

<b>UTC Project Information</b>	
Project Title	MPC-400 – Evaluation of Ice Loads on Bridge Piers in South Dakota (Years 2 & 3)
University	South Dakota State University
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Funding Agencies	USDOT, Research and Innovative Technology Administration
Agency ID or Contract Number	DTRT12-G-UTC08
Project Cost	\$83,666
Start and End Dates	January 1, 2012 – December 31, 2013
Project Duration	2 Years
Brief Description of Research Project	<p><b>Research Needs:</b> Ice load on bridge structure is one of the major components for Extreme Event load combinations specified in the AASHTO Code. In seismic inactive regions such as South Dakota, ice load can be the predominant lateral load that governs the design of bridge substructures. Accurate estimation on the magnitude of ice forces that act on bridge piers and abutments in northern climates is a major concern in the design of new bridges and in the evaluation of existing bridges. While empirical equations were provided by AASHTO to calculate the design ice load based mainly on effective ice strength and thickness, these formulas were developed assuming thick ice formation which is quite different from the “ice cakes” that form on South Dakota rivers. Thus even with very accurate ice strength and thickness values, ice load calculated based on AASHTO formulas may still be inaccurate. This inaccuracy will lead to inappropriate pier designs that may cost the public in the long run.</p>

	<p>Field measurement of ice load is the most direct and accurate approach to obtain local pier-ice interaction data and has seen its applications in several cold region bridges (e.g. Brown et al. 2010). The proposed work focuses on directly measuring ice load at critical sites in South Dakota and comparing the actual load statistics with codified load values. Combined with existing studies on ice conditions formerly conducted within the state (USGS report released in 2002), the information gathered in this study will provide the bridge designers with more accurate and confident ice load values for new bridge design as well as existing bridge evaluation.</p> <p><b>Research Objectives:</b>  The objectives of the proposed study include: 1) Develop an efficient and easy-to-implement ice load monitoring system for bridge sub-structures in cold regions; 2) Accurately monitor extreme ice loads exerted on bridge piers at selected site in South Dakota; and 3) Provide recommendation for the application of AASHTO ice load section in South Dakota based on measured ice loads.</p>
<p>Describe Implementation of Research Outcomes (or why not implemented)</p> <p>Place Any Photos Here</p>	<p>Based on limited data, it is safe to use the AASHTO ice load calculation with the highest effective ice strength and without small stream reduction.</p>
<p>Impacts/Benefits of Implementation (actual, not anticipated)</p>	<p>Research results confirmed the safety of the current ice load calculation practice adopted by SD DOT. Improved ice load estimations will allow for appropriately-designed bridge substructures that optimize construction cost without sacrificing safety.</p>
<p>Web Links</p> <ul style="list-style-type: none"> <li>• Reports</li> <li>• Project Website</li> </ul>	<p><a href="http://www.ugpti.org/resources/reports/details.php?id=892">http://www.ugpti.org/resources/reports/details.php?id=892</a></p>