



E CO-FRIENDLY BUILDING MATERIAL FOR LOW-COST HOUSING: ADOBE BRICKS USING STRAW BALE

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Abstract—An eco-friendly material can be described as product that has been designed to do least possible damage to the environment. These kind of building materials are those that guarantee adequate service and durability, with minimal maintenance, minimizing the extraction of raw materials and energy consumed by production and use and which have the greatest potential for reuse or resource recovery. Straw is a natural by-product of rice husk, which is usually burned or disposed off. Instead of burning the straw, using it as a building material will be a revolutionary design. Adobe is one of the oldest building materials used and found in abundance everywhere with affordable and reasonable cost. Adobe, composing soil and straw mixed together, proves to be the best eco-friendly and sustainable material in the field of construction. The easy manufacturing of the resultant products like Adobe brick, Straw Bale, Earthen Plaster, etc. made out of straw can be adopted as a better alternative for the other unsustainable building materials. This project report analyses how straw and straw materials pass the various parameter when compared to the standard sized Burnt Clay Brick. This was conducted by executing various test like compression test & thermal insulation test. The various parameters like weight, strength, manufacturing process, cost, etc. were collated by performing respective activities. The analyses reveals that the perfectly prepared Adobe brick, proves to be light in weight, cost effective and an excellent thermal insulator which can be a best opted material for Low-cost housing.

Keywords— Eco-friendly material, sustainable development, Straw, Environmental-friendly, Low-cost Housing.

I. INTRODUCTION

Past few years we have observed a rapid growth in construction field leading to the extensive use of our natural resources (stones, sand, minerals, etc.) From past decade the need for the hour in our country is affordable housing for the masses. Thus, the usage of eco-friendly materials contributing to the affordable housing sector is necessary for the people and also beneficial for the environment. Environmentally-friendly building materials are those that provide appropriate service and life span, with minimum maintenance. While minimizing the extraction of raw materials and energy consumed by manufacturing and use. They have maximum potential for reuse or resource recovery. The construction industry is responsible for the issuance of various contaminants in the environment; the production of building

materials usually results in significant negative environmental impacts. Eventually, the building sector is one area that could greatly help reduce the effects of human development on the environment if standards and regulations promoting sustainable development were imposed on large construction companies. Indeed, buildings have a big share of the energy consumption, thus they have a significant impact not only on the environment and but also on the natural sources.

II. OBJECTIVES

- To introduce eco-friendly materials which can be sustainable and affordable alternative.
- To reduce the impact of buildings on the environment at each point of its life- cycle from construction to demolition without affecting the quality of life for their owners.
- To offer comfort and convenience at the same time using environmental friendly material.
- To provide sufficient thermal performance.
- To provide same strength as equal to burnt clay brick
- To further reduce the cost of the brick

III. METHODOLOGY

1. Preparation of Raw Materials

Soil sample of suitable quantity was procured from reliable locations. In order to work on this soil the soil was made fit by oven drying method later followed by sieve analysis.

2. Casting of Adobe bricks

The soil obtained from sieve analysis was collected and stored accordingly. This soil before casting needed to be used for obtaining the water content used for casting by standard proctor test. The brick was casted in a suitable ratio between sand and clayey soil.

3. Testing of Bricks

In order to test the bricks various test like compression test, thermal insulation test, weight test were performed and compared to regular burnt clay brick.

5. Result and Conclusion

From the analysis a suitable conclusion shall be drawn whether the experiment conducted was successful or not.

IV. RESULT & DISCUSSION

1. The compressive strength of adobe bricks after compression strength test was 4.4 N/mm² whereas the burnt clay bricks showed testing result of 4.2 N/mm². Indicating a difference of 4.65% increase of compressive strength between adobe brick & burnt clay brick
2. After sun drying the adobe brick for 10 days, its weight was found to be 1.534 Kg. When compared to standard burnt clay brick, a 50% reduction in weight was observed.
3. A positive result of low heat transfer was observed in adobe bricks as compared to standard burnt clay brick.
4. Production Cost of 1 adobe brick was Rs 3/- which is less as compared to the standard production cost of 1 burnt clay brick which generally varies from Rs 7/- to Rs 10 /-.

V. CONCLUSION

We can conclude that, Adobe bricks which are made of earth with high clay content and straw, prove to have 50% reduction in weight when compared with Burnt clay bricks. The embodied energy in these bricks being almost negligibly less making them energy efficient building bricks. The low thermal conductivity of this brick provides more stable temperature behavior inside the house and reduces heat losses. Its wide use can be attributed to its simplicity of design manufacture and economics.

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