Preparation of Bricks By Using Sand And Waste Plastic Bottles

Vedprakash[1], Veer Singh Chauhan[2], Pratush Sharma[3],Ritik Singh[4], Shafiqur Rahman Siddiqui[5]
[1, 2, 3, 4, 5] Dept of Civil Engineering
[1, 2, 3, 4, 5] Bansal Institute of Engineering & Technology Lucknow , India

Abstract- *This project paper manages utilization of waste plastic bottle containers as brick material. Plastic waste which is expanding step by step moves toward becoming high and also dirties the earth, particularly in high mountain towns and visitor trekking areas where no rubbish accumulation framework exists and furthermore which are disposed of or burned which prompts the pollution of land and air. The transfer of waste plastics is a greatest test, as continued reusing of PET bottles containers represent a potential risk of being changed to a cancer-causing material and just a little measure of PET bottles are being reused. Thus this Poly ethylene terephthalate (PET) bottles are cleaned and included with fine total (sand) at different ratios (1:2, 1:3, 1:4) to acquire high quality brick blocks that have warm and sound protection properties to control contamination and to decrease the general expense of development, this is a standout amongst the most ideal approaches to maintain a strategic distance from the amassing of plastic waste which is an on-degradable toxin. The sand that must be obtained from the valuable stream beds/mines. The plastic waste is normally accessible in surplus amount and thus the cost factor descends. Since this type of brick blocks have more compressive strength and less water absorption. Thus this sort of brick blocks are ideally utilized for underground septic tank construction, submerged constructions, and underground construction like passages and furthermore utilized for the sub structure of the buildings so as to oppose the leakage of the water on account of less water absorption limit and furthermore have high compressive quality which oppose the substantial basic burdens. The main drawback of this work is the cost because the sand rate is high due to the demand and also the cost of collection of plastic waste in large amount. But is preferable for government to dispose this waste plastic in the government buildings construction as a waste plastic brick.*

Keywords- Pet, River Sand, Plastic Sand Brick.

I. INTRODUCTION

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. The great problem with plastic is its disposal. Plastic is made of polymer chemicals and they are not bio degradable. This means that plastic will not decompose when it is buried. Though plastic is a very useful material that is flexible, robust and rigid they become waste after their use and they pollute the atmosphere. Recycling is processing used materials (waste) into new products to prevent waste of potentially useful materials. The increase in the popularity of using environmental friendly, low cost and lightweight construction materials in building industry has brought about the need to investigate how this can be achieved by benefiting to the environment as well as maintaining the material requirements affirmed in the standards. To protect the environment as well as to take advantage of plastic, recycling procedure is used. In the recent past research, the replacement and addition have be done with the direct inclusion of polyethylene or plastic fibre, polyethylene terephthalate (PET) bottles in shredded form, chemically treated polyethylene fibre, PET in aggregate form by replacing natural coarse aggregate. Most of replacements have been done by volume calculation, and showed the decreased in compressive strength as the plastic fibre increased. In this study, recycled plastic bottle have been introduced in crush form as the fibre . The replacement has been done by weight calculation instead of volume calculation.

II. MATERIALS USED

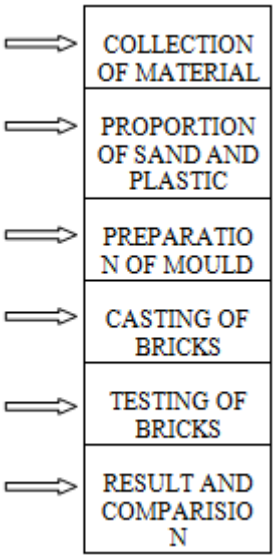
A. PET WASTE

Pet is polyethylene terephthalate is plastic which is used to form Bottles. The bottles are used as container for liquids like water, juices etc. While curbside collection schemes have been very successful at recovering plastic bottle packaging from homes, in terms of the overall consumption typically only 30–40% of post-consumer plastic bottles are recovered. Other 60% is waste.

B. RIVER SAND

Sand generally composed of rounded particles, and may or may not contain clay or other impurities. It is obtained from the banks and beds of rivers.

