

## ECO-BRICK: A WASTE PLASTIC USED AS CONSTRUCTION MATERIAL

Shivam Santosh Pokale\*<sup>1</sup>, P.H. Gund\*<sup>2</sup>, Dattatree Rajabhau Gholve\*<sup>3</sup>,

Shubham Kakasaheb Lagad\*<sup>4</sup>, Sachidanad Ramsuresh Chauhan\*<sup>5</sup>

\*<sup>1,3,4,5</sup>Third Year Students, Civil, Bhivrabai Sawant Polytechnic, Wagholi, Pune-412 207  
Maharashtra, India.

\*<sup>2</sup>Lecturer Civil Engineering Department, Civil, Bhivrabai Sawant Polytechnic, Wagholi,  
Pune-412 207, Maharashtra, India.

### ABSTRACT

In this project we try to overcome the problem associated with plastic waste. In India huge amount of plastics are used for various purposes such as for making of water bottle, soda bottles & bag etc. which are not disposable. Because of these various problems occurs so we use waste plastic bottles for making of bricks by the various ways which are discussed below. After studying the problem we developed the effective way to overcome this problem. Bottle brick are light in weight and withstand high amount of load or pressure.

Eco-bricks, polyethylene terephthalate (PET) bottles filled with mixed inorganic waste, have become a low cost construction material and a valid recycling method to reduce waste disposal in regions where industrial recycling is not yet available. Because Eco-bricks are filled with mixed recovered materials, potential recycling of its constituents is difficult at the end of its life.

**Keywords:** Plastic Waste, Eco-Bricks, PET Bottles, Construction Material, Recycling Method, Light Weight, Reduce Waste, Better Recycling Option.

### I. INTRODUCTION

To minimize the cost of construction as well as to use eco-friendly material Eco-Brick and it is light weight so it is good choice. An Eco-Brick is a plastic bottle packed with plastic waste. Eco-bricks are part of a solution that enables people to not only clean up environment. Plastic is a very common material that is now widely used by everybody in this world. Plastic has many advantages as it is compact and light in weight. Common plastic items that are used are bags, bottles, containers and food packages. This means that plastic will not decompose. Though plastic is a very useful material that is flexible, robust and rigid they become waste after their use and they pollute the atmosphere. So the plastic very good for making Eco-brick. It reduce the construction cost and it is also reduce the plastic. It is very good replacement of brick because it is save the environment

### II. METHODOLOGY

1. Collect: Choose used plastic. Collect, Clean and dry waste plastic
2. Compress: Compress waste into the plastic bottle with a stick
3. Packaging: Pack the plastic in to the bottle
4. Seal: Seal tightly with the bottle top and now eco-brick is read to use.

#### Construction process:

- Collecting the plastic: While collecting the plastic bottles. They may be of different capacities and different thickness. We need to collect same size and shape bottles.
- Filling of bottles: An eco-brick is a building block made entirely from unrecyclable plastic. It's created by filling a plastic bottle with clean, dry plastic until it's packed tightly and can be used as a building block
- Construct the wall: Construct the wall using eco-bricks. Construction process as similar as normal bricks. In constructing wall cement, fine aggregate, water, eco-brick, etc normally used.
- Plastering of wall: Plastering of walls is done by cement paste. Sometimes sand and mud slurry is also preferred.

### III. MODELING AND ANALYSIS

By using eco-brick we saves 50 to 60% cost to built house. Today one brick price is 15rs. The eco-brick price is very less, it is made from plastic waste it is easily available. Generally eco-brick price is 5-6rs because it is only need is man power to make eco-brick. So it is very low cost.

**Case Study:**

New Mexico, USA, Jo Stodgel has run a community eco-brick project since 2014 through his organization Upcycle Santa Fe. The organization conducts regular eco-brick river clean up, has built a number of structures at local schools, and also completed an important research project with Los Alamos National Laboratory regarding the off gassing of eco-bricks. His organization also encourages the usage of milk cartons as well as bottles to make eco-bricks.



