International Journal of Engineering Technology Science and Research
IJETSR
www.ijetsr.com
ISSN 2394 – 3386
Volume 4, Issue 4
April 2017

CONSTRUCTION OF HOUSES USING PLASTIC BOTTLES

A.S.Sajane, Prof. Dr. J.J.Magdum College of Engineering,Jaysinpur.
Sachin E.Agam, Dr.J.J.Magdum College of Engineering, Jaysingpur.
Rakshita R. Patil, Dr.J.J.Magdum College of Engineering, Jaysingpur.
Aakanksha A. Shirgave, Dr.J.J.Magdum College of Engineering, Jaysingpur.
Sagar Y. Pituk, Dr.J.J.Magdum College of Engineering, Jaysingpur.

ABSTRACT
Now adays, large amount of plastic bottles are wasted and disposed every day. People thrown away them without considering that what those plastic bottles can have impact on the humans and environment. As plastics are non-biodegradable its disposal has always been a problem. Waste plastic bottles are major cause of solid waste disposal. One of the main disadvantages in constructing houses is high cost of the building. High cost is primary requirement for constructing the house in places where people are below poverty line, is becoming one of the most significant problem of people. On the other hand, urbanization growth will increase rubbish especially non-renewable ones. This paper intends to investigate the application of plastic bottles as one of the urban wastage in buildings construction and that how it can lead to sustainable development. It also intends to compare the characteristics of some construction materials such as brick and concrete block with bottle wall. It also intends to compare the strength of the cubes of casted by using plastic bottles.

INTRODUCTION: Everyday millions of people drinks water from packed plastic bottles and though it is expected that after consumption of water, bottle should be crushed and dropped in dustbin. But it is not in practice effectively. So instead of telling everyone to do so, a new method to use plastic bottles effectively is innovated. One of the main disadvantages in constructing houses is high cost of the building. High cost is primary requirement for constructing the house in places where people are below poverty line, is becoming one of the most significant problem of peoples. On the other hand, urbanization growth will increase rubbish especially non-renewable ones. Eco friendly architectural principles are being incorporated into more buildings every day in the world but they are still out of reach of many people due to lack of knowledge and awareness. In this paper we implemented strategies and systems based on Eco-friendly environment that could still be built at very low costs, with waste materials that is plastic bottle, providing adequate thermal comfort while being sustainable. At the end, it concluded that in different factors such as time of execution, load capacity, flexibility, reducing waste, cost and energy efficiency, plastic bottles can be more effective compared to some conventional building materials such as brick, concrete and ceramic blocks. Plastic bottles can be used to construct a wall. If plastic bottles are fill with mud then it can replace a brick as a bottle mud brick. It has 50% more strength than a regular class 1 brick. It reduces construction cost near about 40% as per survey. This construction method also helps to reduce pollution caused during formation of regular bricks. It also comes under low cost house project. Plastic pet bottle used for drinking should not use again for same drinking purpose. So using it for construction reduces plastic waste occurring due to it.

1. OBJECTIVES

1. To study proposed method of construction.
2. To test the bottle mud brick for compression strength.
3. Study about cost comparison between conventional material and bottle mud brick.

2. LITERATURE REVIEW

1. Author Name- MojtabaValinejadShoubi
   Title- *Investigating the Application of Plastic Bottle as a Sustainable Material in the Building Construction"*
   Published- January 2013

Plastic bottle is considered as an urban junk with sustainability characteristic which can be used as a material instead of some conventional material such as brick in building construction. This paper intends to investigate the application of plastic bottles as one of the urban wastage in
buildings construction and that how it can lead to sustainable development. It also mentions some ways for self-standing and insulating them in thermal and sound points of views and some
positive points which this material have versus others. At the end, it concluded that in different factors such as time of execution, cost, load capacity, flexibility, reducing waste and
energy efficiency, plastic bottles can be more effective compared to some conventional building materials such as brick, concrete and ceramic block.

