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USE OF PLASTIC BOTTLES AS A BRICK TO SAVE OUR ENVIRONMENT

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ABSTRACT

In India, we can see in urban areas the use of non-renewable products like plastic bottles, have beenincreased, the main concern is how to recycle ordestroy. Disposable of such plastic bottles and othersubstances have become a major issue nowadays. Onlyone in a few plastic bottles are properly recycled. If wetalk about construction of houses then the cost ofconstruction materials are very expensive ifconstruction const are very high then definetly pricesof houses are also very high and for common peopleafford such house are not possible. So, solution of allthese problems are that how to use plastic bottles in asmart way, we can use plastic bottles instead of brick,cement in construction. Plastic bottles price compareto brick is very less. We can use it very easily withoutany other construction materials like brick, cement. Ithas very good compression strength. If we talk about people who are fulfill their dreams by giving themhome.

1.INTRODUCTION:-

In recent scenario where the world is developing alongwith that pollution is also rapidly growing. So, we haveto work on infrastructure that how we can grow itnicely.Environmental engineering develops many ways. Usingwastes and plastic that can be used for construction byfilling sand, gravels and wood particles into bottles. Wecan use sand of our own land for construction of ourown house.We know that plastic is non- decomposable but it isflexible, light in weight, cheap, can take shock loads.Plastic is 20 times more load resistant than bricks.

2.LITERATURE REVIEW :-

The first plastic bottles house was built using 10000 glass bottles. By William F Peck in 1902 in Tonopah,Nevada then after new and innovative concept has been using plastic bottle instead of glass bottles in constructing houses.First plastic bottles house in Africa was constructed inthe village of Yelwa in Nigeria by Andreas foresee.Foresee used the plastic bottles instead of bricks,bounded the bottles together with string and at the end applied the plaster. And after that otherinstitutions taken examples from it and applied this concept of reusing the plastic bottles for building construction. This concept has spread to countries all over the world. Various kinds of homes have been built from plastic bottles such as;ecological house constructed using 8000 bottles in honduras; an eco-tec home in Bolivia constructed using the PET and wine bottles; The purpose of this paper is to investigate and analyse use of plastic bottles as a municipal waste inthe buildings, the key and positive characteristics of this product ans the benefits obtained by using in building.

3.PLASTIC BOTTLES :

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

1. Light in weight

2. Flexible over a wide temperature.

3.Heat resistance.

4. Chemically stable.

5.Do not absorb moisture.

6. Transparent.

4.WATER :

Water is in a similar way like cement, an active component in mortar. Without water no hydration can be attained no strength can be achieved. Water is responsible for the work ability of a fresh mortar. 20% of the overall weight of the cement and soil was to determine the quantity of water to be used in mix.

5.SOIL :

Soil is the basic element in any construction project so before using it in our project we have to study the basic properties of the soil and go modifies the effect of texture in regard to moisture and air relationships, availability of nutrients, action of microorganisms and root growth.

6.METHODOLOGY

1)COLLECTION OF PLASTIC MATERIALS :-

The plastic material should be collected from the out the shop where plastic bottles are thrown and lake side plastic, in park etc.

2) Batching of plastic :-

Measurement of materials for making plastic as a brick.

3) FILLING:-

Filling plastic bottles with sand only and on the bottle neck we use small amount ofcement then put the cap so it cannot open.

4)materials

-Plastic bottles

-cement

-sand

-water

-fly ash

7.PROCEDURE OF PREPARING PLASTIC BOTTLE BRICKS

1. Collection of PET bottles of different sizes from different sources such as hotels, canteens, waste management plant etc. and to decide uniform size for us for the construction of the plastic bottles.

2. Bottle sized with 25 cm is preferable because normally wall thickness in construction is assumed 23cm commonly. So we are using 25 cm heightedbottle in our construction with 7 cm diameter.

3. Than collect filler materials to fill the bottlese.g. sand, soil and fly-ash and tamping rod to makematerial fill properly without living air voids filling ofmaterials in bottle.

4. First of all we had filled bottle with saturated sand and soil in each bottles separately. After filling a thick paste of mortar was placed on the cap of the bottle so that filler material should not come out due to excessive compressive load on each bottle.

5. Measured the bottles with filler material sothat it will be easy to take proportion of other bottles

6. Bottle filled with sand was of 130 gm weight and the bottle filled with soil was having 800 gm weight.

7. Then after that taking these weights we got an idea how to proportionate the remaining filler materials.

8. After taking filling all four bottles we took compressive test on each bottle to knowwhich bottle resist more compressive forces.

