

Soil Stabilization of Clayey Soil using Shredded Rubber Tyre

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Abstract— Soil properties play very important role in construction. some time the properties of soil are not favourable for construction and we used some method to improve properties of soil called soil stabilization. In this paper we used shredded rubber tyre to improve properties of soil. Shredded rubber tyres with different sizes (10mm ,20mm,30mm) in width and (20mm,40mm,60mm) in length are used for experimental work. the percentage used is (1%,2%,11%) for the experimental work. Use of shredded rubber tyres in geotechnical engineering for enhancing the soil properties, has received great attention in the recent times. This paper presents the effect on the behavior of pavement subgrade when pavement subgrade soil is stabilized with shredded rubber tyre. It is found from the investigation that the optimum value of shredded rubber tyre is 1%.and size is 10mm×20mm.it improve the value of UCS by 7.83% than in comparison of virgin soil.

Keywords— Soil Stabilization, UCS, Shredded Rubber Tyre,

I. INTRODUCTION

Soil is very important thing for construction. Soil in site should be such that it can bear the load even in critical situation.but some time soil is good in normal condition. but in adverse condition soil is not capable of bearing the load, it fails in shear or another type of failure occur. To avoid this type of failure, we should investigate the soil properly,in normal condition or in adverse condition also.

some time the soil is not meet the engineering requirement, so we use soil stabilization, we improve the soil properties by meachanical and chemical action,

In this paper shredded rubber tyre of different size and different percentage is used to to find the effect of shredded rubber tyre on unconfined compressive strength of soil.

II. MATERIAL USED

The soil used in this study is collected from Banur near Chandigarh. Classification of soil as per BIS is CL which is clay with low compressibility. Compaction characteristics of plain soil are given below

Table 3.1 show the MDD and OMC of virgin soil

Soil type	OMC%	MDD(g/cc)
Virgin soil	12.7	1.95

Shredded rubber tyre was cut into different sizes (10mm,20mm,30mm) in width and (20mm,40mm,60mm) in length. The percentage used for laboratory experiment was 1%,2%,3%.3.

III. COMPACTION CHARACTERISTICS

Modified proctor test was used to find the compaction characteristics i.e optimum moisture content and maximum dry density. optimum moisture content and maximum dry density was found of soil mixed with shredded tyre of percentage 1%,2%,3%. And size (10mm ,20mm,30mm) in width and (20mm,40mm,60mm) in length.and also optimum moisture content and maximum dry density was found by modified proctor test of virgin soil.

Table 3.1 show the MDD and OMC of virgin soil

Soil type	OMC%	MDD(g/cc)
Virgin soil	12.7	1.95

And the optimum moisture content and maximum dry density of soil when mixed with shredded tyre are shown below in table.

Table 3.2:OMC AND MDD TABLE FOR SIZE
10mm×20mm

S.NO	PERCENTAGE	MDD	OMC
1	1%	1.92	12.9
2	2%	1.87	13.1
3	3%	1.80	13.3

Table 3.3:OMC AND MDD TABLE FOR SIZE
20mm×40mm

S.NO	PERCENTAGE	MDD	OMC
1	1%	1.91	12.8
2	2%	1.87	13
3	3%	1.82	13.2

Table 3.4:OMC AND MDD TABLE FOR SIZE
30mm×60mm

S.NO	PERCENTAGE	MDD	OMC
1	1%	1.90	13
2	2%	1.85	13.3
3	3%	1.79	13.5

It can be seen from the above tables that the MDD of soil-tyre mixtures reduces significantly with an increase in the percentage of shredded rubber tyre. This is due to the light weight nature of shredded rubber tyre. On the other hand the value of optimum moisture content is increased with increase in percentage of shredded tyre. This is due to the fact that shredded tyre has some value of water absorption.

IV. UCS VALUE OF THE SOIL

UCS tests were conducted on soil and soil-shredded rubber tyre mixtures to determine the UCS value from which the suitability of soil stabilized with shredded tyres can be assessed. SO. The tests were conducted a corresponding OMC and MDD of the soil, soil-tyre mixtures. The soil is mixed with tyre shreds of 1%,2% and 3% by weight of soil. The UCS values of the soil and soil-mixture .it is difficult to find out the strength of soil at the site so we used unconfined compressive strength test of soil in labortary.