2. Author Name-Aditya Singh Rawat and R. Kansal
   Title- *PET Bottles as Sustainable Building Material: A Step Towards Green Building Construction*"
   Published- August, 2014

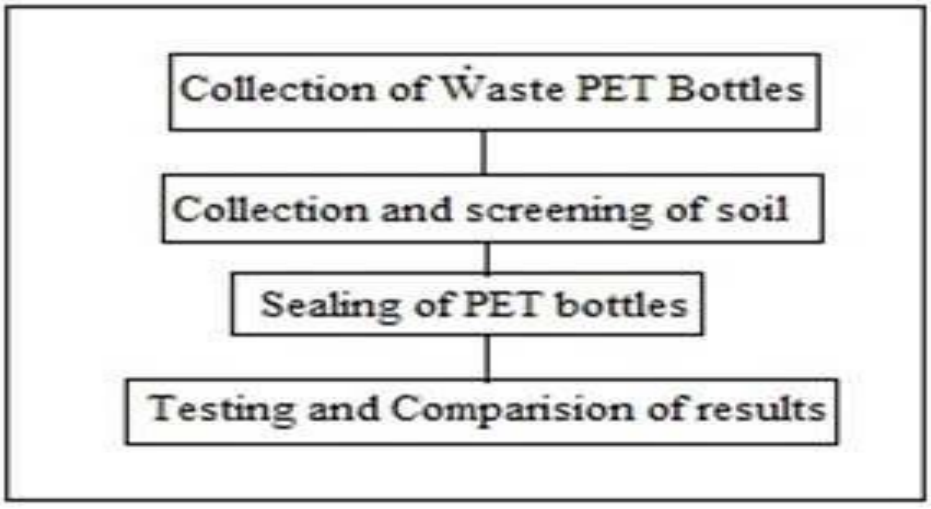
This project deals with the possibility of using waste PET bottles as a partial replacement. It can be concluded that benefit of the use of PET bottles include both improved ductility in comparison with raw blocks and inhibition of crack propagation after its initial formation. The solution offered in the paper is one of the answers to long standing menace of waste disposal.

3. Author Name- Dr. Pratima A. Patel
   Title- *Waste plastic bottles offering innovative building materials with sustainable application*
   Published-2016

This paper intends to investigate the application of plastic bottles as one of the urban wastage in buildings construction and that how it can lead to sustainable development. This paper also includes different factors such as time of execution, cost, load capacity, flexibility, reducing waste and energy efficiency; plastic bottles may be more effective compared to some conventional building materials such as brick and concrete block. Authors made effort towards waste plastic bottle used as construction material. Considering some limitation in properties of plastic bottles, authors tested bottle required properties, filler material as sand or clay and made cost analysis between bottles used wall & conventional masonry wall.

4. ***METHODOLOGY***

In this study, the first step taken was collection of waste PET bottles from stores, waste collectors and other possible resources. Once the bottles are collected they have to be filled with locally available materials like soil, sand, fly ash etc. so as to provide them the structural strength. The locally available material is first screened by a sieve shaker properly so as to remove any unwanted foreign large size particles. All the collected bottles are filled with this prepared soil and tamping it in installment they are tightly capped and sealed. Now to check the structural strength various tests are performed and comparison is made against those for a brick. A comparative economic analysis is also done.



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5. ***RESULT***

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 container
M'=m1-m3-m2 =1845gm
6. Bulk density of sand(M'/V) =1.56 gm/cm3

Density 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 sa filling calibrating container
M'=m1-m3-m2 =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 container
M'=m1-m3-m2 =1978gm
6. Bulk density of flyash (M'/V) =1.67 gm/cm3

Table:-Density of Material

	Material block	Weight	Volume(m3)	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

