IOSR Journal of Engineering (IOSRJEN) **www.iosrjen.org**
ISSN (e): 2250-3021, ISSN (p): 2278-8719
Vol. 08, Issue 8 (August. 2018), ||V (VI) || PP 49-53

Replacement Of Bricks By Eco-Bricks With M-Sand

Anjali Singh[1], Richa Gaikwad[2],Prakhyat Roy[3],Piyush Tidke[4],Tumesh Bopche[5],Tejas Dumne[6]

[1]*(Research Scholar, Department of civil Engineering, G.H. RAISONI ACADMEY ,NAGPUR)*
[2]*(Research Scholar, Department of civil Engineering , G.H. RAISONI ACADMEY,NAGPUR)*
[3]*(Research Scholar, Department of civil Engineering , G.H. RAISONI ACADEMY ,NAGPUR)*
[4]*(Research Scholar, Department of civil Engineering , G.H. RAISONI ACADEMY ,NAGPUR)*
[5]*(Research Scholar, Department of civil Engineering , G.H. RAISONI ACADEMY ,NAGPUR)*
[6]*(Research Scholar, Department of civil Engineering , G.H. RAISONI ACADEMY ,NAGPUR)*

Abstract: Disposal of non-bio-degradablematerialshas become a critical issuenow adays, mass of garbage has beencreated over the earth surface due to suchkind of non bio-degradablematerials. In order to overcomewiththis issue a new concept of Efficient bricks alsoknown as Eco-Bricks isnow been replacedwithbricks .Pet bottles are a new type of building materialwhichis made up of plastic bottles are filledwith plastic wastes, but we are fillingitwith M-sand (Manufactured Sand)forfurther use for construction purpose. [1] These are energy and resource efficient bricks and canbeused to makegardenspaces partition walls ,temporarygodowns and lowcosthouses. Use of these bricksmakes the work moreeconomical as well as reducesthe land pollution. This paper shows the study and ivestigation on a plastic bottles as well as constructionmaterial to use it as a future aspects. It also shows the manufacturing and otherproperties of ecobricks .At the end , multiple factorssuch as costefficiency ,reduction of pollution whichleds to promotevery clean executionand minimization of construction wastecanbeachivedby using PET bottles or Ecobricks.

Keywords: Polyethylene terephthalate, M sand (Manufactured Sand) , Efficient Bricks , Eco-Bricks

---

Date of Submission: 26-08-2018 Date of acceptance: 06-09-2018

I. INTRODUCTION

Bricks are the most commonly used building material.Thesearestructres built by using masonary units with mortar. The masonary units may be : Clay Bricks , Concrete Blocks , Structural Clay Tiles , Stone.
Bricks can be used in different colours , sizes and orientations to get different surface designs. As an aesthetic material bricks can be used : In Pavements , As Facing Brick , For Architectural purposes. As bricks has been used for construction purpose from past few decades by convational methodsonly . We are surrounded by structure made up of bricks also cause some serious issue which needs to be sorted out by searching other alternative materials which will give more productivity to the structure , minimization of construction waste and proper utilization of resource with less manpower which leads to economical construction work.

If we compareConventional clay Bricks withEcobricks, it charges more due to cost of indirect materials of wood materials, transportation cost and labor cost. The process of burning bricks emits (CO2) carbon dioxide to the environment so this causes environmental problems. Preparation of clay bricks consumes less time and energy but as the clay brick to burning in the kiln to time and energy consumed. Environmental effect transportation and other constraints make the use of clay bricks less attractive.

While an ecobricks can last as long as 300 years (undoubtedly longer than the cement used to bind the bottles together in the walls and columns). Clay bricks are set to be affected by vegetation, over burning, etc. But the pet bottle brick may not affected by vegetation, because it was covered by the M-sands inside of the pet bottles. So there is no vegetation growth in structures. When compared to pet bottles there are no such drawbacks. Especially the plastic wastes in environmental is to be reduced because it reduces the vegetation growth and it does not decompose soon.

