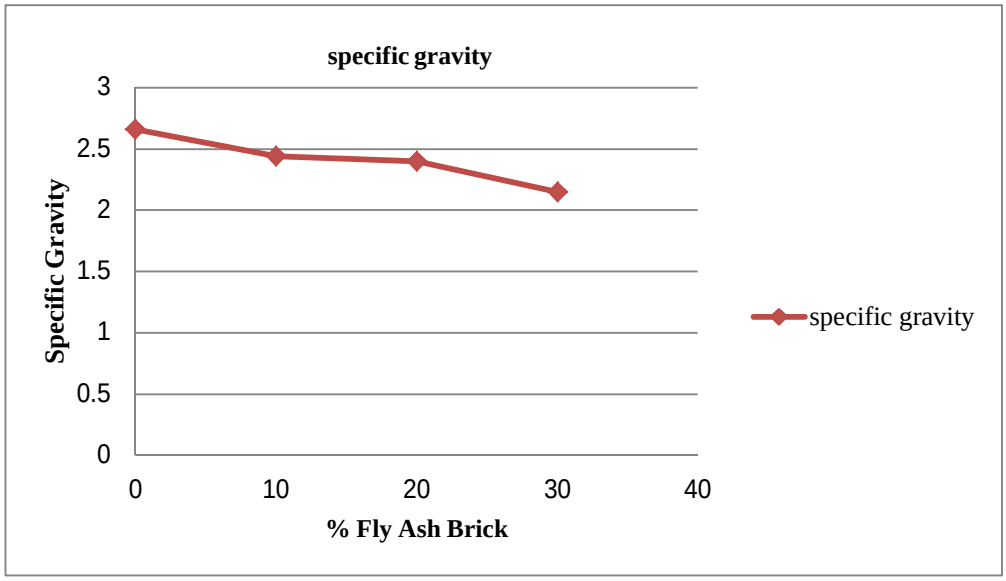


Figure.6 Effect Of Admixture On Specific Gravity Of Soil

G. CBR

The CBR of soil when fly ash brick used as admixture in different composition such as

1) 10% fly ash brick and soil = 5.60%
2) 20% fly ash brick and soil = 7.5%
3) 30% fly ash brick and soil = 9.47%

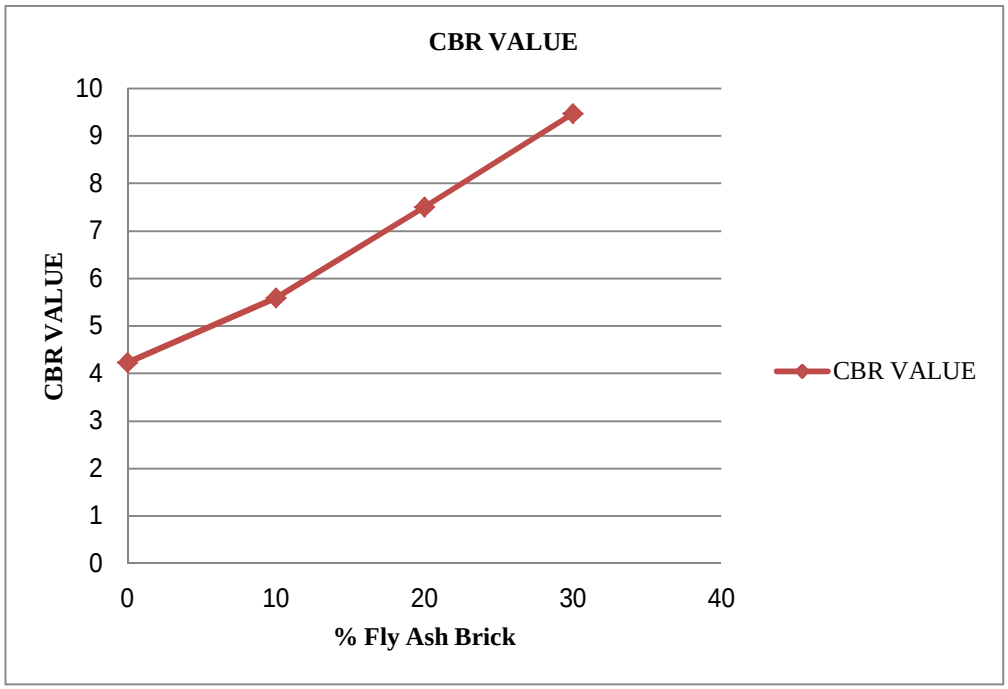


Figure.7 Effect OF Admixture ON CBR Value OF Soil

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V. CONCLUSION

The main characteristic property of silty soil is indicated by large volume change due to change in amount moisture content. A number of trials were done for improve the properties of soil by use of fly ash brick to stabilization in different proportion.