III. METHODOLOGY



IV. PREPARATION PROCESS

1. HEATING PROCESS:

Waste plastic bottles should be heated until the drop of water get evaporated. After the heating was done the collected and dried waste plastic bottles (PET) was put into the pan which get heated due to the heated pan and at certain temperature this placed plastic get melts and get boiled.

2. MELTING PROCESS:

During the melting process the continuous stirring was required. Because the continuous stirring helps to melt the non-melted plastics bottles. During to the melting there is no form of adding water or other cooled materials.

3. MIXING PROCESS:

The mixing process was carried out after the plastic bottles get melted properly and then in boiling condition. The while the boiling of the plastic molten immediately add the dried sand into the pan which was having molten plastic inside it.

4. PLACING PROCESS :

After the process of mixing the sand and liquid plastic molten in the pan the process of placing the prepared sand and plastic slag in the prepared brick mould was take place. But in this, the prepared slag was in hot condition so the process of self-compaction takes place upto 3/4th of the mould.

5. DEMOULDING PROCESS:

The demoulding of the casted plastic bricks was done one hour later after the process of placing the plastic sand slag into the brick mould.

V. TESTS OF BRICKS

- **WATER ABSORPTION TEST**
- **COMPRESSIVE STRENGTH TEST**
- **HARDNESS TEST**
- **EFFLORESCENCE TEST**
- **SOUNDNESS TEST**

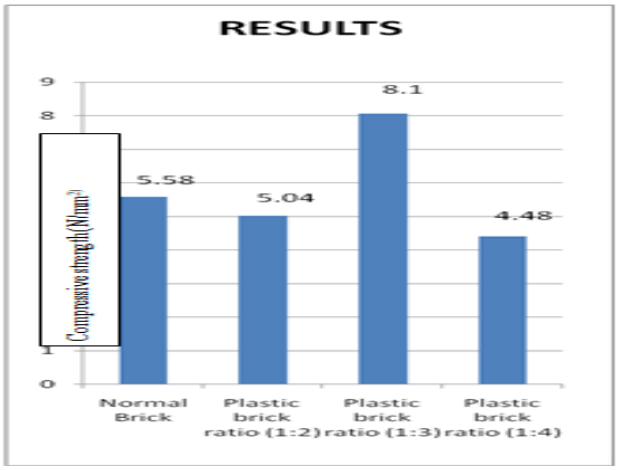
1. WATER ABSORPTION TEST:

In this test, bricks are weighed in dry condition and let them immersed in fresh water for 24 hours. After 24 hours of immersion, those are taken out from water and wipe out with cloth. Then, brick is weighed in wet condition. The difference between weights is the water absorbed by brick. The percentage of water absorption is then calculated. The less water absorbed by brick the greater its quality. Good quality brick doesn't absorb more than 20% water of its own weight.

BRICKS WERE IMMERSE IN TO WATER

2. COMPRESSIVE STRENGTH TEST:

This test is done to know the compressive strength of brick. It is also called crushing strength of brick. All 3 specimens of bricks are taken to laboratory for testing and tested one by one. In this test, a brick specimen is put on crushing machine and applied pressure till it breaks. The ultimate pressure at which brick is crushed is taken into account.



TYPES OF BRICKS

3. HARDNESS TEST :

In this test, a scratch was made on brick surfaces. When the scratch is made with the help of finger nail on the bricks, very light impression was left on the sand brick surface. So this test results that fibrous concrete bricks are sufficiently hard.

After stretching

4. EFFLORESCENCE TEST:

Efflorescence test also showed the excellence performance of the sand bricks. There is no absence of grey or a white deposit was shown on its sand bricks surfaces for all ratios. From this test, we can conclude that no alkalis was presence in this sand brick.

5. SOUNDNESS TEST:

In this test, the bricks were broken and the structures of that bricks were examined, whether they were free from any defects such as holes, lumps, etc. In this test, sand bricks can cut into equal parts. The sand brick piece structure was homogenous, compact, and free from defects and this brick pieces look like a cake piece.

