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STUDY ON COMPRESSED STABILISED EARTH BLOCKS BY USING CHEMICAL ADMIXTURES

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Abstract - *The study investigates the suitability of stabilized laterite soils for the production of compressed earth blocks for low-cost housing construction. The materials which is used for this experiment is red soil and some chemicals. The results of the study revealed that the specific gravity, bulk density, moisture content and plasticity index of the sample showed satisfactory performance. This experimental mainly deals with the manufacture of compressed stabilised earth blocks by using chemicals. The blocks are tested under CTM for compressive strength. The cost comparison with the conventional bricks has revealed that compressed cement stabilised soil block is preferred because it is more economical walling material in itself and permits the use of economical building techniques.*

Key Words: Laterite soil, CSEB by chemical admixtures

1. INTRODUCTION

A compressed earth block also known as pressed earth block or compressed soil block, is a building material made primarily from damp soil compressed at high pressure to form blocks. If the blocks are stabilized with a chemical binder such as Portland cement they are called Compressed stabilized earth block (CSEB) or Stabilized earth block (SEB).Constructed earth blocks are masonry elements, which are small in size and which have a regular and verified characteristic obtained by the static or dynamic compression of earth in a humid State followed by immediate remoulding. Earth construction is very cost effective, energy efficient (excellent thermal properties and low energy input required for production), environmentally friendly, and safe, qualities which are particularly relevant and important with the ever growing need for increased awareness to reduce energy consumption worldwide.

1.1. LITERATURE REVIEW

1.1.1 O.S. Oladeji et al 2013- the two chemical additives namely KS770 and Soda Ash investigated do not alter the aesthetic view of the resultant brick products. The KS770 appears to increase the moisture content of clay thereby preventing early setting and hardening. Conversely, soda ash additive appears to increase the workability, and produces brick blocks with relatively higher compressive strength and lower corresponding density especially when its fired, compared with the bricks without additive as well as those with the KS770 additive. The additive water ratio for achieving optimum enhanced brick workability is 1:27

1.1.2. Marwan Mostafa July 2016 The proposed innovative Banana-Compressed Earth Block (B-CEB) consists of ordinary CEB ingredients plus banana fibers, which will be the focus of this study. Banana fibers are widely available worldwide due to agricultural waste from banana cultivation. Additionally, banana fibers are environmentally friendly and present important attributes, such as low density, light weight, low cost, high tensile strength, as well as being water repellent and fire resistant.

1.1.3. Shivnath Jangid Feb 2017- The Present Study is used to analysis the soil which is better for stabilized earth block. The Engineering behaviour of Compress stabilized earth block (CSEB) such as compression strength, durability, water absorption etc. are depends on the types of soil and stabilized material as binder. Here the soil will be mixed with suitable proportion of stabilized such as lime, fly ash, cement, coir and Chemicals will be compressed manually or mechanically. The Block produced will have more strength than conventional burnt clay brick. Soil tested and regarded as favourable for CSEB on the basis of density index which manufacture by Block Cotton Soil. It Concluded that the soil have more Compressive strength than normal brick but cannot satisfy the Condition of water absorption.

2. MATERIALS AND METHODOLOGY

2.1 MASTER PEL 707

It is a lignosulphonate polymer based, waterproofing cum plasticizing admixture. The product shall comply with IS: 2645-2003 when tested at a dosage of 300ml/100 kg bag of cement. The product must be free of chlorides and shall have specific gravity not less than 1.17 and shall comply with ASTM C494 Type A and D. It can be used in structural concrete that is constantly or intermittently in contact with water such as sea walls, tunnels, basements, structural and pre-cast concrete.