9. Noted down all thee reading and preparedresultsand conclusion for the project

8.PROCEDURE OF CONSTRUCTION WALL

1. Lay, 2cm (3/4 inch) of cement onto the foundations of which the wall is being built on the ground .

2. Place plastic bottles on top of this cement with a 1cm (1/3 inch) space between bottles.

3. Pour cement on top of those bottles being careful to fill altogether gaps, ensuring that the cement is 2cm (3/4 inch) above the highest of the bottle

4. Place subsequent layer of plastic bottles in between the bottles below. (Fig.5.6 Construct wall sample)

5. Pour cement on top of those bottles being careful to fillaltogether gaps, ensuring that the cement is2cm (3/4 inch) above the highest of the bottles.

6. Repeat steps 1-5 until the wall is at the specified height.

9. RESULT AND APPLICATION

EXPERIMENTALLY WORK: CHECK DENSITY OF MATERIAL:

Density calculation for sand

a. Determination of mass of sand in the cone

1. mass of sand + cylinder before pouring (M1) =7900gm

2. mean mass of sand in cone (M2) =405 gm

b. Determination of bulk density of sand

3. Volume of calibrating container (v) =1178.10cm3

4. mean mass of sand+ cylinder after pouring=5650gm

5. mass of sand filling calibrating containerM'=m1-m3-m2=1845gm

6. Bulk density of sand(M'/V) =1.56 gm/cm3Density calculation for soil

a. Determination of mass of soil in the cone

1. mass of soil + cylinder before pouring (M1) =5880gm

2. mean mass of soil in cone (M2) =274 gm

b. .Determination of bulk density of soil

3. Volume of calibrating container (v) = 1178.10cm3

4. mean mass of soil+ cylinder after pouring =4356gm

5. mass of sand filling calibrating container M'=m1-m3-m=1250gm

6. Bulk density of soil(M'/V) =1.06 gm/cm3 Density calculation for flyash

a. Determination of mass of flyash in the cone

1. mass of flyash + cylinder before pouring(M1) =6800gm

2. mean mass of flyash in cone (M2) =315gm

b. Determination of bulk density of flyash

3. Volume of calibrating container (v) =1178.10cm3

4. mean mass of flyash + cylinder after pouring =4507gm

5. mass of flyash filling calibrating containerM'=m1-m3-m2=1978gm

6. Bulk density of flyash (M'/V) =1.67 gm/cm3 M'=m1-m3-m

Table1 : DENSITY OF MATERIALS

Sr.no	Material Block	Weight	Volume	Density (Kg/M3)
1.	Sand	59	0.027	2185.18
2.	Soil	52	0.027	1925.92
3.	Fly ash	64	0.027	2370.37

COST COMPARISON

TABLE 2: COST ANALYSIS OF 1M3 CLAY BRICK

Sr.no.	Material	Quality	Rate	Per	Amount(rs)
1	Brick	500 no.	6	No.	3000
2	Cement	1.4 bag	275	Bag	385
3	Sand	0.284cum	2115	Cum	600.7
4	Labour work	3nos	100	Day	300
				Total	4285.7

