

## Mechanical Strength of Mineral-Admixed Cement–Lime Stabilized Compressed Earth Blocks



**Muhammed Said ERDEMONAR**<sup>1</sup>, (Speaker);

**Ali Osman KURUŞÇU**<sup>2</sup>,

**Z.Canan GİRGIN**<sup>3</sup>

Yildiz Technical University<sup>1,2,3</sup>, İstanbul

mserdemonar@gelisim.edu.tr

[okuruscu@yildiz.edu.tr](mailto:okuruscu@yildiz.edu.tr)

[zcgirgin@yildiz.edu.tr](mailto:zcgirgin@yildiz.edu.tr)

### ABSTRACT

Compressed soil-based construction elements are regaining importance in sustainable construction discussions due to their reliance on local raw materials and relatively low dependence on energy-intensive production processes. This study experimentally investigates the effect of stabilization with lime and cement and changes in aggregate ratio on the 7- and 14-day compressive strength of compressed soil samples, with the aim of evaluating the interaction between soil, aggregate, and binder through early-age performance. Additionally, water absorption measurements were included in the limited scope of the evaluation to observe the reflection of different mineral additives in selected mixtures on moisture-related behavior.

The specimens were prepared under a repeatable production protocol; the binder type and ratio, aggregate ratio, and mineral additive presence were varied in a controlled manner. Compaction parameters and curing conditions were kept constant; compressive strength tests were performed on days 7 and 14. The findings reveal that early-age strength cannot be reduced solely to the binder ratio; aggregate content can significantly affect strength development through density and void structure. The partial results regarding the water absorption rates of mineral additives indicate that the mixture design must be considered in conjunction with moisture-related behavior indicators as well as mechanical performance. The study provides an applicable experimental framework for the comparative evaluation of early-age strength development for compacted soil elements.

### Keywords:

Cement Stabilized Earth Blocks (CSEB), Earthen Construction, Sustainable Construction Materials, Compressive Strength