Effects of Cement Stabilization and Fibers on the Water Resistance of Compressed Stabilized Earth Blocks

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Abstract:

There is an increasing demand for housing globally. Earth construction, which has traditionally been associated with dry climates and depressed socio-economic groups presents many benefits as a sustainable, affordable, and locally appropriate material and should be explored for wider use. This research project focuses on investigating the effects of synthetic fibers and cement stabilization on the water absorption, surface erosion, rebound hardness, and the relationship of wet and dry compressive strengths of compressed stabilized earth blocks (CSEB). The use of locally available soils blended with fibers and cement is investigated to obtain a design mix for compressed stabilized earth blocks capable of staying intact in wet and humid regions in the world (i.e. regions with annual rainfall of over 50 in). Two sets of experiments are carried out with blocks including 5%, 6%, 8%, 10% and 15% cement stabilization and 0.25% synthetic fibers. Findings suggest that 10% cement stabilization has many benefits and may be optimal, while 15% stabilization is difficult to quality control. Depending on the fiber type, fiber addition does not seem to have any significant benefits or disadvantages with respect to resistance against water or compressive strength. If fibers are to be used, polyvinyl alcohol (PVA) micro fibers are suggested over polyethylene terephthalate (PET) macro fibers.

DOI: 10.70803/001c.138254

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