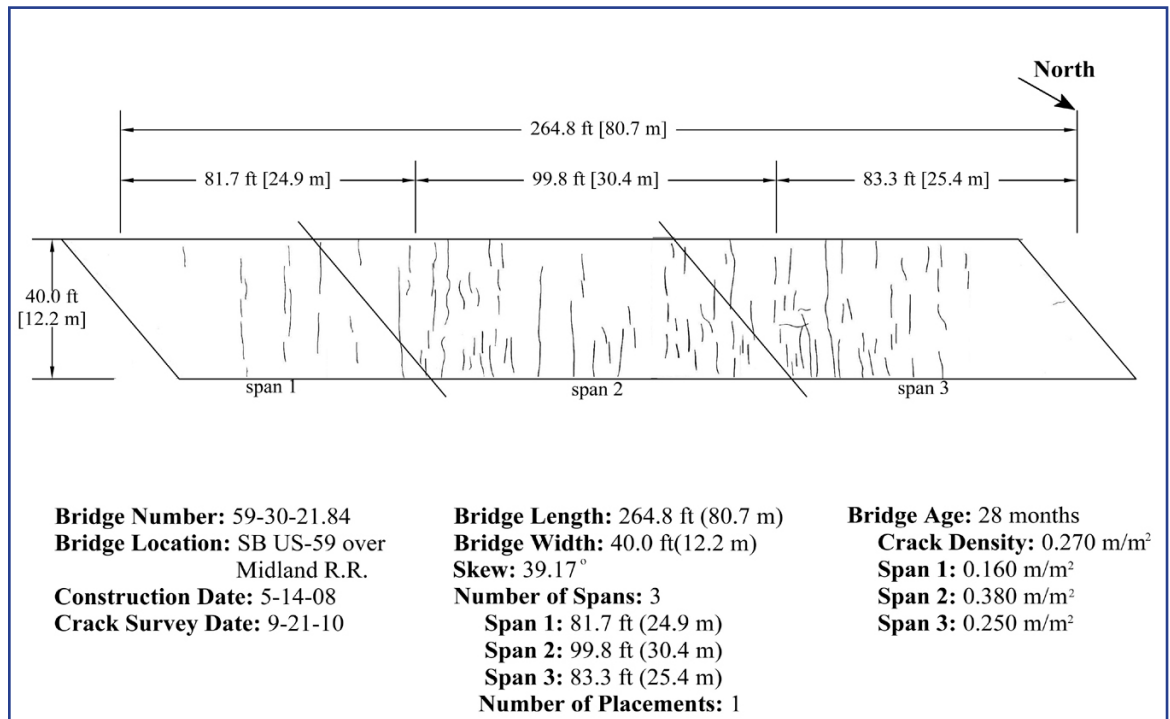


Use of Innovative Concrete Mixes for Improved Constructability and Sustainability of Bridge Decks

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Pankaj Narayan Shrestha
Amber Harley
Benjamin Pendergrass, Ph.D., P.E.
David Darwin, Ph.D., P.E.
JoAnn Browning, Ph.D., P.E.
The University of Kansas



US-59 5 (Survey 1)

Introduction

Bridge deck crack surveys were performed on twelve bridges on US-59 south of Lawrence, Kansas, to determine the effects of mixture proportions, concrete properties, deck type, and girder type on the crack density of reinforced concrete bridge decks.

Project Description

Of the twelve decks surveyed, eight are supported by prestressed concrete girders and four are supported by steel girders. Four of the decks supported by prestressed girders are cast on partial-depth precast deck panels, two are monolithic with synthetic fibers, and two have

overlays. Of the four decks supported by steel girders, two have silica fume overlays (SFO) and two are monolithic. One of two decks with a silica fume overlay contains synthetic fibers in the overlay. Following the surveys, crack maps were plotted and analyzed and cracking trends were observed. The results for the US-59 bridge decks are compared with crack densities obtained in a study of low-cracking high-performance concrete (LC-HPC) bridge decks.

Project Results

The monolithic concrete bridge decks supported by prestressed concrete girders within this study exhibit less cracking than decks supported by steel girders. At an age of approximately three and a half years, the US-59 monolithic decks supported by prestressed girders with deck panels are not displaying significant cracking; most of the cracks are short transverse cracks aligned with the joints between the deck panels. The US-59 decks supported by prestressed girders with overlays exhibit significantly more cracking than the decks on prestressed girders without overlays. Bridge decks supported by steel girders without overlays have slightly higher crack densities than the decks with overlays. No benefits of using fibers in either the overlay or deck have been observed in this study, the sample size, however, is small. An increase in crack density was observed with an increase in average concrete slump for decks supported by both prestressed and steel girders. Decks with deck panels supported by prestressed girders exhibited an increased crack density with an increase in paste content.

Project Information

For information on this report, please contact Dr. David Darwin at the University of Kansas Department of Civil, Environmental, and Architectural Engineering; 2150 Learned Hall, Lawrence, Kansas 66045; 785.864.3827; daved@ku.edu.

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