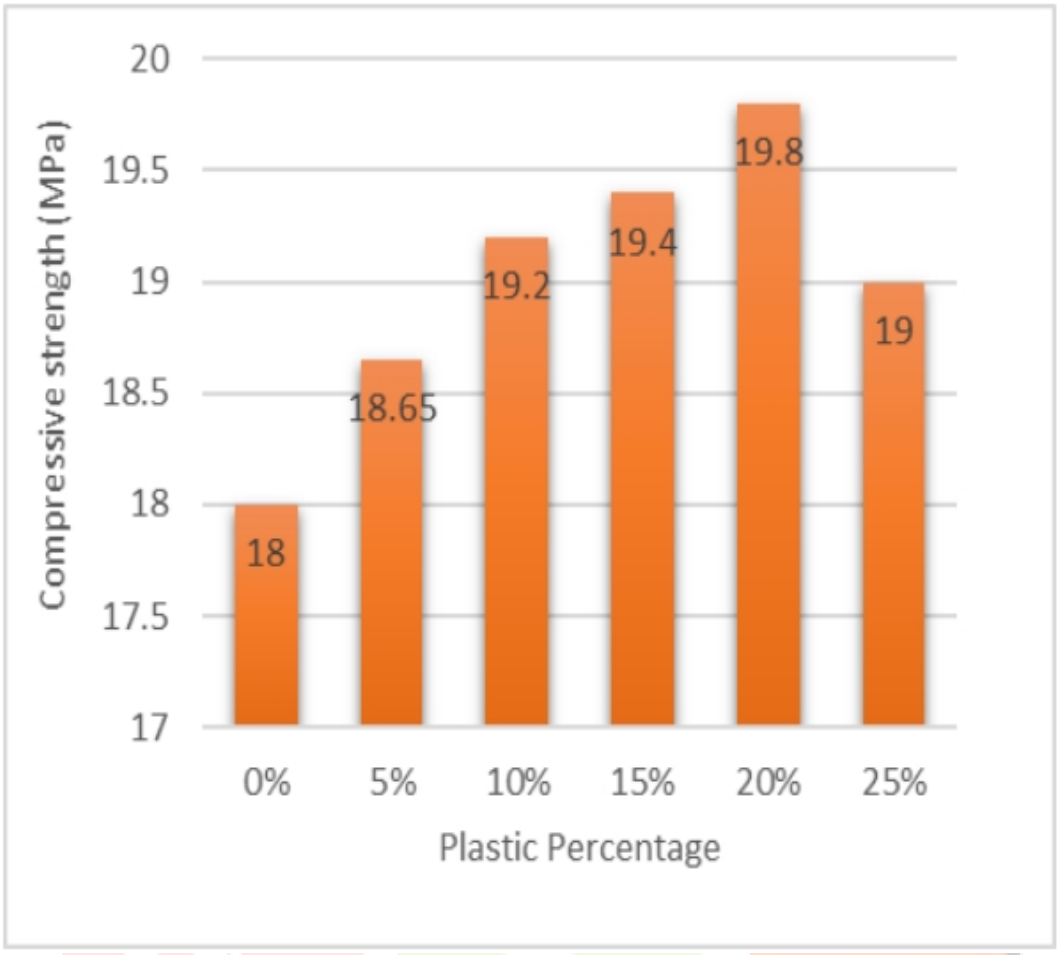
TABLE 2 COST ANALYSIS OF 1m3 PLASTIC BOTTLE BRICK WALL

Sr.no.	Material	Quantity	Rate	Per	Amount(rs)
1	Plastic brick	27.8	15	No.	417
2	cement	2.665bgs	275	bag	732.8
3	sand	0.555cumec	2115	cum	1173.8
4	soil	0.1557m3	100	M3	45
5	Labour work	4no.	100	day	400
				total	2768.6

