

AN EXPERIMENTAL INVESTIGATION ON MASONRY WALL CONSTRUCTION USING PET BOTTLES

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Abstract- Plastic bottles are used to store different substances for consumption and for other uses. Bottle used to package water takes over 1,000 years to bio-degrade and incinerated, they produce toxic fumes. Recycling is only feasible in limited circumstances because only PET bottles can be recycled all other bottles are discarded and only 1 out of 5 are sent to the recycle bin. So there is a need for environment friendly constructive use of waste plastic bottles. This report consist of use of plastic waste bottle in construction as a brick which is filled with compacted sand or mud and other material, method and technique of use, its relative advantages over traditional bricks in this way plastic waste of bottle can be removed and reused safely for construction

Key Words: Waste plastic bottles, bottle bricks, methods and techniques, Aesthetic advantages.

1. INTRODUCTION

Plastics are produced from the oil that is considered as non-renewable resource. Because plastic has the insolubility. About 300 years in the nature, it is considered as a sustainable waste and environment pollutant so reusing or recycling of it can be effectual in mitigation of environment impacts relating to it. It has been proven that the use of plastic bottles as innovative material for building can be a proper solution for replacement of conventional materials. The use of this material has been considered not only for exterior walls but also for the ceiling of the building. The objective of this paper is to investigate the using of plastic bottles as municipal waste in the buildings, the key and positive characteristics of this product and the benefit obtained by using it in building. it also intends to compare the characteristics of some construction materials such as brick, ceramic and concrete block with bottle panel.

PET BOTTLE

Since plastic bottles are used as a fundamental element, we have gone through every property of the PET bottles so as to ensure a stable structure.



OBJECTIVE

We are the part the environment & we has responsibility towards society and environment. We want to do such types of project which help to make our environment more sustainable.

OUR AIMS

- We want to minimize plastic bottles waste from environment and society.
- This plastic bottles house and toilets economical for poor people.
- Plastic in non-degradable waste in environment therefore only reuse of plastic is the best way to dispose effectively.
- To make green structure to conserve natural resources for future need.

LITERATURE REVIEW

The first bottles house was build using 10000 glass beer bottles by William peck in 1902 in tonopha, Nevada after that the never innovative concept has been using plastic bottles instead of glass bottles in constructing the houses. This innovative idea took to account for some reasons such as providing a cost- efficient construction method for pauperized third-world countries, reusing the plastic bottles due to their not in composable characteristic, and etc. the first plastic bottles house in Africa was constructed in the village of yelwa in Nigeria by andreas foresee. Foresee used

the plastic bottles instead of bricks, bound the bottles together with string and at the end applied the plaster.

NECESSITY'S OF REUSE OF PLASTIC WASTE BOTTLES

Now a day plastic bottles waste increase rapidly and in our society no any efficient techniques available to dispose it

So if we make use of plastic bottles as construction material then we have solution to dispose plastic bottles and we can conserve natural resources.

CEMENT :

Cement is a material that has cohesive and adhesive properties in the presence of water. Such cement are called hydraulic cement. Cement is a binding material in concrete, which binds the other material to form a compact mass. Generally OPC is used for all Engineering Construction works. OPC is available in three grades of 33, 43, and 53. In this project, 53 grade cement is used for the experimental study

SOIL :

Soil is the basic element in any construction project, thus a study of the basic properties of the soil is required and different tests are conducted to check whether the soil sample selected is suitable. The various test conducted according to the relevant IS code:

- Standard proctor test
- Moisture content
- Direct shear test
- Specific gravity test
- Sieve analysis

D. WATER

Water like other material is an active component in mortar. No hydration can take place in the cement mortar in the absence of water .water accounts for the workability of a fresh mortar. Certain percentage from the overall weight of the cement and soil was used to prepare the Mortar. Consistency of fresh mortar was evaluated by conducting slump test and flow test.



TEST FOR PET BOTTLE:

Sl.NO	PROPERTIES	PET BOTTLE
1	compressive strength	45N/mm ²

WEIGHT MEASURING TEST:

Weight of bottle when filled with M sand is equal to 846grams

VOLUME OF BOTTLE:

Volume of bottle is equal to ½ litre.

ESTIMATION AND DELEGATION OF WORK

PET BOTTLE ROOM 10'X10'

MATERIALS	QUANTITY	COST
NO. of BRICKS	572	4,576
PET BOTTLES	2,850	1,425
CEMENT	16BAG	7,200
M SAND	1 UNIT	3,500
FILLED SOIL (M SAND)	2,368Kg	3,552
STEEL BARS		
10mm	9	3,600

8mm	7	2,744
MASON	6DAYS	4,500
LABOUR	6DAYS	3,600
AGGREGATE	1 UNIT	2,500
	TOTAL	Rs.37,197



NORMAL BRICK 10’X10’ROOM

OVERVIEW AFTER COMPLETION OF EXECUTION WORK OF PROJECT

MATERIALS	QUANTITY	COST
BRICK	2,811	22,488
M SAND	1 UNIT	3,500
CEMENT	16 BAGS	7,200
STEEL BARS		
10mm	9	3,600
8mm	7	2,244
AGGREGATE	1 UNIT	2,500
MASON	6DAYS	4,500
LABOUR	6DAYS	3,600
	TOTAL	Rs.49,632

Time required for whole work is 20 days with total ten workers. Cost of whole construction is

We face following problems during execution work

1. When we going to prepared mortar that time mud becomes early dried so water requirement is increases.
2. While collecting PET bottles, transportation from hotels to college is too difficulties for us.



