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SUMMARY REPORT

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South Carolina
Department of Transportation
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Evaluating the Effect of Slab Curling on IRI for South Carolina Concrete Pavements

Concrete pavements are known to curl due to a temperature gradient within the concrete caused by both daily and seasonal temperature variations. This research project measured the magnitude of concrete pavement slab curling of two newly constructed jointed plain concrete pavements in South Carolina and the effect of the slab curling on the rideability of the pavements. To measure the amount of slab curling, digital indicators were placed on the pavement to measure small changes in elevation at multiple points along the slab profile. A terrestrial laser scanner was used to develop a three-dimensional model of the changing pavement surface. A high-speed inertial profiler was used to measure the rideability of the pavement to compare the variation in IRI with the change in the pavement profile due to slab curling.

It was found that the pavements showed small changes in curvature as the temperature increased during the day. The data collected from the test slabs indicated that the curling may be occurring over a longer wavelength than a single slab. In general, the pavement curling and warping as temperatures increased during the day corresponded to an increase in roughness. The IRI increase during a day was found to be less than 10 inches/mile on days with large swings in temperature. The change in IRI from seasonal temperature variations was in the range of 1 to 4 inches/mile. These variations were considered to be relatively small when compared to the

typical variation of IRI values of diamond ground concrete pavements. Based on this research project, it is recommended that SCDOT schedule its quality acceptance rideability testing for the same time of day (i.e. afternoon) to reduce the variation in the IRI measurements caused by daily temperature cycles and make measurement.

This research project was conducted at the South Carolina Department of Transportation Office of Materials and Research by Bryan Smith, Andrew Johnson, Wei Johnson, and Luke Gibson. For further information, contact Terry Swygert at SCDOT: (803) 737 6652; swygerttl@scdot.org