Figure 1: View of eco-brick wall.

### IV. RESULTS AND DISCUSSION

**Eco-bricks :**

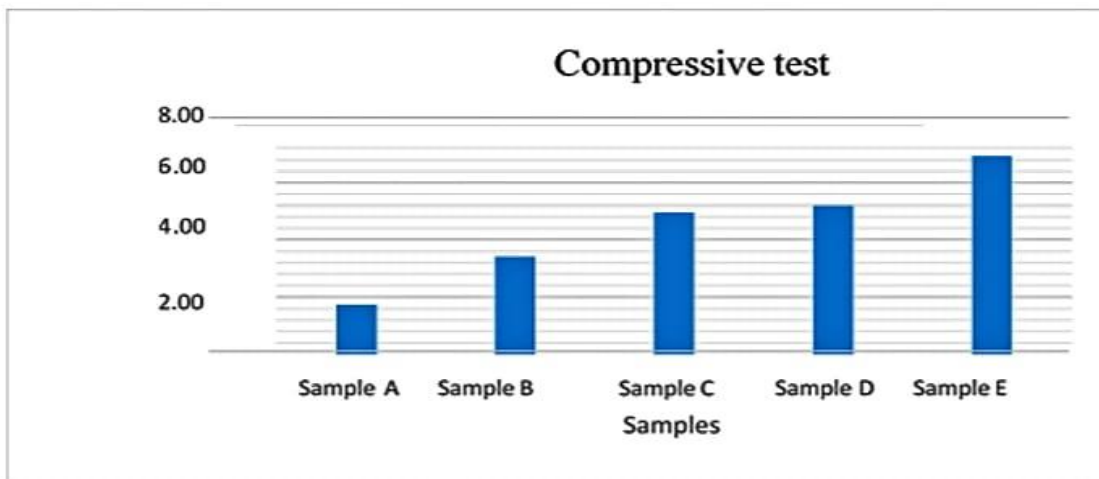


Figure 2: Compressive strength versus different density ratio of plastic bottles

No	Sample	Density	Load at failure (N/m <sup>2</sup> )	Compressive strength (N/mm <sup>2</sup> )
1	A	0.15	134.851	1.72
2	B	0.35	268.365	3.42
3	C	0.55	388.006	4.94
4	D	0.75	407.453	5.19
5	E	0.95	543.270	6.92

Figure 3: Result of compressive strength

## V. CONCLUSION

Eco-brick is the recyclable material of plastic. It is low cost material. This Eco-brick used as construction materials. It is stronger, cheaper and easy to build. ECO-BRICK is good for environment Usually, when thrown away, plastic breaks down into tiny pieces and polluted the area . Eco-Bricks seal the plastic in the bottle preventing the build-up of toxic gases emitted during the degradation of the plastic, such as methane. And pollution will be decreased automatically. Eco-brick is the earthquake resistant material.

## ACKNOWLEDGEMENTS

Thanking to Mr. Pruthvi Gund for giving us proper guidance.

## VI. REFERENCES

- [1] Stodgel, Jo (2014-09-09). "Ecobrick.it". www.ecobrick.it. Upcycle Santa Fe. Retrieved 4 February 2015.
- [2] Hayden K. Webb, Jaimys Arnott, Russell J. Crawford and Elena P. Ivanova, 'Plastic Degradation and Its Environmental Implications with Special Reference to Poly(ethylene terephthalate)', (Faculty of Life and Social Sciences, Swinburne University of Technology, 28 December 2012)
- [3] The Global Ecobrick Alliance: <https://www.ecobricks.org/about/>
- [4] Aditya Singh Rawat, R. Kansal, "Pet Bottles As Sustainable Building Material: A Step Towards Green Building Construction", Journal of Civil Engineering and Environmental Technology, August, 2014, Goa, India.