

# Experimental Study on Core hole Clay Brick for Collecting Water Using Plastic, Glass Powder and Dry Leaves

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**ABSTRACT:** An ordinary clay brick contain clay,sand and water. As an innovation for the ordinary brick, we replace the fine aggregate ie,sand. The main raw materials that are used in the place of sand are clay, plastic, glass powder and dry leaves. The main aim of this project is for the effective utilization and management of water and plastics.and other applications are also included. The process behind the manufacturing of core hole brick is that the dry mixtures like clay, plastics and dry leaves mixed together and mixed with water.Core holes as three evenly spaced holes lined along the centre of the brick.The materials are taken in terms of volume. In brick, holes are provided on the top,these holes are provided in order to save or for the effective utilization of water because through the holes the water will penetrate through the bricks and it is collected on the underground. From there the water is diverted for various purposes like watering garden. The brick gain strength by filling mortar inside the holes for small construction work.Material including plastic and glass powder is used to reduce water absorption. The core hole brick is a sustainable environment friendly brick.

**KEYWORDS:** Brick, Water harvesting, Eco friendly,core hole,lightweight.

## I. INTRODUCTION

A brick is a block or a single unit of a kneaded clay-bearing soil, sand and lime or concrete material. In our project we replace the sand and lime by plastic bottles, glass, and dry leaves. Different types of waste generated, plastic waste is one of the most hazardous waste which needs to be treated in a proper systematic way. This project is one of the sustainable and effective ways of managing plastic waste in urban and rural parts of India in order to minimize their adverse environmental impacts.This type of brick are lightweight.

Plastic waste management is all the activities and actions required to manage plastic waste from its inception to its final disposal this includes amongst other things, collection, transport, treatment and disposal of plastic waste together with monitoring and regulation. It also encircles the legal and regulatory framework that relates to plastic waste management enclosing guidance on recycling etc.

Clay is a fine grained natural rock or soil material that combines one or more clay minerals with traces of metal oxides and organic matter clays are plastic due to their water content and become hard, brittle and non- plastic upon drying or firing. Formation of clay minerals typically forms over long periods of time from the gradual chemical weathering of rocks, usually silicate bearing by low concentration of carbonic acid, migrate through the weathering rock after leaching through upper weathered layers.

II. RELATED WORK

[1] Material collection [2] Mould preparation [3] Casting of clay brick [4] Test on clay brick.

In order to construct the brick clay, plastic, glass powder and dry leaves powder were used as rawmaterials. Clay was collected from kiln located at Kalady, Kerala. Plastic powder was collected fromSSK plastic Myloor. Glass powder was collected from glass wares, Kuthukuzhy. Dry leaves arecollected from the surroundings and powdered by grinding. Following materials are collected.

Wooden mould of rectangular shape (28.8cmx10.7cmx6.9cm) are made in the mechanical engineering work shop with the guidance of lab assistants. The three holes provided by placing 3cm diameter PVCpipes.

**Mix proportion for clay brick:** (Clay: plastic powder: glass powder: dry leaves:

water4:1:2.5:0.5:3.5,4:1:1.5:2:3.5,4:1.5:3:1:3.5,4:1:3.5:1.5:3.5.The selected size of mould is 288mmx107mmx69mm.

III. METHODOLOGY

The quality of the brick depends on the composition of raw materials, production method, firingmethod and firing temperature. Fired clay bricks are made from clay by burning it at hightemperature. With their attractive appearances and superior properties such as high compressivestrength and durability, excellent fire and weather resistance, good thermal and sound insulation. Thesize of brick we designed is 28.8cmx10.7cmx6.9cm. After making the brick should be exposed toundry for 7 days. After that provide 900-1100°C temperature for brick.

The main aim of our project is water collection..We were constructing the bricks on the ground surface, for that upto the ground level masonry is provided and just above the masonry PVC pipeare laid in order for the passage of water.Through these PVC pipe the water which is passing through the brick where falling.The PVC pipe are properly concreted to avoid any movement.Above the concreted surface the bricks are laid in the form of stack bond,the stack bond is provided for the vertical movement of water to the PVC pipe.

