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REPLACEMENT OF BRICKS WITH PLASTIC BOTTLES IN CONSTRUCTION

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Abstract: One of the biggest disadvantages of building a world house is the high price of the building. The high cost of building houses below the poverty line is one of the most important human problems. On the other hand, increasing urbanization increases waste, especially non-renewable ones. An appropriate approach to such a situation is to use part of the household waste as necessary materials for the construction of the house, and also to ensure a comfortable space and adequate heat for the inhabitants of the house. A plastic bottle is considered a household waste that has durability properties and can be used as a material in house construction instead of a conventional material such as brick. [1,2] The purpose of this paper is to investigate the use of plastic bottles as municipal waste in one building and how this can lead to sustainability. It also mentions some ways to set up and insulate them in terms of heat and sound, and some positive points that this material has over others. Finally, it was concluded that plastic bottles can be more efficient compared to some conventional building materials such as brick, concrete and ceramic block in terms of various factors such as lead time, cost, carrying capacity, flexibility, waste and energy efficiency. A small village in Nigeria has implemented a solution that not only provides shelter in a poor country, but also finds a use for waste. Packing sand in plastic bottles is a technique that started nine years ago in India, South and Central America and now we used this type of construction in Chhattisgarh India. The compacted sand inside the bottles, called bottle brick technology, is almost 20 times stronger than bricks. The best part is that in an area that doesn't have a lot of money [5] for building materials, houses cost about 1/3 of a concrete and brick house.

Index Terms **– Plastic Bottle, waste material, bricks, binding material.**

I. INTRODUCTION

Today, a large number of plastic bottles are wasted and disposed of every day. People throw them away without considering that plastic bottles can affect people and/or the environment. Andreas Faroese, the founder of Eco-Tec Environmental Solution, created an innovation to build plastic bottle houses looking for an inventive solution to waste. The first bottle house was built by Wiliam F. peck in 1902 in Tonopah, Nevada, using 10,000 glass beer bottles. Since then, a more recent innovative concept has been the use of plastic bottles instead of glass bottles in building houses. Figure 1.1: Plastic waste bottle This innovative idea was considered for a number of reasons such as providing a cost-effective construction method to poor third world countries, recycling plastic bottles due to their non-degradable properties, etc. The first plastic bottle house in Africa was built in the village. Andreas Forese from Yelwa, Nigeria. 'Andreas Forese' used plastic bottles instead of bricks, tied the bottles together with string and finally put plaster. Plastics are made from petroleum, which is considered a non-renewable natural resource. Since the insolubility of plastic in nature is about 300 years, it is considered a sustainable waste and an environmental pollutant, so its reuse or recycling can be effective in mitigating the environmental impacts associated with it. It has been proven that the use of plastic bottles as an innovative construction material can be the right solution to replace traditional materials. The use of this material was considered not only on the external walls but also on the roof of the building. [6,7] The purpose of this article is to investigate the use of plastic bottles as household waste in buildings, the key and positive features of the product and the benefits of its use in construction. It is also planned to compare the properties of some building materials such as brick, ceramic and concrete block with the bottle panel.

II. OBJECTIVES OF THE STUDY

OBJECTIVES OF THE PROJECT In collaboration with the vision and goals of Habitat for Humanity, this project aims to design a waste solution for people's worsening waste problems. As sustainability and equity are ever-growing topics in a globalizing world, a waste solution must be beneficial in every way to provide a safe and healthy place to live. Therefore, the project aims to provide Vietnamese people with a better way of life by improving waste management and reducing waste production in every possible way, in line with the vision and goals of Habitat for Humanity. Design considerations are key to ensure that the objectives below are fully covered and as a result the project is completed according to the design concept. [8,9]

The objectives were:

- Aligns with the goals and values of Habitat for Humanity by supporting their core activities of housing, construction and sanitation.
- Be innovative, low-cost, small-scale, low-cost and relevant.
- Consider cultural customs, local norms and religion.

- Be sustainable by considering how local materials, skills and local community knowledge are used.
- Be sustainable and consider the natural environment, including disasters and climate change and sustainable land use.