2.2 MASTER CAST 1163

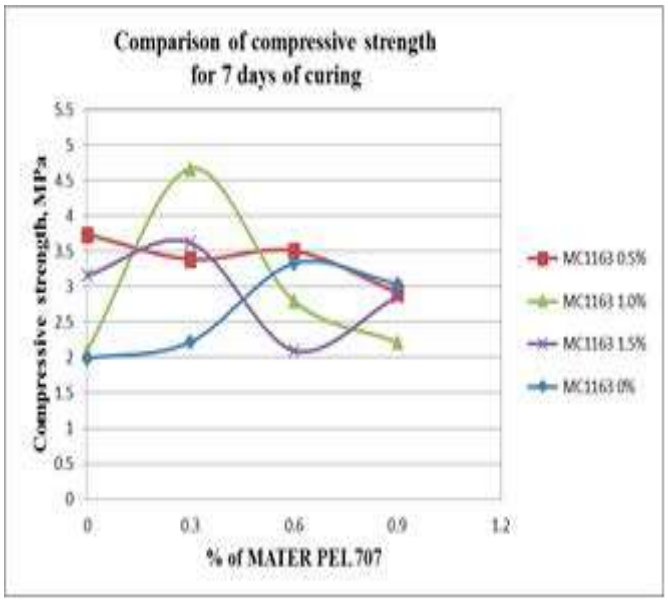
It is multipurpose superplasticizer based on polycarboxylic ether polymers, specially developed for paver's blocks with low cement content. It accelerates the strength. The unique principle of action on the cement grain is that it fully exploits the hydration potential of cement resulting in higher early strengths and shorter curing times. It improves cohesiveness, setting time, strength, finish of masonary blocks, paver blocks, plasters etc.

2.3 RED AND LATERITE SOIL

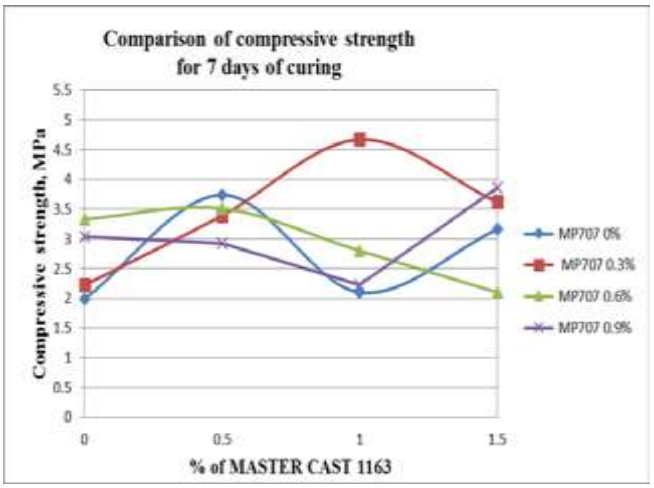
Spread over some 30% land area they occur extensively in eastern Madhya Pradesh , on Bihar plateau , in Orissa and parts of west Bengal, Andhra Pradesh, Karnataka , Kerala and Tamilnadu. Most red soils are shallow that limits their capacity to hold water greatly reducing their agricultural potential.

3. TEST RESULTS AND ANALYSIS ON THE PRODUCED COMPRESSED STABILISED SOIL BLOCK BY USING CHEMICALS

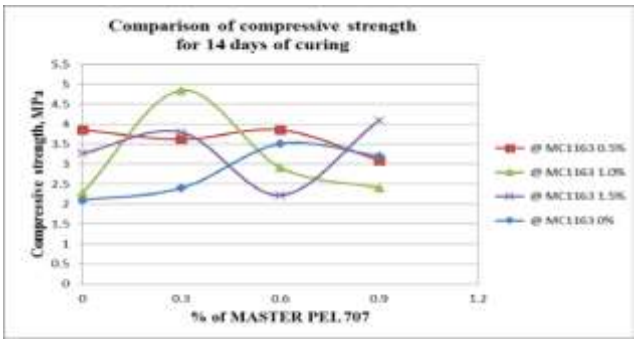
The compressive strength is the most universally accepted value for determining the quality of bricks. Nevertheless, it is intensely related with the soil type and the content of stabilizer. The crushing strengths of the blocks were tested using the universal testing machine. A total of 60 specimens were prepared and crushed at different curing ages of 7, 14 and 28days. Compressive tests were conducted on the blocks at different ages to indicate the rate of strength gain and the strength at a point in time.



