International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 06 Issue: 03 | Mar 2019 www.irjet.net p-ISSN: 2395-0072

REUSE OF PLASTIC BOTTLES IN CONSTRUCTION OF BUILDINGS

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Abstract - *Plastic bottles are used to store different substances for consumption and for other uses. Bottles used to package water takes over 1000 years to biodegrade and if incinerated, the produced toxic fumes. Recycling is only feasible in limit circumstances because only PET bottles can be recycled all other bottles are discarded and only 1 out of 5 bottles are sent to the recycle bin. So there is a need for environment friendly constructive use of plastic bottles .This report consists 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: Plastic bottles, Economical, Bio climatic, Earthquake resistance, Durable

1. INTRODUCTION:

Plastic is considered as a sustainable waste and environmental pollutant from the past 300 years so reusing or recycling of it can be effectual in mitigation of environmental impact relating to it. The use of this material has been considered not only for exterior but also for the ceiling of the building. It also intends to compare the characteristics of some constructional materials such as brick, ceramic and concrete block with bottle panel. Plastic bottle can assist to obtain a social equity by avoiding the gap between the rich and poor people in the society. With population growth in today's world, the need to the building has increased and to respond to this demand, the countries tend to use the industrial building materials and decline the use of indigenous and traditional materials. These factors in spite of increasing the energy consumption in the industry section

2. OBJECTIVES:

To minimize plastic bottles waste from environment and society

This plastic bottles house and toilets are economical for poor peoples.

Plastic is non-degradable waste in environment therefore only reuse of plastic is the best way to dispose effectively.

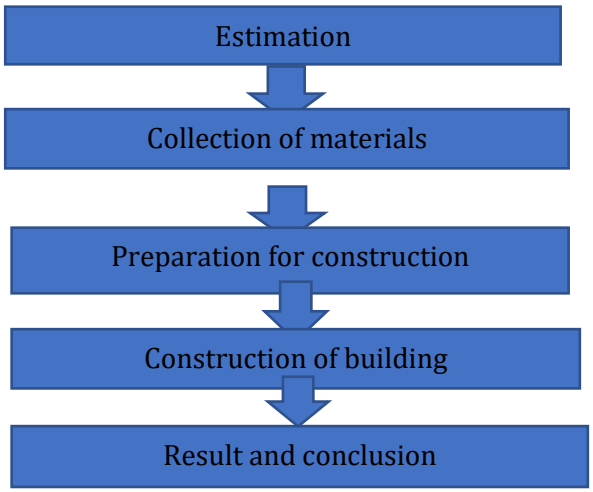
To make green structure to conserve natural resource for future need.

3. SCOPE:

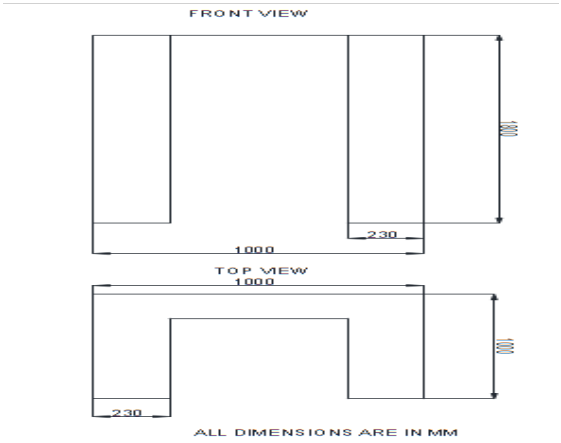
Resource conservation: To conserve the non-renewable resources such as fuel, mineral to ensure sufficient supply for present and future generation. Built development: To integrate environmental considerations into planning and development to respect the natural environment.

Environmental quality: To prevent or reduce processes such as landfilling which can lead to environmental degradation and develop the culture of reusing and recycling process.

4. METHODOLOGY:



5. PLAN



6. ESTIMATION

Length = 1m

Breadth = 1m

Height = 150 mm

Volume = 0.15 m^3

Grade of concrete = M_5

Ratio = 1:5:10

Mass = Volume× density

= 0.15×2400 = 360 Kg

Required amount of cement = (1/16)× 3

= 22Kg

Required amount of fine aggregate = (5/16)×360=112Kg

Required amount of Coarse aggregate = (10/16)×360=225Kg

CONSTRUCTION USING PLASTIC BOTTLES

Volume of the wall=3×1.8×0.230=1.40m^3

Volume of bottle with mortar= $(\pi/4)\times(0.08)^2\times0.28=1.4\times10^{-3}m^3$

Number of bottles=887 bottles

Volume of bottle without mortar=$(\pi/4)\times(0.07)^2\times0.27=1.03\times10^{-3}m^3$

Volume of 907 bottles=0.913m^3

Required amount of cement mortar=1.242-0.913=0.329m^3

Ratio of cement mortar =1:6

Required amount of cement =0.329×(1/7)×1440=67.68kg

Required amount of sand =0.329×(6/7)×1540=434.28kg

Total amount of cement required = 22+67.68= 89.68Kg

Total amount of sand required=434.28+112= 546 Kg

Cost of cement =Rs 717/-

Cost of sand = Rs 1605/-

Cost of coarse aggregate = Rs 562.5/-

Total rate of construction using plastic bottles =Rs 5030/-

CONSTRUCTION USING BRICKS

Volume of the wall=1.242 m^3

Volume of brick with mortar= 0.2×0.1×0.1=0.002m^3

Number of bricks=621 bricks

Volume of bricks without mortar =0.001539m^3

Volume of 621 bricks=0.956m^3

Required amount of cement mortar in wet condition=1.242-0.956=0.286 m^3

Ratio of cement mortar = 1:6

Required amount of cement = 0.286×(1/7)×1440=58.83 kg

Required amount of sand=0.286× (6/7) ×1540=377.52 kg

Total amount of sand required = 489 Kg

Total amount of cement required = 80.83 Kg

cost of cement = Rs 646.64 /-

cost of sand = Rs 1437/-

cost of brick = Rs 4968/-

Cost of coarse aggregate = Rs 562/-

Total rate for construction using bricks = Rs 7614/-

Net saving = Rs 2584 /-

EXPERIMENTAL TEST

Split Tensile Test for a bottle was determined on universal testing machine and the average value was considered for analysis. Weight of empty bottles and completed filled bottles were noted and amount of soil used was calculated for the same. Similarly split tensile test for brick was calculated by taking the average value and the result were compared and analysed.

The formula for split tensile test

= $2P/\pi DL$ =16 N/mm^2

CONCLUSION

From the above experimental observations we can infer that no curing time is required if waste plastic bottles are used as building material as compared to bricks which required 28 days of curing time also while making of brick of bricks there is a major issue of carbon emission which is negligible by using this plastic bottles. Generally it has durability of over 300 years which is more as compared to standard bricks. Cost of construction of plastic bottle is more economical than the standard brick. Split tensile strength is also nearly equal to the standard brick. Thus we can conclude that using the concept of plastic bottle construction is cost effective, energy efficient and commercially feasible.

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