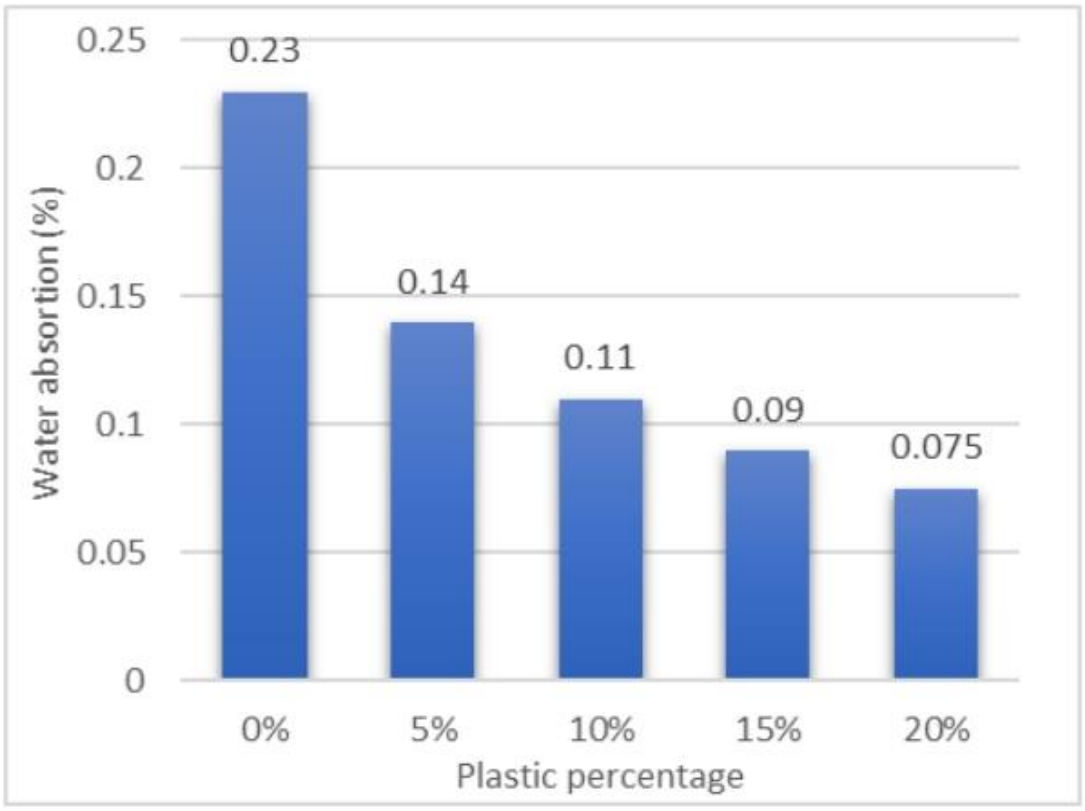
COMPARISON BETWEEN THE WALLS BY PLASTIC BOTTLE AND BRICK

Sr.no.	Factors	Consideration	Plastic bottle Wall	Brick wall
1.	Time and speed of execution	6 persons team one working day	20% faster	120m2
2.	Materials and equipment cost	implementation	Saving cement grinder	More weight more materials
3.	Transportation cost	Displacement in the building	Lighter and higher volume easy and cheap displacement	Greater weight and less volume and costly displacement
4.	Execution cost	Using calculations of panel	Less manpower and indigenous	More human resources the higher cost
5.	Strength and losd capacity		20 times more than brick	Greater wall thickness, lower strength high weight and less of materials
6.	Resistance to earthquake	Earthquake has a direct relationship with the weight of each structure	Low and integrated weight at falling debris	
7.	Cleanness and beauty of work		Very clean execution, no construction waste	High volume of construction waste
8.	flexibility		Very flexible	Easily damaged

COMPRESSIVE STRENGTH TEST RESULTS



WATER ABSORPTION TEST RESULTS



10.FUTURE WORK

Plastic sand bricks give us hope and a way to work on innovative things related to the plastic and to try to invent some new civil engineering materials which shows some remarkable response in future industry and changes the thoughts of the researchers, users and industries. Such as, in going for Plastic sand wall in framed structures as a partition Wall Plastic sand benches in the parks Plastic sand tracks for running and jogging in place of concrete or stone tracks.Research on Composition of plastic with fly ash, Quarry dust etc.

11.CONCLUSIONS

Waste plastic, which is available everywhere, may be put to an effective use in brick. Plastic bricks can help reduce the environmental pollution, thereby making the environment clean and healthy.Plastic sand bricks reduce the usage of clay in making of bricks. Plastic sand bricks give an alternative option of bricks to the customers on affordable rates. Water absorption of plastic sand brick is zero Percent Compressive strength of plastic sand brick is 5.6 N/mm2 at the compressive load of 96KN. We conclude that the plastic sand bricks are useful for the construction industry when we compare with Fly Ash bricks and 3rd class clay bricks.

12.REFERENCE

1.Atul chaurasia, Simmit Gangwar. Reuse of plastic bottles as a construction material. International Journal Of Engineering And Techical Research(IJETR). 2019;9(9):1–6.

2.Binafeigha TR, Enwin A. The state of solid waste management in Port Harcourt City, Nigeria. American Journal of Civil Engineering and Architecture. 2017;5(4):160–166.

3.Ikebude CF. Feasibility study on solid waste management in port Harcourt metropolis: causes, effect and possible solutions: Nigerian Journal Of Technology (NIJOTECH). 2017;36(1):276–281.

4.Twumasi Ampofo K, Oppong R. Alternative wall material (AWM): comparing pet bottle bricks with cement blocks and compressed earth blocks for housing in Ghana. Journal of Emerging Trends in Engineering and Applied Sciences (JETEAS). 2017;8(3):123–130.

5.Simanshu P Pandey, Sakshi Gotmare, SA Wankhade. Waste plastic bottle as construction material. International Advanced Research Journal in Science, Engineering and Technology. 2017;4(3):1–6.

6.Bezeau, R. 2016. The Founder of Plastic Bottle Village. Renaissance Forum. [online]. Available at: https://www.plasticbottlevillage.com.

7.Shubina, Abhishek Tiwari* and R.K. Sharma international journal of current engineering and technology “investigating the compressive strength of Pet Bottles as masonry” volume 8, no. 4, July-Aug 2018.

8. Pranav Sonone, Rajanikant Devalkar international journal od innovative research in science, engineering and technology. “Green sustainable bricks made of fly ash and diacarded polyethylene waste” vol.6, issue 4, April 2017.

9. Prof.A. S. Manjarekar, Ravi D. Gulpatil, Vivek P. Patil, Ranjit S. Nikam, Chetali M.Jeur. International journal for research in applied science and engineering technology" utilization of plastic waste in foundry sand bricks" volume 5 issue |||, March 2017.