UCS value of plain soil=2.17KG/CM²

Table 4.1:UCS Value of soil tyre mixture (10mm×20mm)

s.no	Percentage	UCS VALUE
1	1%	2.34KG/CM ²
2	2%	2.19 KG/CM ²
3	3%	2.13 kg/CM ²

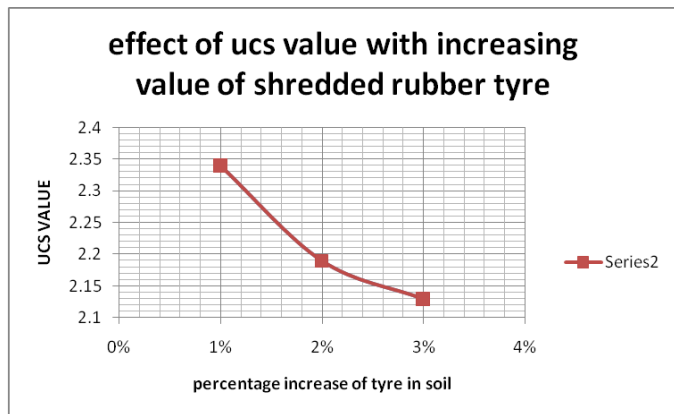


FIG.1 UCS VALUE OF SOIL-TYRE MIXTURE (10mm×20mm)

Use Table 4.2:UCS Value of soil tyre mixture (20mm×40mm)

s.no	Percentage	UCS VALUE
1	1%	2.31KG/CM ²
2	2%	2.20 KG/CM ²
3	3%	2.11 kg/CM ²

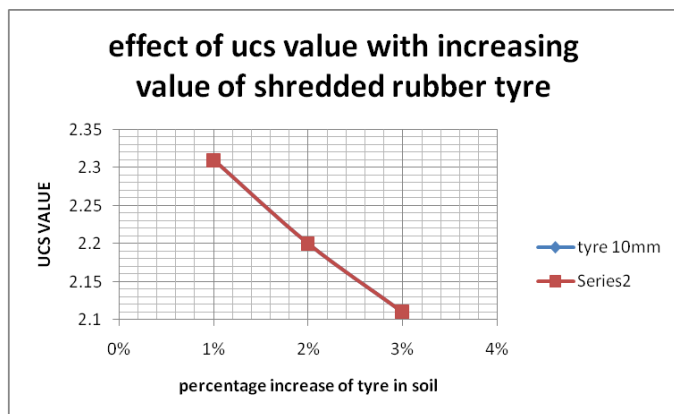


FIG.2 UCS VALUE OF SOIL-TYRE MIXTURE (20MM×40MM)

Table 4.3.:UCS Value of soil tyre mixture (30mm×60mm)

s.no	Percentage	UCS VALUE
1	1%	2.27KG/CM ²
2	2%	2.16 KG/CM ²
3	3%	2.11 kg/CM ²

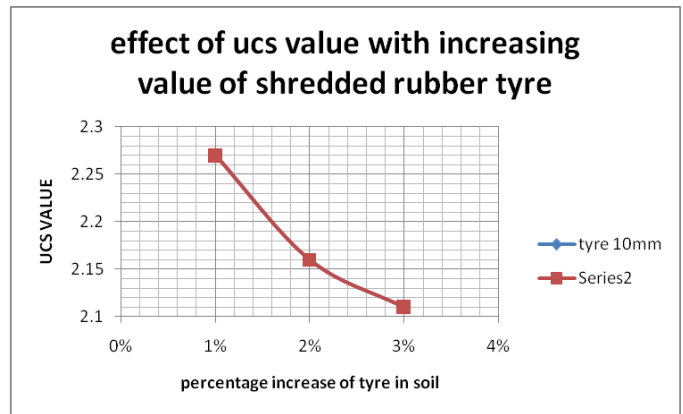


FIG.3 UCS VALUE OF SOIL-TYRE MIXTURE (30mm×60mm)

It is inferred from Tables and Fig.1, Fig.2 and Fig.3 that the 1% of size 10 mm×20 mm of tyre content is the specific value.UCS value at 1% shredded tyre with size 10mm×20mm is 2.34 and the UCS value of plain soilis 2.17.and improvement in UCS value from the experimental study was 7.83% than from virgin soil.

V. CONCLUSION

Based on the experiments carried out on soil and soil-tyre mixtures, the following observations and conclusions are drawn:

- i. The optimum moisture content is found to increase with increase in percentage of shredded tyre, because shredded tyres have some water absorption value.
- ii. The maximum dry density of soil decrease with increase in percentage of soil. This is due to the light weight nature of tyre waste.
- iii. When soil mixed with 1% of shredded tyre with size (10mm×20mm) its UCS value increase to 7.83% than from virgin soil.
- iv. The percentage increase in UCS value of stabilized soil is 7.83% in soaked condition an increase in UCS increase the strength of soil.and waste shredded tyre which pollute the environment is used as stabilized material.

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