EXECUTION OF WORK:

ADVANTAGES ECONOMICAL:

1.LAYOUT

As per design we mark a square on ground

Empty plastic bottles has low purchasing value as compared to brick to therefore it can be reduces about 80% cost of construction.

2. BOTTLE FILLING WITH SOIL

All bottles fill with M sand properly and to fill bottle steel rod use , it help to avoid voids will chances of creation in bottles.

SIMPLE AND EASY CONSTRUCTION:

With the help of plastic bottles construction could be becomes easy there are no requirement of skilled labour and mason.

3. MASONRY WORK

All plastic bottles are arranged as a English bond with minimum mortar.

MINIMIZED WASTE FROM ENVIRONMENT:

If we make an reuse of waste plastic bottles in automatically decrease.

4. FINISHING WORK

Door, window, roofing work are done in this work.

HIGH DURABILITY:

When plastic filled with M sand then it gives 45N/mm² compressive strength which 900% greater than standard brick. Plastic is non-degradable material remains as it is in the environment.

CURING DOES NOT REQUIRED :

Plastic bottles have 0% water absorption capacity and plastic is does not required is does not required water curing or any other method to increase strength.

GREEN CONSTRUCTION:

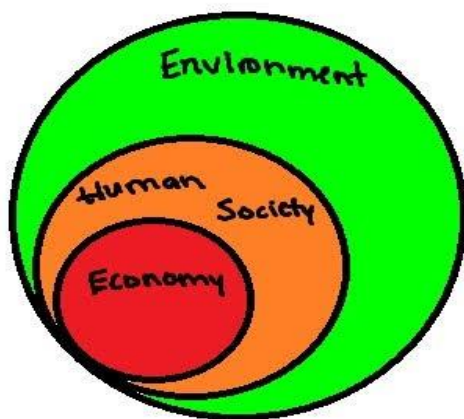
Plastic bottles is considered as a sustainable material which can help in achieving the SD. Using the plastic bottle can follow the objectives of sd. It can abstain from the resources depletion, assist in protecting; prevent or reduce the environmental degradation process such as land filing through reusing process and it can assist to obtain a social equity by avoiding the gap between the rich and the poor people in the society.

NON-BRITTLE CHARACTERISTIC:

Using the non brittle materials can reduce construction waste. Unlike brick, plastic bottle is non-brittle. So due to the frangibility property, the percentage of producing construction waste in brick is more than plastic bottles.

ABSORPS ABRUPT SHOCK LOADS:

Flexibility is a characteristic which makes the building performance higher against the unexpected load. Since the plastic bottle are not fragile, they can be flexible and tolerates sudden loads without failure. This characteristic can also increase the building bearing capacity against the earthquake.



DISADVANTAGES

MATERIAL AVAILABILITY:

In hilly or remote area which not well developed there are very less chances of a getting material for construction such as plastic bottles, soil etc.

APPLICABLE ONLY FOR LOAD BEARING STRUCTURE

For multi-storeyed building it is not fully applicable but we can be use it in a partician wall for construction.

PROPERTIES OF PLASTIC BOTTLES

- Plastic bottles are remains as it is in environment for 300 years.
- Plastic bottles are bullet proof
- Plastic bottles are light in weight
- Non absorptive material Chemical & insects proof

OUR EXPERIENCE

It was very nice experience of project work. We feel like a civil engineer while working project work. We listened that how need to us work actually on site in future.

We knowing that team work, communication between peoples, how to give presentation, how to take decision team.

Main thing is that we learn if we going to execute any project so that time which things we need to plan , which things need to do etc. when we execute any concept then this concept how to present in front of other.

This experience definitely helpful to us in future for execution of any work, project etc.



CONCLUSIONS

Plastic bottles are considered as a kind of indecomposable junk which can have substantial dangerous impact on environment. On the other hand using non-renewable resources cannot lead to sustainable development and causes to the resource depletion which can bring a destructive concern for the future generation. It has been demonstrated that the plastic bottles can be used in some parts of building construction such as walls, roof etc. reusing the plastic bottles as the building materials can have substantial effect on saving the building embodied energy by using them instead of bricks in walls and reducing the co2

emission in manufacturing the cement by reducing the percentages of cement used. It is counted as one of the foundation green project and has caught the attention of the architecture and construction industry .generally the bottle house are bioclimatic in design, which means that when it is cold outside is warm inside and vice versa. use of innovative materials with sustainable application such as plastic bottles can have considerable benefits including finding the best optimistic in energy consumption of the region, reducing environmental degradation, establishment of the appropriate structural behaviour in building such as causing to the light weight structure and can also be applied in a project to construct buildings considered temporary.



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