III. METHODOLOGY

COLLECTION OF PLASTIC BOTTLES- To start, collect all types of plastic bottles (all biodegradable) that can be plastic bottles. This includes all types of plastic bottle waste. You want to prevent organic matter and moisture from entering the bottle as much as possible, but a little residue or moisture is not a problem. If you have [10] food covered in plastic, you can wash it and hang it to dry before bottling. There are two main ways to make a bottle brick. One option is to collect all dry inorganic waste and fill the bottles later. Another option is to leave the bottle outside at the bus stop, train station, kitchen, car, and workplace.

1. Collected from Bus Stand
2. Collected from Railway Station
3. Collected By Restaurant
4. Collected By International Cricket Stadium

TYPE OF BOTTLE BRICK-

(a) BOTTLE BRICK FILL WITH ONLY SAND:- For making sand brick, sand is filled into the bottle to the top of the bottle level. Sand is fully compacted so that no void should be present in the bottle after well compacting the cap of the bottle is tightly fixed.

(b) BOTTLE BRICK FILL WITH SAND AND MORTAR:
This type of bottle brick 80% of the well compacted sand is filled into the bottle and 20% is filled with the mortar. ratio of mortar is 1:6 in which 1 part of cement and 6 part of sand is used. After filling the mortar to the top level of bottle the bottle is kept for drying and after drying the bottle is fully dipped into the water for water absorption the bottle is again dried and the cap of bottle is tightly fixed.

(c) BOTTLE BRICK FILL WITH PLASTIC WASTE MATERIALS:
In this the waste polythene, plastic material, junk material filled into the bottle. The waste is fully compacted and filled to the top level of the bottle and then the cap of the bottle is tightly fixed.

IV. DEVELOPMENT TECHNIQUE

The development of a plastic jug house is generally straightforward, with the utilization of basic instruments and surely knew strategies. Materials can without much of a stretch be gotten, as they are promptly accessible from neighborhood markets. The fundamental materials expected for the development are plastic jugs, sand and concrete.
After broad examination and a few computations, our assessment shows that there will be an adequate number of plastic containers tossed out by the nearby individuals with the end goal that the acquisition of plastic jugs ought not be an issue. Sand, which is expected in the filling of plastic containers and in the creation of concrete and mortar, is accessible locally. [11]
The gear expected to develop/complete a form utilizing sand filled plastic jugs will be like that expected to construct an ordinary house produced using blocks. The gear required is: a work cart, thick wood/scoop, wooden sheets, scoop, container, troly slender wood and facemask.
For an overall thought on the most proficient method to develop a plastic jug house, the fundamental basic advances are displayed underneath. [12]

1. Prepare all the gear for use and acquire al the materials required for example plastic containers, sand and concrete.
2. Fill the gathered jugs with sand and set up the ground in which the development will happen.
3. Follow the manual gave to finish the development.

Stage 1 - Assemble
The social occasion stage is the least complex spread out the area, first and foremost, where the development is to be finished. Expecting them to work out the quantity of containers they will require and to then gather the jugs and fundamental gear.

Stage 2 - Get ready
The get ready stage then, at that point, expects them to fill the gathered containers with sand and set up the ground whereupon the development will happen. With the assistance of correspondence we orchestrate the dry sand, concrete and container block. After spread out the mortar proportion 1:6 is being made in which 1 section is concrete and 6 section is sand. [13]

Stage 3 - Development
The development stage is the most troublesome and requires the mortgage holder to intently follow the manual gave to them.in this stage the container is binded with assistance of concrete mortar.

After the development is finished the upper layer and all sides of the built design ought to be put. The restoring is been finished after 24hr of development and subsequently the design being prepared to utilize.

V. ADVANTAGES AND DISADVANTAGES OF PLASTIC BRICKS

Advantages-

THIS IS A COMPELLING ANSWER FOR REUSING THE PLASTIC. BOTTLES ENJOY THE ACCOMPANYING UPPER HANDS OVER BLOCKS AND OTHER DEVELOPMENT MATERIALS:

1. Low expense - You know how much a jug costs!
2. Non-Weak - (In contrast to blocks)
3. Absorbs sudden shock loads - Since they are not fragile, there can take up weighty burdens without disappointment.
4. Bio climatic

5. Re-usable
6. Less development material
7. Easy to assemble
8. Green Development
9. Environmental effects of reusing the jug boards in building.