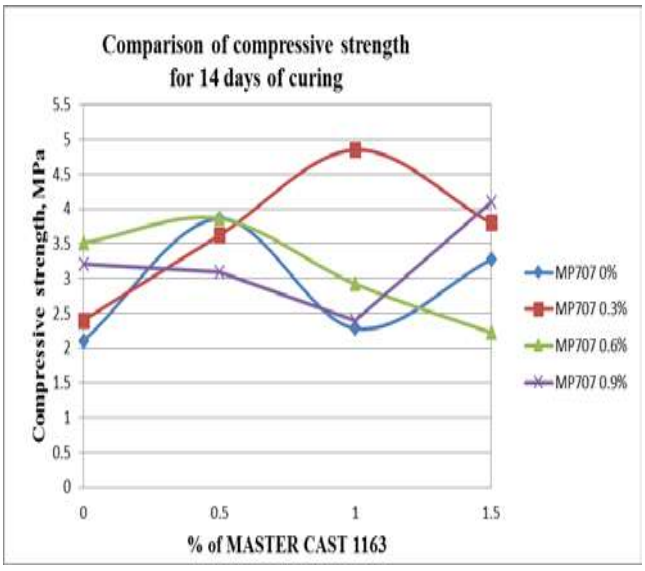
Graph -1: Compressive strength for 7 days cured compressed stabilized earth blocks in different chemical proportions



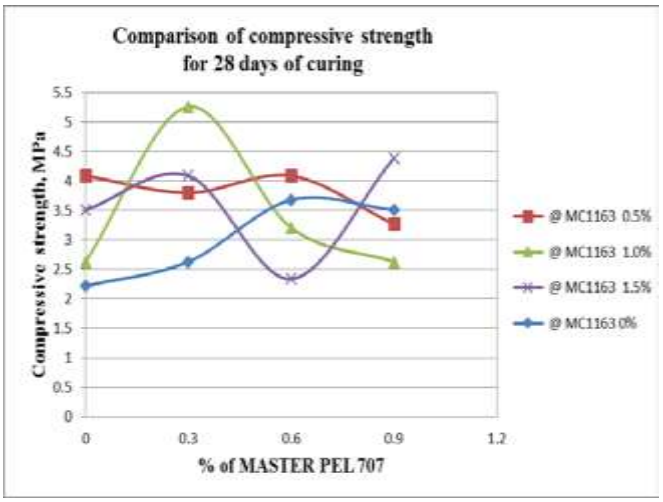
Graph -2: Compressive strength for 7 days cured compressed stabilized earth blocks in different chemical proportions



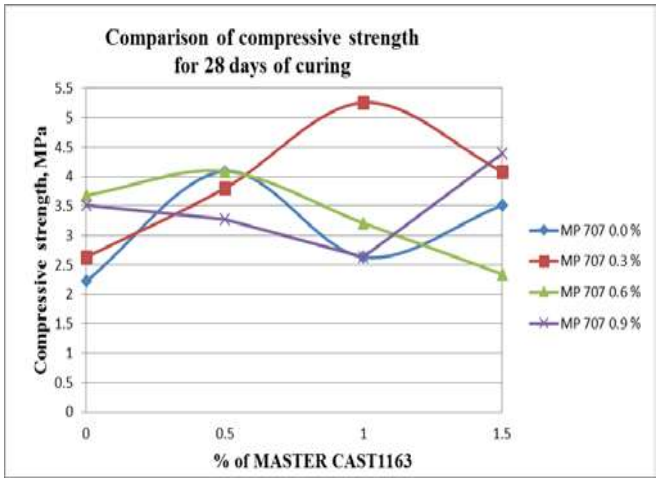
Graph -3: Compressive strength for 14 days cured compressed stabilized earth blocks in different chemical proportions