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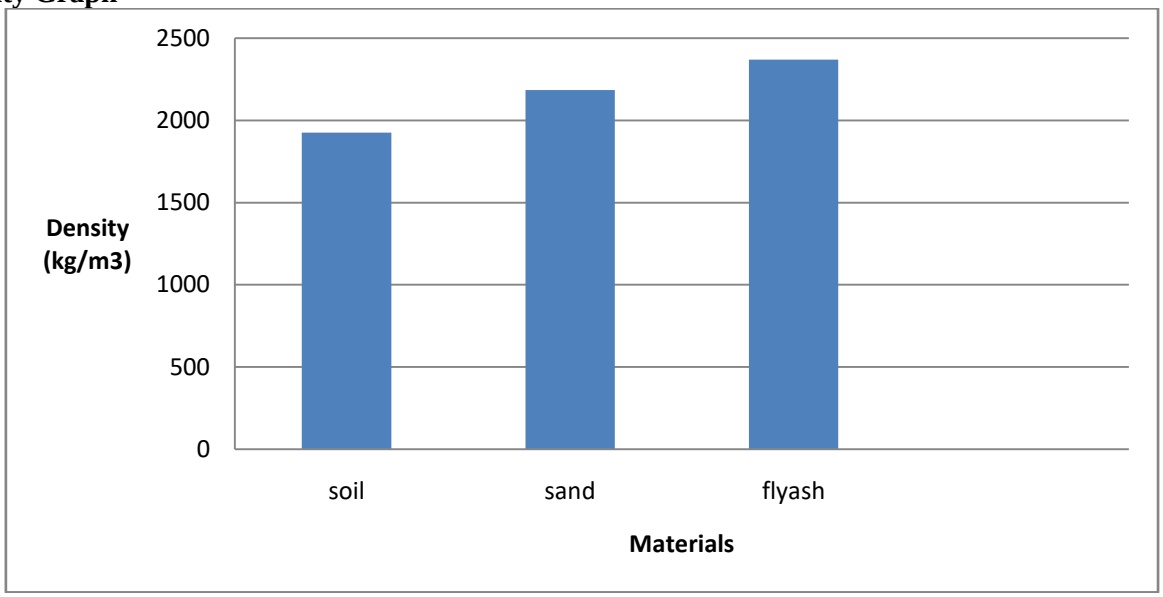
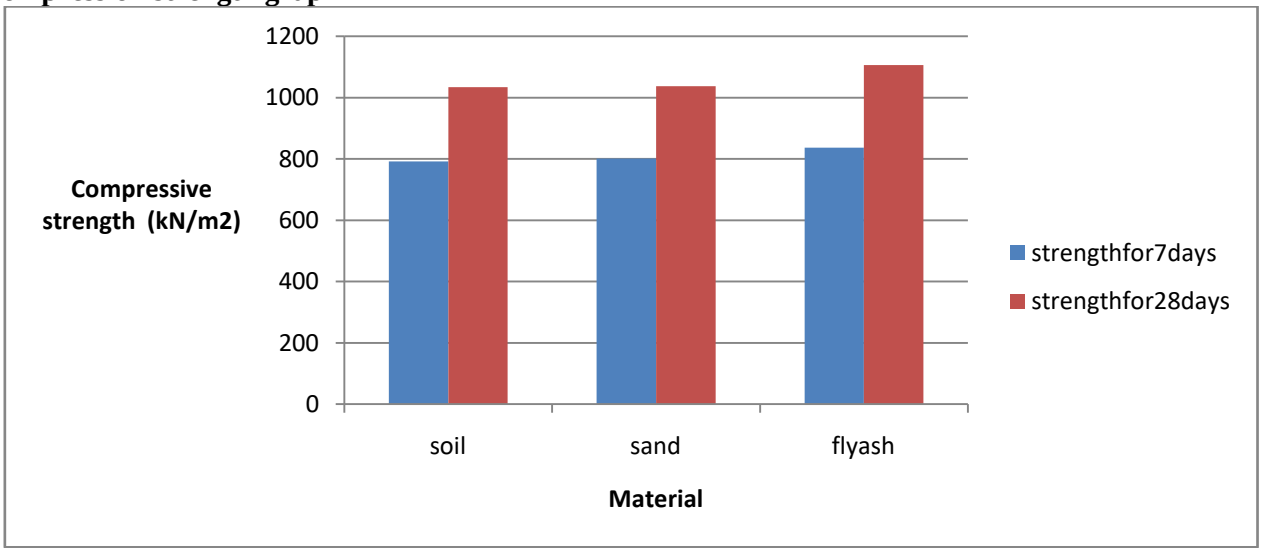
Density Graph



Compression strength Table

Materials	7days strength(KN/m2)	Average(KN/m2)	28days strength(KN/m2)	Average(KN/m2)
Soil	788	791.33	1023	1034.33
	794		1042	
	792		1038	
Sand	796	800.66	1030	1037
	800		1039	
	806		1042	
Flyash	827	837	1090	1105.66
	838		1100	
	846		1127	