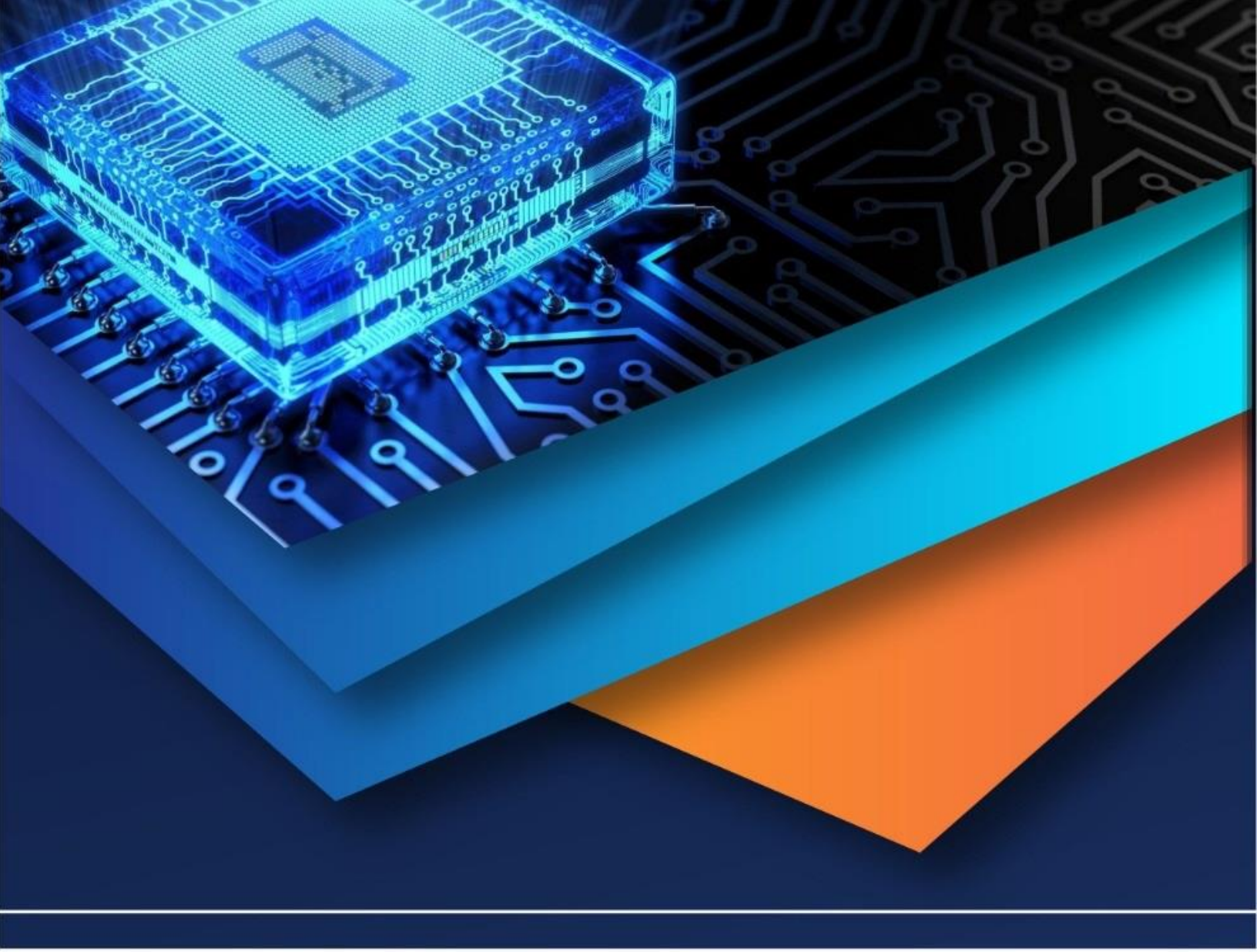
A. The liquid limit of soil is increases when demolished fly ash brick mixed in different proportion such as 0%, 10%, 20% and 30% the value of liquid limit 14.47%,24%,27%and 31,66% respectively.
B. The plastic limit of soil is regularly increases when demolished fly ash brick mixed in different proportion such as 0%, 10%, 20% and 30%.
C. The value of Lesser P.I more useful the soil. Value of P.I increase as % of fly ash brick increase.
D. M.D.D. of soil increase as % of fly ash brick increase from 0%,10%,20% and 30%
E. CBR value showing increasing trend for increase in % of fly ash brick .With increase in % of fly ash brick penetration load increase so CBR value increase.
F. Specific gravity of soil continuously decrease as % of fly ash brick in soil increase.
G. As per their CBR value, section of sub grade is decided (as per IRC: SP: 20).

Value of CBR increases from 4.24% to 9.47% so mixture of 30% fly ash soil and 70% silty sand will be use for sub-grade for increase bearing capacity and decrease permeability of sub-grade.

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