



## **OPTIMIZATION OF PRODUCTION COST AND CURING TIME IN COMPRESSED STABILIZED EARTH BLOCK PRODUCTION PROCESS**

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Compressed Stabilized Earth Blocks (CSEB) made with natural soil as the main ingredient is a sustainable and eco-friendly alternative to burnt clay bricks and cement sand blocks. Excellent engineering properties, thermal comfort during any climatic condition and attractive appearance without plastering are added advantages of CSEB.

SLS1382: Part 1-3 specifies the standards applicable to CSEB in Sri Lanka. Engineering properties specified in SLS 1382 are dimensions, dry density, total water absorption, dry/wet compressive strength, bending strength, erosion resistance and linear expansion upon saturation with water. According to SLS 1382 a minimum cement content of 5% as a binder should be used and the produced CSEB should be cured for at least 28 days.

In this study, possibility of reducing the cement content further by partially replacing cement with fly ash, a pozzolanic material, was studied. Keeping the total binder content at 4, 6, 8 and 10% respectively, cement was partially replaced by mixing 5, 10, 15, 20, 25, 30, 35 and 40% fly ash. In addition, to further economize the production cost, above combinations of CSEB produced using a specially fabricated machine were tested after 7, 14, 21 and 28 days of curing. All the tests recommended in SLS 1382 were carried out.

Test results observed are very impressive. Even the CSEB produced with 4% binder (which is less than 5% specified by SLS 1382) with up to 10% fly ash replacement, achieved all required engineering properties stated above after 28 days of curing. All samples having binder content equal to or above 6% with fly ash replacement from 5 to 15% achieved the required engineering properties even after 7 days of curing. A cost analysis carried out indicated that the CSEB made with 6% binder with 15% of cement replaced with fly ash and 7 days curing, which satisfies all specified engineering properties, is the most economical out of the various combinations tested.

**Keywords:** CSEB, Cement, Fly ash, Blocks

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