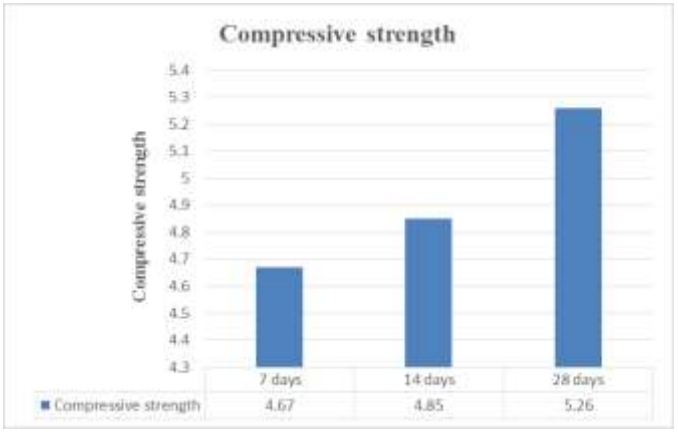
Graph -4: Compressive strength for 14 days cured compressed stabilized earth blocks in different chemical proportions



Graph -5: Compressive strength for 28 days cured compressed stabilized earth blocks in different chemical proportions



Graph -6: Compressive strength for 28 days cured compressed stabilized earth blocks in different chemical proportions.



The result shows that the highest compressive strength of 5.260 N/mm² was obtained from sample at the curing age of 28 days.

4. TOTAL WATER ABSORPTION TEST

Total water absorption test was conducted on all the twenty samples types with different curing periods. The experimental results of the water absorption test show the effect of chemical content on the water absorption capacity of the blocks. The mean water absorption values for the various samples tested range from 21% to 23.14%.

5. CONCLUSIONS

- Stabilized compressed earth blocks include; uniform, sized building components which can result in less waste, faster construction and the possibility of using other pre-made components or modular manufactured building elements.
- Major usage in the world for construction is clay bricks; many researchers are presently looking for newer options because they need low cost materials, which are also environmentally friendly.
- When the soil is stabilized with 10% of cement and Master Cast 1163, Master Pel 707 is of 1% & 0.3% respectively, the highest compressive strength of 5.260N/mm² and water absorption of 18.86% was achieved.
- The investigation of this thesis has revealed that many different factors are responsible for ensuring a good bond between the cement, chemicals and particles mix together. These requirements not only affect the components of the mixture used, how it prepared, delivered into its final state, but also environmental conditions of the finished product.

REFERENCES

[1] Properties of Compressed Stabilized Earth Blocks (CSEB) For Low-Cost Housing Construction: A Preliminary Investigation by Baba Shehu Waziri, Zanna Alhaji Lawan, Mustapha, Maaji Mala , International Journal of Sustainable Construction Engineering & Technology (ISSN: 2180-3242) Vol 4, No 2, 2013, page no.39-44

[2] Compressed Stabilized Earth Blocks by using Lime by Abhijeet D. Patil, Dr. A. C. Attar, International Journal of Engineering Research & Technology (IJERT)ISSN: 2278-0181 (Vol. 4 Issue 09, September-2015

[3] Study on bricks and stabilized compressed earth blocks by Sadek Deboucha and Roslan Hashim, Scientific Research and Essays Vol. 6(3), page no. 499-506, February 2011

[4] Study of compressed cement stabilized soil block as an alternative wall making material by Asmamaw

Tadege (October 2007).

[5] Durability of compressed stabilized earth blocks by Iyambo Lisias Ipinge, July 2012.

[6] Study of stabilized mud block as an alternative building material and development of models by Habtemariam molla.