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ANALYSIS OF LOAD BEARING WALL WITH OPENING USING WASTE PLASTIC BRICK

Pradeep. M[1], K. Veeraselvam, M.E.[2], K. Tamil Thendral M.E[3]

[1]Student, M.E. Structural Engineering, Oxford Engineering College, Trichirappalli, Tamilnadu. India-620009.
[2,3]Asst.Professor, Department of Civil Engineering, Oxford Engineering College, Trichirappalli, Tamilnadu. India-620009.

Abstract *To investigate the potential use of various solid wastes for producing construction materials. The business and urban organization systems are generating solid wastes, and most often dumping them in open fields. These activities cause serious effects on the environment. To safe guard the environment for the recycling of different types of solid wastes to utilizing them in the production of various construction materials. Here we discusses about the environmental advantages of recycling potentials and its possibility. The study of some of plastic waste materials which we can reuse by certain processing and use it in the production of bricks. The discussed materials have many advantages over conventional/ traditional materials of bricks. This paper discuss the ecological implication caused by the generation of various plastic wastes, and highlights their recycling potentials and possible use for producing construction materials like bricks. The conducted study on recycling of plastic waste and blending it with soil to make a brick and compare with the environmental and economic conditions. Some of these materials are relatively cheaper and provide more strength as compared to traditional brick materials. This project will come up with useful information and creating awareness among the learner in the industry regarding waste material, so that can have a step towards further detailed information about these materials and thus be able to implement on field which will definitely improve the level of construction. Percentage of replacing the materials by batching In terms of Plastic bricks by adding M.Sand with waste plastics.*

Key words: waste plastic, compressive strength test, water absorbtion test.

1. INDRODUCTION

Brick is one of the most common masonry units used as building material. Appropriate to the exact, different types of waste enclose be investigated to be incorporated into the bricks. Present have be a considerable imbalance between the availability of conventional building materials and their demand in the recent past. Building materials like bricks, concrete block, tiles, etc. are popularly used in construction. However, these materials are expensive and hence common people find it difficult to easily afford them. Moreover, these building materials require certain specific compositions to obtain desired properties. The building materials used here are Plastic waste, and organic waste with clay soil.

1.2 TYPES OF BRICKS

1.2.1 Burnt clay brick

Are formed by pressing in moulds. Then this brick are dried and fired in a kiln. Common burnt clay bricks are used in general work with no special attractive appearance. When this bricks are used in a walls, they require plastering or rendering.

1.2.2 Sand lime bricks

Sand lime bricks made by mixing sand, fly ash, lime followed by a chemical process during wet mixing.

1.2.3 Manufacturing bricks

Engineering bricks are manufactured at extremely high temperature, forming a dense and strong bricks allowing the bricks to limit strength and water absorption. Excellent load bearing capacity damp proof characteristics, chemical resisting characteristics.

1.2.4 Concrete bricks

They made from solid concrete and very common among home builders, a concrete brick are usually placed in facades, fence and provides an excellent aesthetic presence. These bricks can be manufactured to provide different colors as pigmented during its production.

1.2.5 Fly ash clay bricks

Bricks are manufactured with clay and fly ash, at about 1000 degree Celsius; some studies have shown that these bricks tend to fail poor produce pop-outs, when bricks come into contact with moisture and water, causing the bricks to expand.

1.3 CLASSIFICATION OF BRICKS

There are two main types of Bricks:

1.3.1 Un burnt Bricks

These bricks are dried through sun light. It is also called Sun-dried Bricks. They have very low strength as compared to other types of bricks. It is believed that first-time bricks were used, in sun-dried form (Un burnt Bricks), in Egypt some 6000 years ago.

1.3.2 Burnt Bricks

The bricks which are used commonly in today's age are burnt bricks. They are prepared and burnt in a kiln. They include tall strength as compared to un burnt bricks. They are further classified into the following categories.

a) First Class Bricks

Size is 19 x 9 x 9 cm in size. Made from earth, free from saline deposits. The be supposed to be thoroughly burnt. They should be of good color. Should of regular shape with square edges and parallel faces. These bricks be on the house starting flaws, cracks, chips, stones, etc. They should give a ringing sound when two bricks are struck together. Its compressive strength should not to be less than 140 kg/cm^2.

USE: Excellent for all types of construction in the exterior walls. They are also suitable for flooring.

b) Second Class Bricks

These are also fully burnt and give a clear ringing sound when struck together. Somewhat irregularity in shape, size or color are accepted. Its compressive strength shall not be less than 70 kg/cm^2 and absorption value should not be greater than 22 percent when soaked for 24 hours in water.

Use: For exterior work when plastering is to be done.

c) Third Class Bricks

These are not burnt so fully as in previous two cases but are generally of uniform reddish yellow color. Defects in uniformity or shape are tolerated. On striking together, they produce a dull thud sound. Its compressive strength lies between 35 – 70 kg/cm^2 and absorption between 22 – 25 percent.

Use: They are used mostly in the ordinary type of construction and in dry situations.

d) Fourth Class Bricks:

These types of bricks are irregular in shape and dark in color which is due to over burning. They are quite strong in compressive strength, generally above 150 kg/cm^2 and low in porosity and absorption.