II. Material And Methodology

Materials Used In Making Eco-Bricks

- Plastic Bottles
- M-sand
- Iron rod to compress the M-sand inside the bottle

PETbottle : PET a thermoplastic polymer resin of the polyester family and is used in synthetic

Fibres, Beverage , food and other liqior content.
Msand: Manufactured sand is a substitute of river for construction purposes sand produced from hard granite stone by crushing. The crushed sand is of cubical shape with grounded edges, washed and graded to as a construction material. The size of manufactured sand (M-Sand) is less than 4.75mm.

Necessity of Replacing River sand with M-sand
Environmental factors and shortage of good quality river sand has led to the invention of manufactured sand also known as M-sand or robo sand.

Parameters	M sand	River sand
Process	Manufactured in factory.	Naturally Available on river banks .
Shape	Angular and has rougher texture. Angular aggregates demands more water. Water demand can be compensated with cement content	Smoother texture with better shape . Demand less water.
Moisture Content	Moisture is available only in water washed M-sand.	Moisture is trapped in between the particles which is good for Concrete Purposes.
Concrete Strength	Higher concrete strength compared to river sand used for concreting.	Lesser concrete compared to M-sand.
Silt Content	Zero Silt	Minimum Permissible silt content is 3%. Anything more than 3% is harmful to the concrete durability. We can expect 5-20% silt content in medium quality river sand.
Over Sized Materials	0% Since it is artificially manufactured.	1-6% of minimum oversized materials can be expected. Like pebble stones.
Marine Products	0%	1-2% like sea shells , tree barks etc.

Process of making Eco-Bricks :
Step 1 : Collection of discarded plastic bottles .
Step 2 : Cleaning of discarded plastic bottles and check weather it have any hole or not , bottle with holes shall be kept aside and not been used.
Step 3 : Take the bottles, fill them with M-sand, sealed and then paste them with a mixture made of earth, clay, and a little cement to provide additional strength and durability.

Experimental Work On Pet Bottle Brick

A. Classification and characteristics of bricks as per is-1077 – 1973
B. Tests for the acceptance of bricks for building construction.
- **Dimension and tolerance test**
- **Compressive strength test**
- **Water absorption test**
- **Efflorescence test**

III. Specimens And Testing Details

Compressive load test: In the test, the compressive load for the pet bottle is found out by using compression testing machine or universal testing machine. Instead of: the Compressive strength of test because its contact area is difficult to find as single bottle area.
The following specimens are pet bottle of different sizes filled with the dry sand and m-sand.
1. 3 Different sizes of bottle(600ml , 1lit & 2 lit) are taken for testing filled with dry sand.
2. The sand is compacted with the help of iron rod for better compaction .
3. Then the given specimen is been tested on compressive testing machine respectively as shown in figure below.
4. The required outcome of testing from 3 different specimen are shown below tabular form.
5. Now we have taken 1 litre bottle for testing filled with m-sand and adopted the same procedure as above .

Figure 1 .Pet bottle filled with dry sand

Figure 2 . Compression Test
On 1litre (Specimen 2) with Result (Specimen 2)

