



# KANSAS

## DEPARTMENT OF TRANSPORTATION

### CROSS-FRAME DIAPHRAGM BRACING OF STEEL BRIDGE GIRDERS

Report Number: K-TRAN: KU-01-2

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#### Introduction

Steel plate girder bridges make use of traditional cross-frame diaphragms to stabilize the compression flange of girders. These braces are required during construction, especially during deck placement, to prevent lateral torsional buckling of bridge girders. Girder buckling capacity is a function of cross-frame diaphragm spacing as well as strength and stiffness. Recent developments in bridge design may cause the governing girder limit state to shift from one of strength to one of stability. These developments include the elimination of in-plan bracing, composite girders, High Performance Steels, and phased deck replacements. In addition, the American Association of State Highway and Transportation Officials (AASHTO) has changed its code requirement for cross-frame diaphragm spacing in the 1998 AASHTO LRFD Bridge Design Specifications. The requirement for 25-foot maximum brace spacing has been removed. The current requirement is for a “rational analysis” to determine cross-frame diaphragm spacing. Explanations of the problems these changes cause in design are discussed.

#### Project Objective

This review looks at the function, design and current practices with regard to cross-frame diaphragms to provide a safe and economic brace design following a comparison survey of design methods using the Steel Bridge Collaboration (SBC).

#### Project Description

A case study is presented of a bridge that suffered construction difficulties during deck placement.

#### Project Results

This investigation found that the cross-frame diaphragms were not stiff enough to brace the plate girders during the deck placement. Suggestions are given as to an efficient, economical design and spacing for cross-frame diaphragms on plate girder bridges.

#### Report Information

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For a copy of the full report, please contact: KDOT Library; 700 SW Harrison Street, Topeka, Kansas 66603-3754; Phone: 785-291-3854; Fax: 785-291-3717; e-mail: [library@ksdot.org](mailto:library@ksdot.org).