

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>Comments from the remainder of state technical contacts were received on the first draft of the special research provisions for the construction of crack-free bridge decks. A full summary of these comments has been made, and a revised version of the research specifications has been completed and sent to the state contacts for further review before the annual meeting to be held in May 2004.</p> <p>Work continued on the optimization of concrete mix designs for reduced cracking. Eighteen batches of free shrinkage specimens (ASTM C 157, three specimens per batch) were cast for combinations of 60%, 70%, and 80% aggregate content with water/cement ratios of 0.40, 0.45, and 0.50 for both Type I/II cement and Type II coarse-ground cement. Specimens were allowed to harden for 24 hours and then cured in a lime saturated water for 48 hours. Data is collected daily for the first 30 days, and then every other day for the remainder of the testing period. Mineral admixtures (silica fume, fly ash, and slag) and the corresponding material properties have been collected for future free shrinkage analysis. Current testing also focuses on dosage requirements to obtain proper air content (air-entraining admixtures) and workability (superplasticizers).</p> <p>Testing continued on the twelve concrete ring specimens and companion free shrinkage specimens that were cast at the end of last quarter. The mixes include one MoDOT high-cement content mix (not a mix currently used by MoDOT), one current KDOT mix, and two optimized low-cement content mixes, one with Type I/II cement and one with coarse ground Type II cement. Strain gage readings and visual observations are completed daily to determine if cracking has occurred. No cracks have been identified after 80 days of drying. Another set of 15 steel rings for the ring tests have been cut, machined, and are currently being polished for the next set of testing. New humidity-controlled tents are being constructed to house additional specimens. To address the problem of air instability in mixes with low paste contents and superplasticizers, new admixtures (Master Builders) have been obtained for future concrete mixes used to cast ring specimens.</p> <p>Molds are being constructed to perform permeability tests for selected optimized mixes. These tests will be of special interest for mixes containing coarse ground cements to increased permeability.</p> <p>Reservations have been made for the second annual meeting of state representatives and FHWA officials for the project to be held at the Kansas City Airport Hilton on May 7, 2004. Information has been sent to the participants regarding room reservations.</p> <p>Project Personnel: David Darwin (Principal Investigator), JoAnn Browning (Co-Principal Investigator)</p>		

SUMMARY OF ACTIVITIES EXPECTED TO BE PERFORMED NEXT QUARTER:

The second annual meeting of state representatives will be held at the Kansas City Airport Hilton on May 7, 2004. An agenda and travel information will be sent to all participants in the early in the quarter. The meeting will focus on finalizing the research bridge deck construction specifications and the identification of 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.

Work will continue to optimize concrete mix designs. Goals for the next quarter include casting permeability test specimens to further evaluate the effects of using coarse-ground cement and mineral admixtures. The shrinkage properties of the optimized mixes with various cement and aggregate contents and chemical and mineral admixtures will continue to be evaluated using restrained and free shrinkage specimens.

STATUS AND COMPLETION DATE

Percentage of work completed to date for total project is: 20

 X on schedule behind schedule, explain:

Expected Completion Date: March 31, 2008