

# MOUNTAIN-PLAINS CONSORTIUM

PROJECT BRIEF | MPC 15-298 | December 2015

## Innovative and Economical Steel Bridge Design Alternatives for Colorado



### the **ISSUE**

This report presents an alternative method to construct steel bridges with continuous spans, which is safer and more economical than the standard practice of using bolted steel splice plates to achieve continuity.

### the **RESEARCH**

Simple-made-continuous (SMC) steel bridges are a relatively new innovation in steel bridge design. The SMC concept has been used for quite some time in the construction of precast concrete bridges and based on current statistics, precast concrete bridge construction is outpacing steel bridge construction by a factor of two to one. The SMC concept is a viable solution for steel bridges to recover market share of the bridges constructed in the United States. The majority of SMC bridges currently in use are constructed with concrete diaphragms. This study presents the results of numerical analysis and laboratory testing of an alternative simple-made-continuous connection scheme that uses steel diaphragms in lieu of concrete diaphragms. A bridge using steel diaphragms was constructed by the Colorado Department of Transportation in 2005 and the connections on this bridge serve as a basis for this research.



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Colorado State University  
North Dakota State University  
South Dakota State University

University of Colorado Denver  
University of Denver  
University of Utah

Utah State University  
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### Project Title

Innovative and  
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Design Alternatives for  
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### Sponsors | Partners

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Innovative Technology  
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## the FINDINGS

The results of analysis and physical testing provided information necessary to correct design flaws and data for the development of a design methodology based on the actual physical behavior of the SMC connection. Also, particular behaviors noted in the finite element analysis were corroborated with the physical test and the design methodology recognizes these behaviors.

## the IMPACT

The research provided information to correct flaws in previous construction as well as documentation that verifies that the proposed methodology is not only more economical than constructing fully continuous bridges, but is also more economical and less time consuming than schemes involving connecting the girders in concrete diaphragms.

For more information on this project, download the entire report at <http://www.ugpti.org/resources/reports/details.php?id=834>

For more information or additional copies, visit the Web site at [www.mountain-plains.org](http://www.mountain-plains.org), call (701) 231-7938 or write to Mountain-Plains Consortium, Upper Great Plains Transportation Institute, North Dakota State University, Dept. 2880, PO Box 6050, Fargo, ND 58108-6050.



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