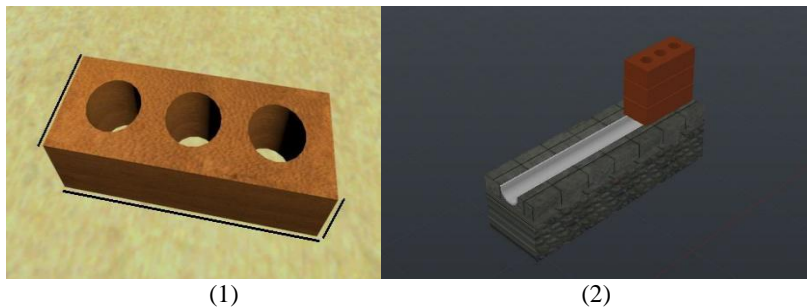


Figure (1) 3D image of brick, Figure (2) 3D image of water harvesting

IV. EXPERIMENTAL RESULTS

For conducting different experimental studies on clay brick, we have casted total of 28 blocks. In that, four bricks of each proportion are taken for compressive strength test, hardness test, waterabsorption test and efflorescence test.Following are the tests done on clay brick: -(a). Compressive strength test (b). Hardness test (c). Water absorption test (d). Efflorescence test.

SI No	Mix proportion	Tests			
		Compressive strength (N/mm <sup>2</sup> )	Hardness	Water absorption (%)	Efflorescence
1	4:1:2.5:0.5:3.5	10.69	No impression	0.51	No white precipitate
2	4:1:1.5:2:3.5	14.8	No impression	1.45	No white precipitate
3	4:1.5:3:1:3.5	15.25	No impression	1.03	No white precipitate
4	4:1:3.5:1.5:3.5	16.09	No impression	0.908	No white precipitate

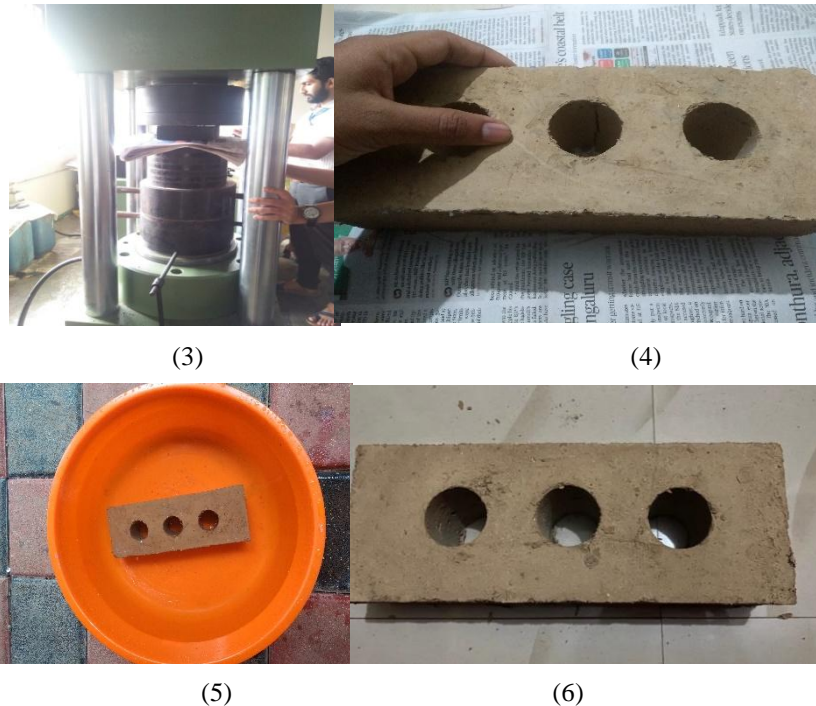


Figure (3) Compressive strength test, Figure (4) Hardness test, Figure (5) Water absorption test, Figure (6) Efflorescence test

## V. CONCLUSION

Core hole bricks have more advantage than burnt clay bricks and it is cost effective. Brick made with mix proportion 4:1:3.5:1.5:3.5 gives a compressive strength of  $16.09 \text{ N/mm}^2$ , which is greater than the requirement for a first class brick. From the result of hardness test no impression occur after scratching on each bricks. The water absorption for the brick is almost negligible. It is 98.2% less compared to burnt clay bricks. From the result of Efflorescence test, there is no white precipitate occur in the surfaces of core hole brick. The value of compressive strength of core hole brick is  $16.09 \text{ N/mm}^2$  this value obtained from the mix proportion 4:1:3.5:1.5:3.5 and value of compressive strength of normal brick is  $14 \text{ N/mm}^2$ . When we compare the results it can be concluded that core hole brick have greater strength than normal brick. Core hole brick is useful for garden walls, pavement material and it is cost effective due to the usage of waste materials.

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