International Journal on Recent and Innovation Trends in Computing and Communication ISSN: 2321-8169
Volume: 4 Issue: 4 283 - 285

Utilization of Plastic Waste as Construction Material

Chinmaya Tiware[#1],Taher Malvi[#2],Rahul Shirsat[#3],Prasad Bhoir[#4],Mrs.Archana Mahajan[#5]
Department of Civil, VOGCE, Mumbai University,
Aghai, Dist. Thane, Maharashtra, India.
[#1]*chinmaya.tiware97@gmail.com*

Abstract **-** Nowadays, human apply all of its potentiality to consume more. The result of this high consumption is nothing unless reducing the initial resources and increasing the landfill. Lack of waste management and recycling in third world countries has come to the attention of many organizations. The Plastic waste is relevant part of the complete amount of waste worldwide. Only a small fraction of it go into plastic recycling, the rest pollutes the environment, either indirectly through toxic fumes by incineration or directly. Today the construction industry is in need of finding cost effective materials for increasing the strength ofstructures.This project emphasizes utilization of plastic waste green, effectively and economically for the construction purpose. Due to the use of plastic waste it will not only decrease the solid waste but also bring empowerment to the people below poverty line.

Keywords – *Bottle – X, P- sand, Thermoplastic, agglomerated*

*****

I. INTRODUCTION

The quantum of strong waste is steadily expanding because of expansion in populace, formative exercises, changes in way of life, and financial conditions. In India, around 5.6 million metric huge amounts of plastic waste is created every year Plastics waste is a noteworthy part of the aggregate municipal solid waste (MSW). As indicated by report by Central Pollution Control Board (CPCB),it is evaluated that roughly 10 thousand tons per day (TPD) of plastics waste is created i.e. 9% of 1.20 lacs TPD of MSW in the nation. As a result of its strength, plastics won't break down, however is mechanically lessened to miniaturized scale plastics or buoys in the seas for an uncertain measure of time. The plastics waste constitutes two noteworthy classification of plastics; (i) Thermoplastics and (ii) Thermoset plastics. Thermoplastics, constitutes 80% and thermoset constitutes around 20% of aggregate post-purchaser plastics waste created in India. The ecological risks because of bungle of plastics waste incorporate the accompanying aspects: Littered plastics ruins excellence of the city and stifle depletes and make vital open spots filthy; Garbage containing plastics, when blazed may bring about air contamination by transmitting dirtying gases; Garbage blended with plastics meddles in waste handling offices and may likewise bring about issues in landfill operations; Recycling commercial enterprises working in non-accommodating zones are posturing unhygienic issues to the environment.[1]

Plastic lessening endeavors have happened in a few ranges in endeavors to diminish plastic utilization and contamination and advance plastic reusing. Ordinarily a plastic is not reused into the same sort of plastic items produced using reused plastics are regularly not recyclable. The utilization of biodegradable plastics is expanding. On the off chance that some of these get blended in alternate plastics for reusing, the recovered plastic is not recyclable in light of the fact that the difference in properties and melt temperatures. [2]

The primary target of this anticipate proposition is greatest usage of plastic waste in various thoughts and advancement. Henceforth, plastic waste utilization will increment and in this way incineration site and landfill site will be diminished.

II. METHODOLOGY

Plastic waste must be discrete from the guardian strong waste. Further, it can be destroyed, agglomerated, or and so on. We have use plastic container as a block i.e. Bottle-X and ad libbed produced sand i.e. P-sand.

A. Bottle-X

The Bottle-X is an aggregate substitution over normal block. We have fill the Matrix i.e. soil, development waste in container and we have use as block. Accordingly the name clarify Bottle i.e. plastic container and X i.e. any lattice we can fill in the container. We have developed Bottle-X stone work in our school grounds and taking after are the strategy of Bottle-X brick work:

1. First steps is to collect the PET bottles needed for construction from different sources like dumping yard, hotel, mall etc and then clean them. As shown in figure no. 1.

Fig. No. 1 Collection of plastic waste.