Disadvantages-

1. Plastic are having low holding successes with the goal that the strength of cement gets diminished, For example, compressive, pliable and flexural strength.
2. Its liquefying point is low so it can't be utilized in heaters since it gets dissolve as its interacted with the intensity at high temperature.
3. It is un-decomposable and in destructible.
4. Most plastic is produce from the oil and the world is running shy of oil.
5. The compromising hindrance is contamination.
6. When it is softened it delivers a compound gas which is extremely hurtful to wellbeing and Climate.
7. Fires including plastic consume quick shift rather heat, thick dark smoke, very poisonous.
8. Cold can make some plastic become weak and break under tension.
9. One burdens of plastic material is there inclination to relax at raised temperatures.

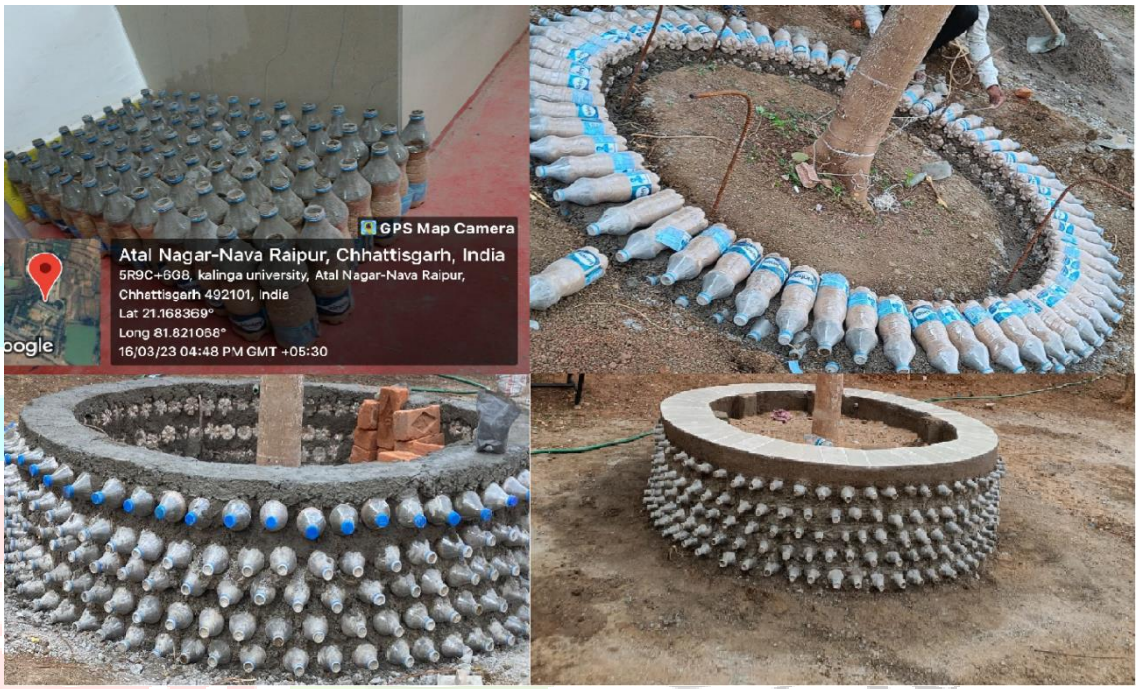

Figure No. 1: Bottle Brick Construction

VI. CONCLUSION

Plastic bottles are considered a non-degradable waste that can have significant hazardous effects on the environment.[14] On the other hand, the use of non-renewable natural resources cannot lead to sustainable development and leads to depletion of natural resources, which can be a devastating concern for the future generation. It was shown that plastic bottles can be used in some parts of the building such as walls, roof, etc. Recycling plastic bottles as a building material can significantly affect the energy savings of a building by using them instead of bricks. Walls and reducing CO2 emissions in cement production by reducing the percentage of cement used. It was considered one of the green projects of the foundation and attracted the attention of the architecture and construction industry. In general, the bottle rooms are bioclimatic, [15,16]which means that when it is cold outside, it is warm inside and vice versa. The use of sustainable innovative materials such as plastic bottles can have significant advantages, such as finding the best optimization of energy consumption in the area, reducing environmental pollution, creating the correct structural behavior of the building, such as creating lightness. Applied in the construction project of buildings considered temporary.

