Public Abstract
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Title:EFFECTS OF CALCIUM-RICH ADDITIVES ON THE SMALL-STRAIN MODULUS OF REPRESENTATIVE SUBGRADE SOILS IN MISSOURI

The mixing of calcium rich additives with subgrade soils improves mechanical properties (stiffness and strength) of soil, resulting in better performance and more economical pavement design. The objectives of this study were to: (1) quantify the effectiveness of additive stabilization of subgrade soils for Missouri pavements, and (2) assess the viability of wave-based non-destructive testing quality control methods that can be applied in the laboratory and the field. Two soils were selected to represent the typical range of Missouri plasticity index values. The soils were mixed with fly ash and lime kiln dust to assess the changes in wave velocity and Young's modulus using the free-free resonant column (FFRC) method over a period of three days. The modulus of the low plasticity (CL) soil increased while the high plasticity (CH) soil showed little to no increase during the same time period when mixed with fly ash. Both soil-lime kiln dust mixtures showed an increase in modulus compared to unstabilized measurements after three days. Modulus measurements of the CL soil hours after compaction indicated that the change in modulus for stabilized soils, compared to unstabilized soil, is measurable using FFRC. Differentiating mixture ratios of additives does not appear possible using velocity/modulus because the mixture ratio did not affect the gains in modulus. A study was conducted to examine differing behavior of the low and high plasticity soils. Results suggest that the increased surface area and charge of the CH soil's smectitic composition require more additive content than the CL soil to achieve comparable stabilization.