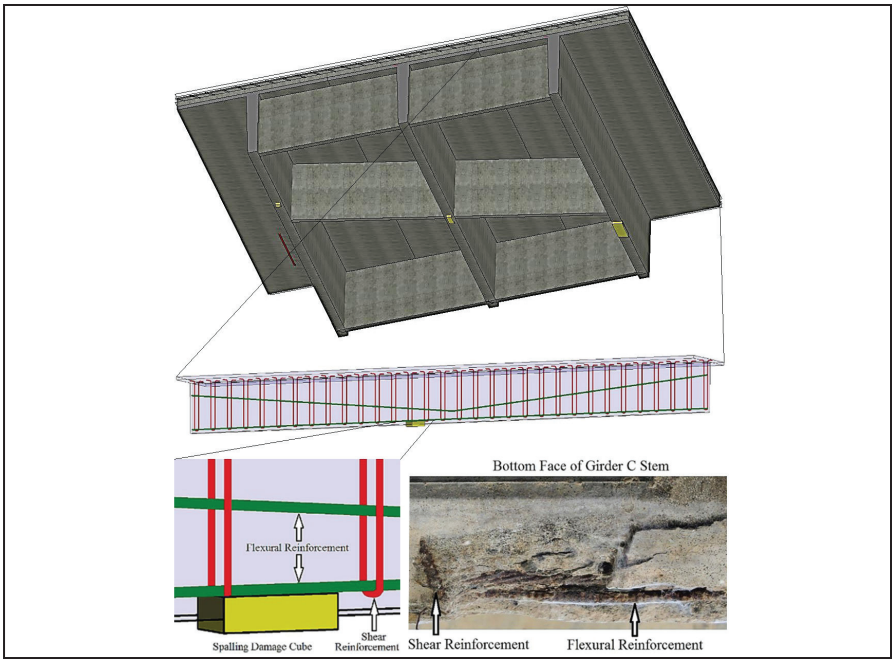
MOUNTAIN-PLAINS CONSORTIUM

RESEARCH BRIEF | MPC 16-310 (project 450) | August 2016

Using Building Information Modeling to Track and Assess the Structural Condition of Bridges



the ISSUE

Quality information about bridge condition can help allocate maintenance resources. Documenting the results of bridge inspections in a way that allows for efficient reuse of the information is challenging. Building information modeling (BIM) is software that has the potential to provide a significant improvement in the documentation of inspection findings.

the RESEARCH

This study investigated the capabilities of several existing BIM software packages to determine their applicability to the challenge of documenting bridge condition data. Specifically, we considered the ability of the software to accept, store, and export information about the type, location, and severity of bridge damage. Autodesk Revit was identified as the software package with existing capabilities most adaptable to the bridge documentation problem, and the ability to document bridge condition with Revit was demonstrated on a sample bridge. Subsequently, to demonstrate the utility of storing the additional bridge condition data an analysis tool was written using Visual Basic in Microsoft Excel that could accept the exported condition information and use it to calculate load ratings for bridge elements and approximate repair quantities.

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A University Transportation Center sponsored by the U.S. Department of Transportation serving the Mountain-Plains Region. Consortium members:

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North Dakota State University
South Dakota State University
University of Colorado Denver
University of Denver
University of Utah
Utah State University
University of Wyoming

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Project Title

Using Building Information Modeling to Track and Assess the Structural Condition of Bridges

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the FINDINGS

Although no BIM software package was fully ready to accept the desired damage information, Revit was found to have the best flexibility to accommodate the alternative usage. The inspection and load rating calculations on the sample bridge demonstrated the significance of considering location when including the effect of damage. The BIM model was able to show the proximity of the steel reinforcing strand to the sections of missing concrete. Use of the sample bridge also demonstrated that, although the more detailed inspection might take additional time to conduct, there is the potential for time savings at the data analysis and maintenance planning stages. The report also suggests enhancements to BIM software that would further facilitate its use for bridge inspection documentation.

the IMPACT

This project demonstrates to agencies conducting bridge inspections the potential of BIM to allow them to take fuller advantage of visual bridge inspections. BIM gives agencies the opportunity to document what they observe as opposed to somewhat subjective bridge inspector ratings. The documented condition of the bridge can then be used to determine inspector ratings if required, and also to calculate bridge load ratings and maintenance quantities. BIM also provides a platform to store several different types of bridge inspection data, including visual inspections, NDE testing, and destructive tests, in one comprehensive bridge model facilitating data-driven decision making.

For more information on this project, download the entire report at http://www.ugpti.org/resources/reports/details.php?id=849

For more information or additional copies, visit the Web site at 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.