REFERENCES

[1] Narayan, P. Analyzing Plastic Waste Management in India: Case study of Polybags and PET bottles‖ published by IIIEE, Lund University, Sweden, pp 24-25.

[2] P K Jain, Shanta Kumar & J B Sengupta, "Mitigation of rutting in bituminous roads by use of waste polymeric packaging materials" Indian Journal of Engineering & Materials Sciences Vol. 18, June 2011,pp. 233-238

[3] V.Kasselouri-Rigopoulou, S. Gavela, S. Kolias "Use Of Polymeric Wastes in The Concrete Production" Polymers in concrete: a vision for the 21st century, Cement & Concrete Composites 21: (1999)449-452.

[4] L.R Schroeder, "The Use of Recycled Materials in Highway construction", Public Roads, Vol 58, Issue 2, 1994.

[5] Pandey, P., Lamba, A., & Agrawal, S. (2021). A Review on Study of Multilevel Car Parking. *International Research Journal of Modernization in Engineering Technology and Science. https://www. irjmets. com/uploadedfiles/paper/volume_3/issue_12_december_2021/17422/final/fin_irjmets1638433809. pdf.*

[6] Lamba, M. A., Agrawal, M. S., & Dubey, M. A. (2021). ANALYSIS OF USE OF SUGARCANE BAGASSE ASH FOR THE PRODUCTION OF GEO POLYMER CONCRETE. *International Research Journal of Modernization in Engineering Technology and Science*, *3*.

[7] Agrawal, M. S. (2022). IMPACT OF HEAVY METAL ACCUMULATION IN GROUND WATER DUE TO LEACHATE & ASSESSMENT OF RHEOLOGICAL PROPERTIES. *Journal of East China University of Science and Technology*, *65*(2), 318-326.

[8] Sarangi, M. S., Agrawal, M. S., & Vanarotti, M. B. (2022). Design and development of a suspension system to generate automatic electric power. *Telematique*, 2244-2253.

[9] Shori, A., & Lamba, A. (2019). Performance of Concrete using Red Mud as Replacement Material with Basalt Fiber.

[10] Pandey, P., Lamba, A., & Agrawal, S. (2021). A Review on Study of Multilevel Car Parking. *International Research Journal of Modernization in Engineering Technology and Science. https://www. irjmets. com/uploadedfiles/paper/volume_3/issue_12_december_2021/17422/final/fin_irjmets1638433809. pdf*.

[11] Chakrabortty, N., & Lamba, A. (2020). Analysis and Design of G+ 3 Building in Different Seismic Zones using E-tabs. *International Research Journal of Engineering and Technology (IRJET) www. irjet. net*.

[12] Lamba, M. A. (2022). In-Structure Response Spectra Considering Nonlinearity Of RCC Structures: Experiments And Analysis. *Yantu Gongcheng Xuebao/Chinese Journal of Geotechnical Engineering*, *44*(5), 97-103.

[13] Lamba, M. A., Tamrakar, M. G., & Gaur, M. H. (2022). Design and compare CNN deep learning model to classify lung cancer using CT images. *Telematique*, 2277-2290.

[14] Sahu, M. K., Padhy, M. A. P., & Lamba, M. A. (2022). BOIS Locker room chat Decoding Process: An analytical view over Juvenile High-Tech Misconduct. *Telematique*, 2879-2890.

[15] Lamba, M. A., Gaur, M. H., & Dewangan, M. K. P. (2022). Analysis of Innovative Design and Effective Control of AVR Microcontroller Based Electronic Syringe Pump. *Telematique*, 1635-1643.

[16] Chakrabortty, N., & Lamba, A. (2020). Analysis and Design of G+ 3 Building in Different Seismic Zones using E-tabs. *International Research Journal of Engineering and Technology (IRJET) www. irjet. net*.