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A Study on Compressed Stabilized Earth Block

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***Abstract*: Basic Soil or earth is an alternate structure material to conventional accoutrements like sword and concrete. Earth is a generally available structure material in utmost areas of the world and used by nearly 40 of the world population. slush block construction exists in earlier times because of the least demand of coffers, low energy consumption and simplicity of product process. Stabilized slush block construction in the assiduity has been the focus of exploration for profitable, environmental and specialized reasons. It has good thermal comfort and sound sequestration property. Stabilized slush block consumes energy 4 times lower than country fired bricks, it requires lower quantum of mortar for trouncing and it gives good architectural appearance. These blocks with different combinations of cement, refractory bricks and recycled plastic was tested for 28 days compressive strength, water absorption and viscosity. Grounded on the results, compressive strength increases with adding chance of cement and refractory bricks, water immersion is reducing with addition of recycled plastic and viscosity is within the respectable limit as per IS law.**

***Keywords*: alternate, conventional accoutrements, low energy, recycled, refractory bricks, slush block, stabilized.**

1. Introduction

Stabilized earth blocks (SEBs) are a type of sustainable building material that is made from a mixture of mud, sand and stabilizers such as cement, lime or fly ash. They are an ecological alternative to conventional building materials and require less energy to produce, produce less waste and have a lower carbon footprint. They are also cheaper and more affordable in many regions, making them an attractive choice for affordable housing projects. SMBs offer a sustainable, affordable and resilient construction solution that can contribute to the development of sustainable and resilient communities.

A. Objectives

Stabilized mud brick reduces environmental impact of construction by using locally available materials that are renewable, biodegradable, and energy-efficient. Cost-effectiveness, accessibility, durability, health and safety, and energy efficiency can help reduce energy consumption.

B. Material Used

The materials used for the manufacture of compacted stabilized mud block were locally available raw soils which are collected from Palghar district of Maharashtra and suitable for manufacture. Along with raw cement (OPC 53 grade conforming to IS 12269-2013 in the range of 5-15%) is used as primary stabilizer. The reuse of refractory bricks which consist of silica and lime acts as a better stabilizing agent and is added along with cement as 2%. In addition to stabilizers, 2% recycled plastic with cement in the form of polypropylene is used for the production of blocks. Contaminant-free portable water with neutral PH In this research, a compacted stabilized mud block of size 240 mm x 140 mm x 120 mm using a hand press was used.

2. Literature Review

A. Strength Analysis of Stabilized Mud Blocks

The dry and wet impact strength of grout stabilized block masonry and the strength effects of five cement-mortar mixtures and two soil-cement-mortar mixtures and two soil-cement-mortar mixtures were studied using prisms attached to the columns. In order to understand the influence parameters of the different proportions of cement mortar and soil mortar on the resistance of masonry.

B. Experimental Investigation on Stabilized Mud Blocks

The main detail is to mix local soil and clay from Jalpaiguri city in West Bengal with local sand and gravel to create a good composite soil with 15% gravel, 50% sand, 35% silt and of clay for Compacting Stabilized Earth Blocks (CSEB). The blocks were hardened and tested for compressive strength, water

absorption and density, and it was concluded that cement stabilized compacted soil blocks could be a cost effective and environmentally friendly alternative to clay bricks. fired in light load constructions.

C. Use of Coir Pith in Stabilized Mud Brick

Unfired stabilizer bricks were developed as a reliable wall unit against fired bricks and concrete blocks which use lime instead of cement.

D. Stabilized Lateritic Blocks Reinforced with Fibrous Coir Wastes

The addition of fibrous material as a reinforcing element in BEE is one of the promising results of ongoing research in Kerala, which produces 60% of the world's white coconuts. The main objective is to analyze the features of stabilized earth blocks and to study the possibility of increasing their strength and durability by reinforcing them with degradable fiber waste.

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Table 1
Compressive strength

S. No.	Identification	Measured Size (mm)	Compressive Strength (N/sq.mm)
1	ID1	232x192x99	17.3
2	ID1	232x191x99	17.4
3	ID1	231x190x100	18.5

Table 2
Water absorption

S. No.	Identification	Measured size (mm)	Water Absorption (% by wt)	Requirement as per IS:1077-1992
1	ID1	232x192x99	2.7	The average water absorption shall not be more than 20% by weight up to class 12.5 and 15% by weight for higher class
2	ID1	232x191x99	2.5	
3	ID1	231x190x100	3.1	

3. Methodology

Aim: The main aim behind the use of compressed stabilized mud block (CSEB) is to improve sustainability of the structure and to be cost effective.

A. Process of Making CSEB

Stabilized mud blocks (SMB) are compressed earth blocks stabilized with small amounts of cement or other stabilizers. Here are the general methods for producing stabilized mud blocks:

Soil Selection: Select the appropriate soil type for SMB production. The soil should have good clay content, be free of debris and free of organic matter.

Soil Testing: Soil testing to determine its strength and suitability for SMB production. Various tests such as Atterberg limit test, particle size analysis and compaction test can be performed.

Mixing: Mix the earth and the stabilizer (cement, lime or fly ash) in the right proportions. The ratio of soil to stabilizer is depended to the type of soil and the strength desired.

Curing: Cure SMB in a cool place for a few days. This allows the block to harden and reach full strength. Curing times may vary depending on climate and type of stabilizer used.

Compression: The mixed soil is placed in a manual or hydraulic press to compress the clods to the desired strength and size. Blocks should be compacted evenly to ensure uniform strength.

Drying: The compressed SMB is then placed in the sun for a few days. During this time, it is important to protect the block from rain or excessive moisture.

Finishing: Once the block is completely dry, it can be sanded or smoothed to obtain an even surface finish.

Construction: SMB can be used for construction purposes. They are ideal for building walls, houses and other structures.

It is important to note that methods may vary depending on location, equipment available and type of stabilizer used. It is always recommended to follow local SMB production guidelines and regulations.

4. Results

They have been used successfully in various construction projects, particularly in rural and low-income areas, where they have proven to be effective in providing affordable housing solutions. However, the quality of SMBs can vary depending on the type and amount of stabilizer used, the method of production, and the curing conditions. Proper quality control measures and standardized production techniques are essential to ensure the structural integrity and longevity of SMB buildings.

5. Conclusion

A project aimed at promoting the use of stabilized mud blocks (SMBs) in construction can have significant positive impacts. SMBs are a cost-effective, eco-friendly, and sustainable alternative to traditional building materials. They can be easily manufactured on-site, reduce transportation costs and carbon emissions, and offer benefits such as thermal insulation, durability, and resistance to moisture, fire, and pests. A project focused on promoting SMBs could involve educating builders, architects, and homeowners on the benefits of this construction material, as well as providing training on how to manufacture and use SMBs. It could also involve partnering with local communities and organizations to increase the availability of SMBs and promote their use in construction projects.

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