

Relative importance of soil properties and stabiliser treatments to the strength of rammed earth



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ABSTRACT

This paper examines the relative importance of stabilisers and soil properties in determining variation in the strength of stabilised rammed earth. This is achieved by establishing relationships between soil properties (gradation, plasticity, and moisture), stabiliser treatments (0-6% of lime, cement, asphalt), and stabilised unconfined compressive strength (UCS), based on 230 strength experiments on 111 different soil samples taken from construction sites in Australia. An ANOVA model indicates that over 90% of the variation in the UCS of the stabilised samples is due to variation in soil properties. An ANCOVA model reveals that the three significant predictors of UCS are all soil properties, and that the effects of stabiliser type and quantity are negligible. The calculated average contrast in UCS attributable to soil type differences (1.12 MPa) far outweighs the contrast attributable to stabiliser type differences (0.05 MPa) and to stabiliser quantity differences (0.07 MPa per % of cement and 0.03 MPa per % of lime added). These results stress the importance of selecting a soil that is favourably predisposed to stabilisation in order to attain satisfactory strengths of rammed earth. Based on these findings, future research should be aimed at developing a system that uses key soil properties to predict the likelihood of successful stabilisation.

Keywords: rammed earth; stabilisation; soil properties; cement; lime; compressive strength.