Journal of Advances and Scholarly Researches in Allied Education
Vol. XV, Issue No. 2, (Special Issue) April-2018, ISSN 2230-7540

Experimental Study on Bricks by Using Demolished Construction Material

Yeotikar V. U.[1], Kulkarni G. A.[2], Syed Nadeem[3], Bhosale N. M.[4], Kokare D. R.[5], Bhadange P. M.[6]*

[1,2,3,4,5] Under Graduate Students, JSPM's Imperial college of Engineering & Research, Wagholi, Pune

[6] Assistant Professor, JSPM'sImperial College of Engineering & Research, Wagholi, Pune

Abstract – India is a fast developing country, due to increasing urbanization there is huge demand for construction of structures and also the demolition old ones. In earlier study, a sustainable construction materials (bricks) using construction and demolition waste are developed. Cement and fly ash are used as binder and C & D waste is used as fine aggregate. The amount of C & D waste generated in the country has increased considerably in recent years due to rapid pace of development. There is no uniform and systematic process followed in determining the total quantity of C & D waste generated or in collection, transportation and disposal of C & D waste anywhere in India. This study investigates the bricks characteristics, both strength and aesthetic tests such as water absorption test, compressive test are to be conducted on bricks using construction waste and normal bricks which are to be compared. This project is very useful as it is eco-friendly to the environment.

Keywords: C & D Material, Brick, Water Absorption, Compressive Strength.

----------X----------

1. INTRODUCTION

Construction and demolition (C&D) waste is generated whenever any construction and demolition activities takes place such as building, bridges, roads flyover, malls and by the demolition of old buildings, widening of roads, remodelling, etc. C & D material consists mostly of inert and non-biodegradable material such as concrete, plaster, metal, plastics etc. These wastes are heavy, bulky and occupy considerable space in huge amount on the road sides. It is estimated that the construction sector in India generates about 10-12 million tons of wastes annually, It is more often dumped in open and low-lying areas; however, recent recognition of the potential for diversion of waste components from landfills has laid C&D waste becoming a topic of interest for recycling.

The management of C&D waste is of major concern due to the shortage of dumping areas and increase in transportation and disposal costs. C&D waste spread across our cities chokes surface drains, interrupt traffic operation and is an unpleasant look on the urban landscape. Recycling of C&D waste has important conclusion on natural resources and environment. Partial replacement of building materials by use of C&D waste would lead to reduction of sand mining from river beds or cutting of rocks. Industrialized countries have system in place for recycling of construction and demolition debris. Appropriate management of C&D waste would thus be greatly beneficial for our country as a whole such as;

- To comply with policy, legislation and regulation on waste management such as disposal.
- To provide an economical alternative to the C&D industry for land-based disposal, as recycling is more sustainable and the cost of land-filling is increasing
- To eliminate illegal dumping and associated negative impacts on the landscape, especially in rural areas.
- To control waste disposal thereby reducing the transportation costs
- To conserve natural resources and reduce our dependency on materials
- To reduce the volumes of waste being diverted to landfill

- To reduce the environmental harm caused by waste dumping and mining of materials

The C&D plant can efficiently recover bricks, sand and concrete which can be reused. Thus the process not only helps in reducing waste, but also indirectly leads to decreasing pollution. Therefore this process is being looked at by scientists and engineers throughout the world.

Fig.1. Crushed C&D material

Fig.2. Fly ash

Fig.3. Lime

Fig.4. Prepared bricks

2. EXPERIMENTAL METHODS

The bricks are made of dimensions (230mm x 125mm x 75mm). Bricks were made from fly ash, lime, cement and crushed C&D material by 0%, 10%, 20%,30% material by weight. The fly ash, lime, cement, crushed sand, C&D material and water was added according to the optimum moisture content were mixed together by wheel mixer and transfer the mixture to the brick manufacturing machine where the mixture is feed into the moulds and compacted by hydraulic pressure. The wet bricks were left to air-dry for over two-three days in the sun. Slow drying was necessary to prevent the bricks from cracking. Finally, the completely sun dried bricks are place for curing with water for 7 days. Compressive strength was determined for the 0%, 10%, 20%, 30% C&D material containing bricks using a CTM testing machine. A loading was applied to the bricks until they failed and maximum loading rate was recorded. The compressive strength was taken as the average result from a set of 3 tests for each respective brick type.

2.1 Material Preparation

C&D material is collected from the demolished sites. The concrete waste material is crushed and then this material was sieved using 1.18mm, 600 microns, 300 microns, 150 microns, 75micron & Pan. The crushed C&D material is then weighed and packed in ratios of 10%, 20%, and 30%.

3. RESULTS AND DISCUSSION

The bricks produced using C&D material is observed for its various characteristics such as colour, shape, size, texture and hardness. The performance is also tested by finding their compressive strength developed, water absorption for mix proportion of bricks. The results obtained are discussed in detail in the following sections.

3.1 Water Absorption Test

The test was carried out by immersing the bricks in cold water for 24 hours after that its change in weight is calculated for water absorption test as shown in figure 5.Water absorption percentage after 24 hrs immersion in cold water is given by the formula,

Water absorption capacity = $100 \times \frac{W2-W1}{W1}$

The water absorption of bricks produced using C&D material for various mix proportions used in this study are determined as given in the table 1.