2. Then plastic bottles are filled with various waste materials like construction waste and compacted till the brim and sealed. The compaction is done with the help of small tamping rod. As shown in figure no. 2.

Fig. No. 2 Filling of plastic bottle

3. Then trench is dug in the ground and the PCC bed is laid under the supporting wall for leveling and which will act as small footing for the wall. Thus three walls are constructed, two wall at both ends & one in the centre. As shown in figure no. 3.

Fig. No. 3 Laying of P.C.C. bed

4. The bottles are laid similar to normal method and each bottle is tied with nylon fish net to strengthen the structure between the two supporting wall. As shown in figure no. 4.

Fig. No. 4 Bottle- X masonry

5. After construction of wall or structure the pointing process is carried out. The excess mortar is removed with chisel & the facing side or the outer side of structure is wash with water so that the bottle can be visible for architectural view. The structure is plaster for the elegance. The final structure looks like as shown in figure no. 5.

Fig.No. 5 Bottle- X masonry structure.

B. P- sand

The state government has banned the utilization of Natural sand. Thus construction industries are utilizing manufactured sand or crushed sand (M- sand) replacement of natural sand. But it has certain limitation like it does not give proper slump and more pump pressure is required for the pumping of the concrete. The reason for this limitation is fineness modulus. The fineness modulus of M- sand ranges to 3.4 to 3.6. Hence, fineness modulus has to be deducted to 3.2. It can be deducted by adulteration of fines in the sand. But it is tedious job to screen the sand. Thus, we can use plastic fines to deduct the fineness modulus. And this new product is P- sand.

III. RESULT

The all experiments were performed in the college campus and it has been examine by the guide.

A. Compressive strength test

The compressive strength of the specimen is calculated using the following formula:

Compressive Strength, fc = P/A N/mm^2

Where P = Load at failure in N

A = Area subjected to compression in mm^2 [3].

The graph shown in figure no. 6 illustrates the variation of the compressive strength of specimens with Bottle- X and brick.

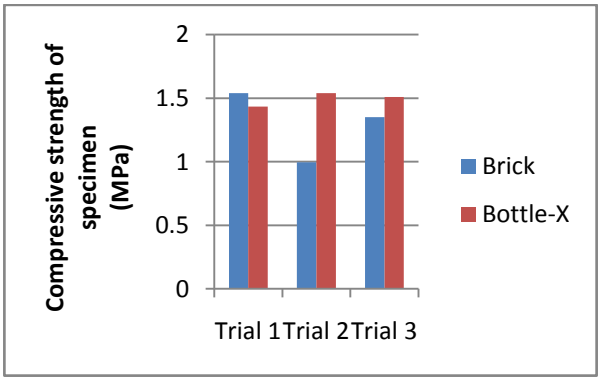

Fig. No. 6 Graph of strength comparison between Brick and Bottle-X

As per figure no. 6, the strength of the Bottle-X is greater than the ordinary brick and thus, it is efficient to use Bottle-X replacement over ordinary brick.

B. Sieve Analysis

The sieve analysis has been done as per I.S. 383 guidelines [4][5]. The following are the readings and graph of M- sand and P- sand.

Sieve	Cumulative %	Passing %
4.75	0.95	99.05
2.36	34.35	65.65
1.18	65.3	34.7
600µ	74.95	**25.05**
300µ	84.5	15.5
150µ	92.2	7.8
pan	100	0
Total	**352.25**	