COST ESTIMATION

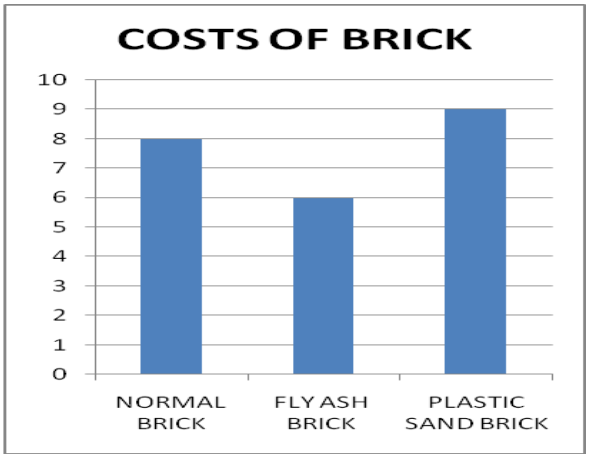
- COST OF SAND PER KG = 2 Rs.
- COST OF PLASTIC PER KG. = NIL
- COST OF SAND REQUIRED PER =6 Rs. (3kg) BRICKS WITH 10% WASTAGE
- COST OF PLASTIC REQUIRED PER = NIL BRICK

LABOUR COST

- LABOUR RATE PER DAY == 400 Rs
- ONE LABOUR CAN MANUFACTURE = 300
- SO, LABOUR COST PER BRICK = 400/300 = 1.33 Rs.
- COST OF BRICK = 6+1.33 =7.33 Rs.

PROFIT

- 10% OF 7.33 = .733
- TOTAL COST = 7.33 + .733 = 8.063
- TOTAL COST ALONG WITH LUMP SUM COST **= 9 Rs.**



TYPES OF BRICKS

VI. FUTURE SCOPE

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.

VII. CONCLUSION

On the basis of result obtained during the experimental investigation, following conclusion was drawn:

- Making bricks from sand and waste plastics can be an alternative to the available traditional clay bricks.
- Sand plastic bricks have lower water absorption, bulk density, and apparent porosity when compared with those of normal clay bricks.
- Sand plastic bricks have higher compressive strength than normal clay bricks.
- Waste plastics which is available everywhere may be put to an efficient use in brick making.
- Sand plastic bricks can help reduce the environmental pollution thereby making the environment clean and healthy.
- Plastic sand bricks/tiles give an alternative option of bricks/tiles to the customers on affordable rates
- We conclude that the plastic sand bricks are useful for the construction industry when we compare with Fly Ash bricks and third class Clay bricks.

VIII. ACKNOWLEDGEMENT

We are thankful to my guide and my group member who helped and supported me during this work . I also extend my heartfelt thanks to my family and well wishers.

REFERENCES

[1] Ronak Shah, Himanshu Garg, Parth Gandhi, Rashmi Patel, Anand Daftardar “Study of plastic dust brick made from waste plastic” - ISSN: 2320-2092, Volume- 5, Issue- 10, Oct-2017.

[2] Mr.N.Thirugnanasambantham, P.Tharun Kumar, R.Sujithra, R.Selvaraman, P.Bharathi “Manufacturing And Testing Of Plastic Sand Bricks”- (IJOSER) 3221 5687, (P) 3221568X, Volume-5, Issue-4, April -2017.

[3] Lairenlakpam Billygraham Singh NHPC Limited, Loktak, Manipur. Loukham Gerion Singh Pongsumbam Boss Singh Suresh Thokchom “Manufacturing Bricks from Sand and Waste Plastics” - ISSN 2349-4476, Issue 3, Volume 5, March 2017.

[4] Siti Aishah Wahid, Sullyfaizura Mohd Rawi, Norlia Md Desa “Utilization of Plastic Bottle Waste in Sand Bricks” - J. Basic Applied Science Research., 5(1)35-44, 2015, ISSN 2090-4304, January 2015.

[5] Utilization of Waste Plastic in Manufacturing of Plastic-Soil Bricks” - IJTEEE, ISSN 2347-4289, issue 4, volume 2, 2014.

[6] Dinesh.S, Kirubakaran.K Dinesh.A. “Utilization of waste plastic in manufacturing of bricks and paver blocks” -International Journal of Applied Engineering Research, ISSN 0973-4562 Vol. 11 No.3, January 2016.

[7] Dr. B.C Punmia, “Soil Mechanics and Foundations”, Lakshmi Publications, sixteenth edition, New Delhi,2010, pp37-66 & 87-107.