Compression strength graph



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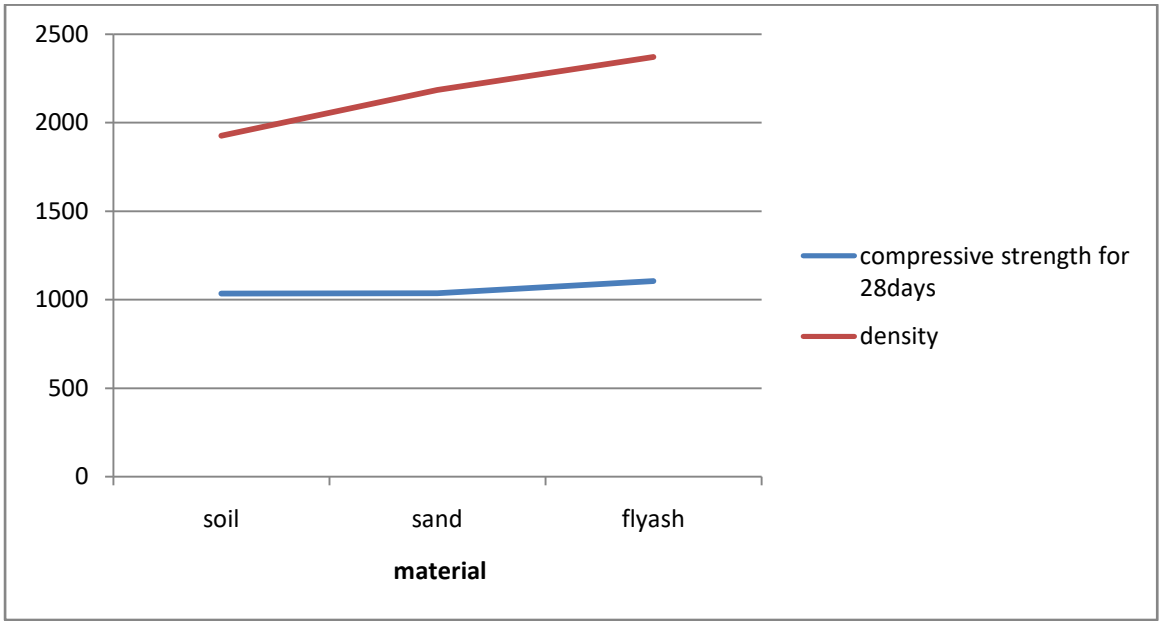

Cost analysis of 1 m3 Brick masonry wall

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

Cost analysis of Block of size 30cmx20xcmx20cm

	Material	Quantity	Rate	Per	Amount(Rs.)
1	Plastic Bottle	4	0.25	No.	1
2	Cement	0.0017 bags	275	Bag	0.46
3	Sand	0.0034cumec	2115	Cum	7.19
				Total	8.65

Cost analysis of 1 m3 Bottle Brick masonry wall

	Material	Quantity	Rate	Per	Amount(Rs.)
1	Bottle mud brick	27.8	15	No.	417
2	Cement	2.665 bags	275	Bag	732.8
3	Sand	0.555cumec	2115	Cum	1173.8
4	Soil	0.1557m3	100	M3	45
5	Labour Work	4 no.	100	day	400
				Total	2768.6

6. *CONCLUSION-*

From the density test of materials soil, sand and fly-ash it is observed that fly-ash has high density than soil and sand. Also compressive strength of fly-ash is more than soil and sand. From these results it is concluded that as the density of material is increases the compressive strength of the material is also increases.

From the cost analysis of 1m3 brick work , it is observed that the cost of bottle brick masonry is 35% less than conventional brick masonary.

Plastic bottles are considered as a kind of indecomposable junk which can have substantial dangerous impact on environment. On the other hand using the non-renewable resource 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 and etc. Reusing the plastic bottles as the building materials can have substantial effects 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 percentage of cement used. It is counted as one of the foundation's green project and has caught the attention of the architecture and construction industry. Generally the bottle houses 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 optimization in energy consumption of the region, reducing environmental degradation, establishment of the appropriate structural behavior in building such as causing to the light weight structure and can also be applied in a project to construct buildings considered temporary

7. REFERANCES-

Journal Papers:

1. AdityaRaut-Application of Waste Plastic Bottle as a Construction Material(2015)
2. Aditya Singh Rawat, R. Kansal- PET Bottles as Sustainable Building Material: A Step Towards Green Building Construction(2014)
3. MojtabaValinejadShoubi-Use of plastic bottle in construction (2013)
4. Pratima A. Patel-Waste plastic bottles offering innovative building materials with sustainable application (2016)

Websites:

1. http://www.radeberger.de/de/radeberger-geschichte
2. http://www.jiaats.com/Journals-Pdf/March-2015/jcme/Jcme-
3. http://www.instructables.com/id/New-Innovation-in-Construction-using-Waste-Plastic/
4. http://www.eco-tecnologia.com
5. en.wikipedia.org/wiki/Bottle_wall