

<b>UTC Project Information</b>	
Project Title	MPC-500 – Rehabilitation of Longitudinal Joints in Double-Tee Bridge Girders
University	South Dakota State University
Principal Investigator	Nadim Wehbe
PI Contact Information	John M. Hanson Professor and Department Head Department of Civil and Environmental Engineering South Dakota State University Phone: (605) 688-4291 Email: nadim.wehbe@sdstate.edu
Funding Agencies	USDOT, Research and Innovative Technology Administration
Agency ID or Contract Number	DTRT13-G-UTC38
Project Cost	\$160,000
Start and End Dates	September 30, 2013 to September 30, 2018
Project Duration	September 30, 2013 to September 30, 2018
Brief Description of Research Project	<p>In a recent SDDOT research project (SD2013-01), which was co-funded by SDDOT and the Mountain Plains Consortium (MPC) University Transportation Center, SDSU researchers investigated the development of a new longitudinal joint detailing for improved performance of double-tee girder bridge systems. The researchers tested at the Lohr Structures Lab two full-scale 23" deep double-tee girder bridge system specimens under fatigue loading. The fatigue load was determined in accordance with AASHTO specifications (AASHTO, 2012). The objective of the tests was to determine the long term performance of longitudinal joints built according to the current standard detailing and to an alternative proposed detailing. The fatigue test results revealed severe inadequacy of the standard joint and exceptional performance of the proposed joint. The standard joint started to leak at the equivalent of 4 years in service and the first weld failure in a joint connection occurred at the equivalent of 12 years of service. Most of the welded connections failed at the equivalent of 16 years in service. On the other hand, the specimen with the proposed joint detailing was subjected to fatigue loading equivalent to more than 100 years of service without showing any significant joint or stiffness degradation (Konrad, 2014).</p> <p>Currently, there are hundreds of double tee bridges on South Dakota highways that were built using the standard joint detailing. Based on observed field performance and test results, those bridges may be deteriorating at a fast rate and their useful lifespan may be much shorter than the expected 50 – 75 years. While new bridges can be built using the proposed joint detailing developed under project SD2013-01, replacing the currently existing deficient bridges would be cost-</p>

	<p>prohibitive. Therefore, a cost-effective retrofit to upgrade the joints of existing bridges would be an attractive alternative to replacing deficient bridges and extending the life span of existing bridges.</p> <p><b>Research Objectives</b></p> <ol style="list-style-type: none"> <li>1) Review and evaluate rehabilitation methods for longitudinal joints on double-tee bridge girder systems.</li> <li>2) Test longitudinal joint rehabilitation designs for the existing double-tee girder system used in South Dakota for fatigue and ultimate load.</li> <li>3) Recommend a longitudinal joint rehabilitation method for double-tee girders in South Dakota based on performance and cost-effectiveness.</li> </ol>
<p>Describe Implementation of Research Outcomes (or why not implemented)</p> <p>Place Any Photos Here</p>	<p>Construction guidelines were recommended for the rehabilitation of longitudinal joints of double-tee girder bridges using two methods: pocket and continuous details. Local governments in South Dakota will now have more options to preserve their bridges instead of girder or bridge replacement.</p>
<p>Impacts/Benefits of Implementation (actual, not anticipated)</p>	<ol style="list-style-type: none"> <li>a. Development of two rehabilitation methods for double-tee bridge girder-to-girder joints. The pocket rehabilitation detail offers 70% cost saving compared with bridge superstructure replacement.</li> <li>b. Extending the service life and eliminating the need for replacement of many existing double-tee girders/bridges.</li> <li>c. A final report to disseminate the findings to DOTs, bridge engineers, local governments, and bridge owners,</li> <li>d. Education of an MS student.</li> </ol>
<p>Web Links</p> <ul style="list-style-type: none"> <li>• Reports</li> <li>• Project Website</li> </ul>	<p><a href="https://www.ugpti.org/resources/reports/details.php?id=962">https://www.ugpti.org/resources/reports/details.php?id=962</a></p>