

Period Covered: July 1 through September 30, 2003 (Quarterly Report)

KSDOT Progress Report
for the

State Planning and Research Program

PROJECT TITLE: Construction of Crack-Free Concrete Bridge Decks		
PROJECT MANAGER: Richard L. McReynolds, P.E.	Project No: TPF-5(051)	Project is: <input type="checkbox"/> PLANNING <input checked="" type="checkbox"/> RESEARCH & DEVELOPMENT
Annual Budget	Multi Year Project Budget \$950,000	
<p>Progress:</p> <p>A meeting was held with King Construction in Hesston, KS on July 14 to discuss bridge construction and to solicit their comments on techniques to reduce bridge deck cracking. A meeting was held with KDOT bridge design and construction engineers on July 21, 2003 to discuss special provisions for constructing low-cracking bridge decks.</p> <p>The revised minutes from the meeting on April 21, 2003 were distributed. A first draft of the special provisions for the construction of crack-free bridge decks was completed and circulated at the end of this quarter. The provisions are based on a version of the AASHTO LRFD Construction Specifications that itself includes several modifications that are under consideration by the AASHTO Technical Committee on Construction, T-4, chaired by Ken Hurst. The draft provisions are based on discussions with designers, contractors, and state officials, and a review of previous work completed by the project team and other investigators. The project team is looking forward to comments from the state technical contacts regarding the proposed special revisions this quarter.</p> <p>Work is proceeding on the optimization of concrete mix designs for reduced cracking. The following are under evaluation: optimization of aggregate gradations using $\frac{3}{4}$ in. maximum size aggregate; Type I/II and coarse-ground Type II cements; cooling the mixture using ice, chilled water, and liquid nitrogen; and chemical admixtures, including various air entraining agents, superplasticizers, and shrinkage-reducing admixtures. The goals of this effort include minimizing the paste content and maximizing the aggregate content while maintaining acceptable workability and finishability of the concrete.</p> <p>Progress on the tests for shrinkage properties of the new mix designs has been another focus of this quarter. The ring-test specimens have been detailed and the molds are being fabricated (three are now complete). The molds consist of steel rings (to provide restraint for a shrinking concrete ring cast around the steel) on a plywood base and molded laminated strips for the outer form walls. Four strain gages are attached to the inside of each steel ring to monitor the compressive strain in the steel caused by the shrinkage of the concrete. Sudden relief in the steel stain indicates that the concrete has cracked. The new mix designs will be compared based on the age of first cracking. The initial "practice" ring was cast in early August, and the second and third rings are being monitored at this time.</p> <p>Project Personnel: David Darwin (Principal Investigator), JoAnn Browning (Co-Principal Investigator)</p>		
<p>SUMMARY OF ACTIVITIES EXPECTED TO BE PERFORMED NEXT QUARTER:</p> <p>Comments to the proposed special provisions for low-cracking bridge decks will be collected and addressed. A revised proposal based on these comments will be submitted for review after all participants have had time to respond.</p> <p>Work will continue to identify new bridge construction projects (in Kansas and in other states) that are eligible for implementing the identified "best practices." A total of 20 bridges will be constructed over the course of the project using the new recommendations. State representatives are encouraged to send their nominations to the project team for consideration.</p> <p>Work will continue to optimize concrete mix designs. Goals for the fourth quarter include casting ring shrinkage specimens to determine the effects of using Type II coarse ground cement, optimized aggregate gradations, superplasticizers, and shrinkage-reducing admixtures. In addition, the first mix designs using 1-in. maximum size aggregate will be undertaken.</p>		

STATUS AND COMPLETION DATE

Percentage of work completed to date for total project

Project is: 0.15

 X on schedule behind schedule, explain:

Expected Completion Date: March 31, 2008