

RESEARCH PROBLEM STATEMENT

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| DATE: 9/5/2019 | PROJECT AREA: Materials |
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TITLE: Design, Construction, and Performance Monitoring of Stabilization of Expansive Soils

PROBLEM STATEMENT:

Expansive soils cause extensive pavement heaves, bumps and longitudinal cracks. The repetitive shrinking and swelling is suspected to be responsible for the development of cracks, heaves and bumps on Arkansas roads. Roadway surface cracks allow water intrusion which degrades underlying pavement layers, and prematurely fails the pavement structure. Surface heaves and bumps are a driver safety issue. Cracks, heaves, and bumps are extremely expensive to repair over the life of the pavement, and it would be more economical and safer to the public to mitigate their occurrences during construction. Previous research results indicate that the fiber-reinforced cement treated bases has shown to increase performance. Significant improvements in both shear and compressive strengths, as well as flexibility, have been reported in fiber reinforced soils and fiber reinforced cement treated bases. Also, fiber reinforced clays and sands were able to reduce volumetric shrinkage strains and swell pressures. It is expected that these types of improvements would directly mitigate the aforementioned distresses.

OBJECTIVES:

The main objectives of this study will be to develop appropriate laboratory test methods to evaluate mix designs for (1) fiber reinforced cement treated base, (2) fiber reinforced clay, and (3) fiber reinforced sandy soil. In addition, this study will provide assistances to ARDOT Districts to develop optimum fiber application rates and establish specifications and construction QC/QA plans for uniform mixing. To this end, it will investigate innovative Nondestructive Testing (NDT) tools to: (1) assist site characterization, (2) select candidate test sections, (3) identify sampling locations, (4) provide input on mix design process, (5) provide Input during QC/QA process, and (6) monitor field performance of the test section.

FORM OF RESEARCH IMPLEMENTATION AND RETURN ON INVESTMENT:

This research project shall provide assistance to ARDOT to develop optimum fiber application rates and establish specifications and construction Quality Control/Quality Assurance (QC/QA) plans for uniform mixing. In addition, this study shall study feasibility of using innovative NDT tools for field uniformity verification and test section performance monitoring. Implementation of fiber reinforced cement treated bases, fiber reinforced clays, and/or fiber reinforced sands will provide savings in both money and time over traditional chemical stabilization methods. Millions of dollars can be saved by minimizing premature failures from cracks, heaves, and bumps.

Estimated Project Duration: 24 Months
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Standing Subcommittee
Ranking

Advisory Council
Ranking

Statement Combined with
Statement Number(s)