Research Project

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C a p s u l e

Technology Transfer Program

LTRC

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Evaluation of the Effects of Using Superplasticizers to Enhance Soil Cement Properties

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LTRC

Louisiana Transportation Research Center

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Problem

Soil cement is widely used as a base or sub-base for pavements in Louisiana because of its advantages over untreated soils, which include greater strength, stiffness, durability, and uniformity. Results of a recent study by researchers at Louisiana State University (LSU), Southern University (SU), and the Louisiana Transportation Research Center (LTRC) indicate that the addition of superplasticizers to soil cement can enhance these advantages.

To date, superplasticizers have rarely been used in soil cement due to a perception that the enhanced properties of the soil cement are insignificant when considering the cost of the superplasticizers. The aforementioned

Preparation of Laboratory Specimen

LSU/SU/LTRC study demonstrated the effectiveness of superplasticizers in enhancing several important soil cement properties. Additionally, advances in manufacturing and increased demand for the use of superplasticizers have resulted in decreased unit prices.

Objective

The objective of this research is to conduct an in-depth laboratory investigation of the effects of superplasticizers on soil cement properties such as shrinkage cracking, resilient modulus, strength, durability, and cost-effectiveness.

Description

The effects of using superplasticizers in Portland cement concrete have been widely studied, but very little work has been conducted using superplasticizers in soil cement. A thorough literature review will be conducted on the effects of different superplasticizers on the shrinkage and early strength of Portland cement concrete. Due to the similarity between soil cement and Portland cement concrete, it is anticipated that the effects of superplasticizers on soil cement should be similar to their effects on Portland cement concrete, but a limited scope of verification testing will be necessary before selecting the superplasticizers to be used for this research.

A test factorial will be designed to investigate the effects of cement content and superplasticizer content on relevant properties of soil cement. Two typical soils and three superplasticizers (plus a control test using no superplasticizer) will be used for this investigation. For each combination, three specimens will be subjected to standard tests for compaction, shrinkage, resilient modulus, unconfined compressive strength, and durability. Additionally, a study will be conducted to establish an effective mixing procedure.

Implementation Potential

One potential benefit of this research is the development of soil cement mixtures with minimal shrinkage cracking, resulting in decreased maintenance and reconstruction costs.