Table No. 1 M- Sand Sieve Analysis

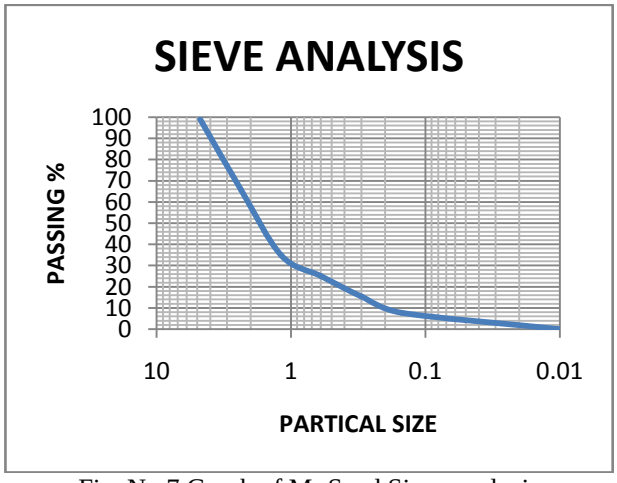

Fig. No.7 Graph of M- Sand Sieve analysis

The table shown in table no.1 and figure shown in figure no.7 illustrates the particle size distribution of the manufactured sand sampled from the college site.

Sieve	Cumulative %	Passing %
4.75	0.730769	99.26923
2.36	26.42308	73.57692
1.18	50.23077	49.76923
0.6	65.34615	**34.65385**
0.3	88.07692	11.92308
0.15	94	6
0	100	0
Total	**324.8077**	

Table No. 2P-Sand sieve analysis

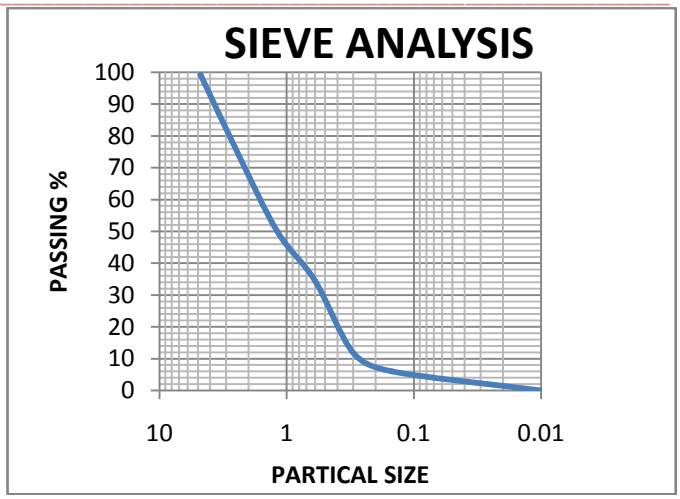

Fig. No.6: P- Sand sieve analysis

The manufactured sand has been improvised by adding plastic fines in M-sand and thus the sand has been sieved. The table shown in table no. 2 and the figure shown in figure no. 6 illustrates the particle size distribution of the the P-sand.

The following are the reading of the Fineness Modulus of M-sand and P- sand.

M- Sand	3.52
P- Sand	3.24

Table No. 3 Fineness modulus of P-sand and M- sand

The table shown in table no. 3 illustrates the difference of fineness modulus in M- sand and P- sand. Due to adulteration of plastic fines in the M- sand the fineness modulus has deduce to 0.28

IV. CONCLUSION

We conclude that the plastic waste can be utilize green, effectively and economically. The compressive strength of the bottle- X is quite similar to the brick and it is total replacement over brick. The plastic fines have deducted the fineness modulus of M- sand and limitation of M- sand is minimized.

ACKNOWLEDGEMENT

We are thankful to the staff and the student of the civil department. We are also thankful to Rameshwarsahu, SawpnilNavghare for their collaboration.

REFERENCE

[1] Report by Central pollution control board on plastic waste management, *Central Pollution Control Board, PariveshBhawan, East Arjun Nagar, Delhi-110032*
[2] Experimental Investigation on the Properties of Concrete With Plastic PET (Bottle) Fibers as Fine Aggregates Ms. K.Ramadevi1, Ms. R. Manju2 *1 Associate Professor, 2 Assistant Professor, Department of Civil Engineering, Kumaraguru College of Technology Coimbatore, Tamilnadu, India*
[3] I.S. 3495 1992 "compression strength of brick".
[4] I.S. 383 2016."Specification for coarse aggregate and fine aggregate"
[5] I.S. 2386 -1 1963 "Methods for test for concrete"