

Performance-Based Evaluation of Sustainable Compressed Stabilized Earth Blocks Produced from Dredged Marine Sediments for Hot Arid Environment

Dana Dashti

Senior Research Associate, Kuwait Institute for Scientific Research, Kuwait

Abstract

Sustainable construction requires alternative building materials that can satisfy the engineering requirements of conventional masonry products while reducing environmental impacts. This study presents a performance-based assessment of compressed stabilized earth blocks (CSEB) produced from dredged marine sediments (DMS) for potential use in hot arid environments. The engineering properties of the optimum CSEB mixture, containing 35% DMS and 15% cement, were benchmarked against the performance requirements specified in the relevant standards for conventional concrete and autoclaved aerated concrete (AAC) masonry units. Experimental results obtained from completed laboratory and factory production of CSEB were evaluated using international compressed earth block standards, while the comparison included compressive strength, water absorption, dry density, dimensional quality, and visual appearance. The factory produced CSEB achieved a dry compressive strength of 15.84 MPa, water absorption of 9.84%, and an average dry density of 1860 kg/m³, satisfying the applicable requirements for loadbearing masonry. The results demonstrate that DMS based CSEB can achieve engineering performance comparable to the requirements of conventional masonry systems, supporting the beneficial reuse of dredged marine sediments as a sustainable construction material. The study highlights the potential of performance-based evaluation to facilitate the adoption of sustainable masonry products in hot arid environments.