Figure- 5: Bricks immersed in water

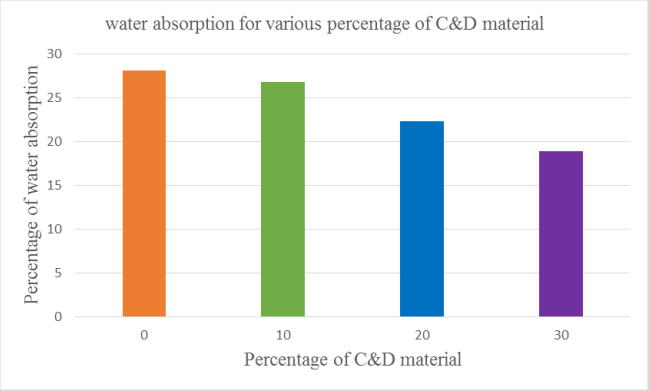

Figure- 6: Water absorption for various percentage of C&D material

Table- 1: Water absorption for various percentage of debris

Sr. No.	Brick description	Wt. of brick dry bricks W1 (Kg)	Wt. of brick after immersion W2 (Kg)	% water absorbed	Average % water absorbed
1	Normal brick	3.215	4.120	28.14	24.01
2	10% C&D material brick	3.355	4.253	26.76	
3	20% C&D material brick	3.577	4.374	22.28	
4	30% C&D material brick	3.734	4.439	18.88	

3.2 Compressive strength test

The compressive strength of bricks produced using C&D material with various mix proportions are tested by using compression Testing Machine as shown in figure 7. Average compressive strength of the given bricks is given in Table 2.

Compressive strength = $\frac{\text{Maximum load}}{\text{Area of bearing face}}$

Fig.7 Compression testing machine (CTM)

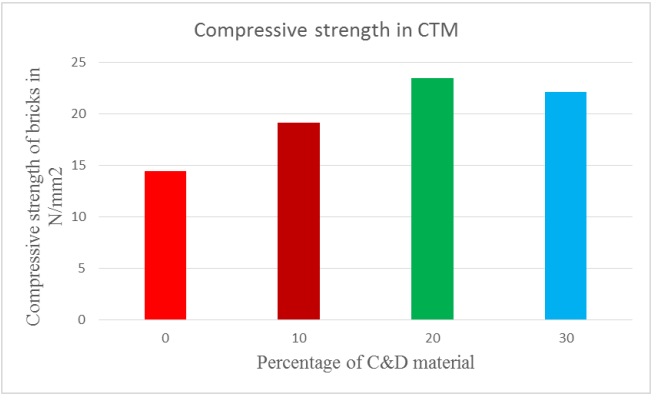

Fig.8 Compressive strength in CTM

Table- 1: Compressive strength of bricks

Sr. No.	Description of specimen	Dimensions (mm)			Area of specimen (Lx B) mm^2	Compressive strength N/mm^2
		L	B	H		
1	Normal brick	230	125	75	28750	14.43
2	10% C&D material brick	230	125	75	28750	19.14
3	20% C&D material brick	230	125	75	28750	23.42
4	30% C&D material brick	230	125	75	28750	22.10

4. CONCLUSION:

This project is done to find out if construction and demolished material can be utilized or substituted

instead of crushed sand in the manufacturing of bricks. From the tests conducted the results obtained are as follows:

1. The colour, shape, size, and texture of the bricks were found to be satisfactory.

2. The water absorption property of all the bricks manufactured with C&D material is similar to the water absorption value of normal bricks.

3. The compressive strength of bricks manufactured with C&D material is found to be equally strong as compare to the normal brick

4. Compressive strength of 20% C&D material brick is 23.42 N/mm^2 highest.

5. From the results obtained we concluded that upto 20% we are able to replace C&D material with crushed sand.

REFERENCES:

Hariprasad N.V and Dayananda H.S. (2014). "*Eco-engineered building materials using construction and demolition waste*", International Journal of Engineering Research & Technology (IJERT) ISSN: 2278-0181, Vol. 3 Issue 4, April – 2014

http:www.google.com/Wikipedia

Kanthe V.N. and Chavan P.G. : "*Solid Waste Used as Construction Material*", IOSR Journal of Engineering (IOSRJEN) ISSN: 2250-3021 ISBN: 2878-8719, PP 75-77, National Symposium on engineering and Research

Mohammad Shahid Arshad and Dr. P.Y. Pawade (2014). "*Reuse of natural waste material for making light weight bricks*", International journal of scientific & technology research volume 3, issue 6, June 2014 ISSN 2277-8616

Niklesh R., Murekar Roshan and S. Satpute (2017). "*Using waste material for making light weight bricks*", International Conference on Recent Trends in Engineering Science and Technology (ICRTEST 2017) ISSN: 2321-8169

R. Praba Rajathi and J. Jai Kanth (2014). "*Utilization of Recycled Demolition Concrete*", International Journal of Engineering & Computer Science ISSN: 2319-7242

R. Sumathi (2016). "*Study and analysis in making of bricks using construction debris*", International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056 Volume: 03 Issue: 12| Dec -2016 www.irjet.net

Rakesh Kumar and A. D. Kulkarni : "*Utilization of fly ash for bricks manufacturing*", International Journal of Advanced Engineering Technology E-ISSN 0976-3945

V.A Dakwale and R.V Ralegaonkar (2014). "*Development of sustainable construction material using construction and demolition waste*", Indian Journal of Engineering And Material Science Vol. 21, August 2014, pp. 451-457

Volume 3 Issue 12 December 2014, Page No. 9602-9605

Volume: 5 Issue: 1(*Special Issue 21-22 January 2017*) pp. 467 – 470

Corresponding Author

Bhadange P. M.*

Assistant Professor, JSPM'sImperial College of Engineering & Research, Wagholi, Pune

E-Mail – pmbhadange19@gmail.com