**Project: Performance of Dowel Bars and Rigid Pavement**

**A) Report Title: "Performance of Dowel Bars and Rigid Pavement"**

## Executive Summary

On U.S. 50, five-miles east of the City of Athens, the response of fiberglass, epoxy coated steel, and grout-filled stainless steel dowel bars were evaluated and compared under a variety of loading and environmental conditions. A few fiberglass and standard steel bars were instrumented to measure strain during curing, environmental cycling, and Falling Weight Deflectometer (FWD) loading.

Dowel bars were instrumented and installed at the time of construction of a Portland cement concrete (PCC) pavement containing 25% ground granulated blast furnace slag (GGBFS). Strain measurements were recorded for the dowel bars periodically over time to determine the forces induced during curing and during changes in environmental conditions, as well as dynamic loads applied with the FWD. Based upon data obtained from the instrumented dowel bars during environmental cycling in the field, steel dowel bars experienced higher bending moments across transverse PCC joints than fiberglass dowel bars. Both types of dowels experienced a permanent bending moment in the PCC pavement slabs during curing. The magnitude of this moment appears to be a function of bar stiffness. Curling and warping during the first few days after concrete placement can result in high bearing stresses being applied to the concrete around the dowel bars. This stress may possibly exceed the allowable bearing stress of the concrete at that early age and result in some permanent loss of contact around the bars.

Based on the results of the FWD tests, the magnitude of bending moments and vertical shear forces transferred by steel dowels across transverse PCC joints were much higher than for fiberglass bars of the same size. Overall, both steel and fiberglass dowels experienced higher moments from environmental factors than from dynamic loading.