Use: Despite their high strength, these types of bricks are unfit for use in building construction. This is because of their distorted shape and irregular size. They are, however, very commonly used in a broken form, in road construction, foundations and floors as coarse aggregate material.

1.4 GENERAL INTRODUCTIONS FOR WASTE MATERIALS

Recycling waste as useful materials is a very important environmental management tool for achieving sustainable development. On the other hand recycling waste without properly based scientific research and development can result in environmental problems greater than the waste itself.

2. MATERIAL USED

Material used in this study are waste plastic.

Table -1 Sieve Analysis Test

Sieve size (mm)	Weight Retained(g)	Cumulative% retained	% passing
4.75	0	0	100
2.36	58	5.8	94.2
1.18	98	15.6	84.4
0.6	206	36.2	63.8
0.3	464	82.6	17.4
0.15	164	99.0	1.0
0.075	10	100	0
Pan	-	-	-

Table -2 Specific Gravity Test

Observations	Trial 1	Trial 2
Weight of the specific gravity bottle(w),g	666	666
Weight of the bottle + 1/3rd filled sand (w2),g	1089	1092
Weight of bottle + 1/3rd filled sand	1754	1759

+ water (w3),g		
weight of bottle + water (w4),g	1516	1516
Specific Gravity	2.65	2.68

3. TESTING OF BRICKS

The behavior of bricks under different loading conditions were to determine the strength characteristics of plastic bricks. The result obtained from the compressive test, water absorption test, efflorescence test, soundness test etc. are discussed in the chapter.

TESTING OF PLASTIC BRICKS

3.1 Weight of Brick

Weight of the Brick has to taken to calculate the moisture content. As per the construction norms the brick should show the 10% moisture content of its weight. If the moisture content satisfies this test it will undergoes the next test.

Table.3.1 Weight of Dry Bricks

SAMPLE NO	M.SAND (in Kg)	PLASTIC (in Kg)	WEIGHT OF THE SPECIMEN (in Kg)
S1	1.50	3	2.10
S2	1.25	3	2.05
S3	1.00	3	2.01

The weight of the brick decreases by increasing the percentage of plastic to the Sand brick. The light weight building materials are sometimes used for earthquake resistant building. Buildings may also be constructed to able to withstand a great amount of vibration. The average weights of the traditional bricks are 2.5 to 3.5 Kg.

3.2 Compressive Strength test

The Compression testing machine is used for testing the compressive strength of bricks. After the curing period gets over bricks are kept for testing. To test the specimens, the bricks are placed in the calibrated compression testing machine of capacity 2000 KN and applied a load uniform at the rate of 5 KN. The load at failure is the maximum load at which specimen fails to produce any further increase in the indicator reading on the testing machine.

Table-3.2 Compressive Strength Test

AREA (mm)	COMPRESSIVE STRENGTH (KN)	COMPRESSIVE STRESS (N/mm^2)
190 X 90	130	07.60
190 X 90	138	08.07
190 X 90	144	08.42

3.3 Water Absorption

Bricks should not absorb water more than 20% by its weight. The bricks to be tested should be dried in an oven at a temperature of 105°C to 115°C till attains constant weight cool the bricks to room temperature and weight (W1). Immerse completely dried and weighed (W1) brick in clean water for 24 hrs at a temperature of 27±20°C. Remove the bricks and wipe out any traces of water and weigh immediately (W2).

Water absorption in % by weight = $\frac{(W2-W1)}{W1} X10$

Table -3 Water Absorption Test

DRY WEIGHT OF BRICKS (in Kg)	WEIGHT OF BRICKS AFTER 24 HOURS (in Kg)	WATER ABSORPTION (in %)
1.82	1.85	1.31
1.75	1.77	1.14
1.45	1.46	1.034

Efflorescence Test

For this test, brick has to be placed vertically in water with one end immersed. The depth of immersion in water being 2.5 cm, then the whole arrangement should be kept in a warm-well-ventilated room temperature of 20-30° C until all evaporates. When the water in the dish is absorbed by the brick and surplus water evaporates. When the water is completely absorbed and evaporated place similar quantity of water in dish and allows it to absorb and evaporate as before. Examine the brick after this and find out the percentage of white spots to the surface area of brick. If any

difference is observed because of presence of any salt deposit, then the rating is reported as "effloresced". If no difference is noted, the rating is reported as "not effloresced".

Table.4 Efflorescence Test

S.NO	MIX RATIO	TRACES
1	1.5:3	Nil
2	1.25:3	Nil
3	1.00:3	Nil

4. CONCLUSION

The main concept of this study includes a molten plastic is a very good binder by this we can add any type of Sand to make a brick as construction material however by doing these process in mechanized form like pre - fabrication structures it is even more easy to produce large quantity of bricks with in short period of time. The Plastic brick possess more advantages which include cost efficiency, resource efficiency, reduction in emission of greenhouse gases, etc., plastic Sand brick is also known as "Eco-Bricks" made of plastic waste which is used for construction purposes. It increases the compressive strength when increasing the plastic content with decreasing the Sand. Use of plastic Sand bricks, the water absorption presence of alkalis was highly reduced. Owing to numerous advantages further research would improve quality and durability of plastic bricks.

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