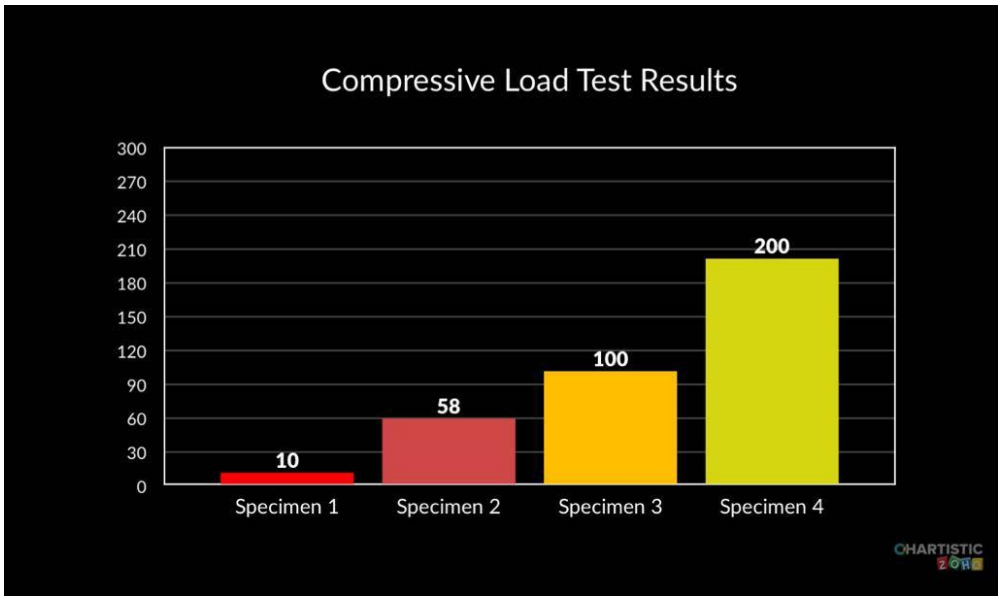
Figure 3 . Compression Test
On 2 litre Bottle (Specimen 3) with Result (Specimen 3)

Figure 4 . Compression Test
On 1 litre Bottle M-sand(Specimen 4) with Result (Specimen 4)

IV. RESULTS

Table 1: compressive load test results

SPECIMEN	LOAD (KN)
SPECIMEN 1	10KN
SPECIMEN 2	58KN
SPECIMEN 3	100KN
SPECIMEN 4	200KN



Maximum Load attain by specimens on x-axis in KN and Loads shown in KN on y-axis

FIGURE 5: COMPRESSIVE LOAD TEST

V. CONCLUSION

Eco bricks also known as bottle bricks are made with the help of plastic waste which is otherwise harmful for all living beings. Not only in India but globally the disposal of plastic has become an issue of major concern.

As a Concerned Civil engineer its our responsibility to utilize these plastic as a form of construction materials ,In order to deal with this problem new concept of eco bricks came into existence. Material which is considered as waste can be utilized in making material for construction. Every year thousands of animals die due to effect of plastic hence if this plastic will be used in making something useful it would be beneficial in preserving our wildlife as well as,marine life. These bricks are very cheaper in cost therefore the dream of shelter of the poor people can be fulfilled by using these bricks. These bricks provide good insulation as well as are bullet proof hence can be used in areas which are prone to attacks. Overall eco brick is a cost efficient and resource efficient building material which can be used in order to deal with the various environmental problems as well for the reduction in the cost of construction. It also do proper justice with factors like material and equipment costs causes lighter and higher volume , easy and cheap displacement which resulting reduction of overall cost of building or construction effectively.

Reference

[1]. https://en.wikipedia.org/wiki/Eco-brick
[2]. https://www.ijrter.com/papers/volume-2/issue-4/constructing-structures-using-eco-bricks.pdf
[3]. http://technicaljournalsonline.com/ijeat/VOL%20VII/IJAET%20VOL%20VII%20ISSUE%20IV%20%20OCTBER%20DECEMBER%202016/20167406.pdf
[4]. Pratima Patel &Akash Shah, "Sub stainable development using waste PET bottles as construction element"www.wastebottleconstruction.com.
[5]. http://medcraveonline.com/MOJCE/MOJCE-03-00082.pdf
[6]. http://theconstructor.org/construction/plastic-bottle-building-construction-benefits/16141/
[7]. http://www.instructables.com/id/New-innovation-in-Construction-using-Waste-Plastic/
[8]. http://www.materialtree.com/blog/m-sand-vs-river-sand/

Anjali Singh "Replacement Of Bricks By Eco-Bricks With M-Sand" IOSR Journal of Engineering (IOSRJEN), vol. 08, no. 8, 2018, pp. 49-53.