



Engineers at local agencies can refer to the results of this project to report the load capacity, as required by federal regulations, for any bridge in the state built according to Iowa DOT standards.

RESEARCH SOLUTIONS

Iowa DOT updates load capacity calculations for standard bridges

Iowa DOT shares standardized bridge plans with cities and counties across Iowa, significantly reducing design and construction costs for these smaller agencies. Like all bridges in service in the U.S., these standard bridges are subject to strict federal regulations that include routine inspections and calculated load ratings—a measure of the bridge's capacity to carry vehicle loads. As laws change and vehicles become larger and heavier, bridge standards must also be reevaluated. The project team incorporated data for three types of standard bridges into a single document that can be used to determine the load rating for any standard bridge in Iowa.

THE NEED

There are approximately 24,000 bridges in Iowa, 82% of which are owned and managed by cities and counties. To reduce costs and ensure consistency, these smaller governmental authorities have designed and built thousands of

bridges according to standardized plans, which Iowa DOT maintains and makes publicly available. Using these standards, smaller governmental authorities have saved millions of dollars in design and construction costs over the years.

The federal government maintains a national bridge database and requires bridge owners around the country to routinely inspect and report on more than 100 different details about each bridge, including its load rating. As reporting guidelines and state and

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“By updating the design standards and making them available to all of Iowa’s bridge owners, Iowa DOT is helping smaller agencies save money.”

— JAMES HAUBER,
Iowa DOT Bridge Rating Engineer

federal regulations change, and as new designs and configurations of heavy trucks become more common on the roadways, Iowa DOT must regularly reevaluate and update its bridge standards. This helps all bridge owners in the state maintain compliance with federal reporting requirements.

PROJECT APPROACH

The project team focused its efforts on three types of standard Iowa bridges: slab, concrete beam, and rolled steel beam. Since these bridges are built using a variety of widths, span lengths, and other optional components, the team could anticipate all possible bridge configurations and then determine the load capacity for each. They did this by developing a complete electronic model of each bridge configuration, then entering all of the structural details for each configuration into AASHTOWare Bridge Rating, a state-of-the-art software tool developed by the American Association of State Highway and Transportation Officials (AASHTO).

Since the reliability of the tool’s output is dependent on the accuracy of the data entered into it, the team added several quality-control measures throughout the process and created a custom spreadsheet that would alert them to possible anomalies. By continually checking the data and conducting periodic comparisons of known and expected results, the team could spot and prevent potential transcription errors

while simultaneously validating the tool’s reliability.

Tabulating the compiled data, the team created a reference document containing dozens of tables representing hundreds of possible combinations of bridge characteristics and vehicle configurations. Engineers can rely on this single source to determine the load rating of any bridge in the state that was built according to one of these standard designs.

WHAT IOWA LEARNED

For drivers in Iowa, the updated load ratings will not impact everyday travel. However, if a bridge owner determines that a type of heavy truck or vehicle configuration exceeds the structure’s load carrying capacity, a load limit sign will be posted at both ends of that bridge to restrict those drivers from crossing the bridge. By restricting access for some heavier vehicles, engineers can keep the bridge in service longer for all motorists.

In addition to updating load capacities for Iowa’s standard bridges, this project also contributed to Iowa DOT’s Structure Inventory and Inspection Management System as well as the national bridge database by allowing the addition of thousands of load rating values to the record.

PUTTING IT TO WORK

With updated load ratings now available, engineers across the state

can assign the appropriate load ratings to any bridge built according to these standards. Local agency engineers can easily determine if a bridge can be crossed by specific vehicles requesting a permit for travel on their roadways.

ABOUT THIS PROJECT

REPORT NAME:

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