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ABOUT THIS PROJECT

PROJECT NAME: Determination of U-Bolt Connection Load Capacities in Overhead Sign Support Structures Phase II

PROJECT NUMBER: RE-23010

PROJECT FUNDING PROGRAM:
State Planning and Research

PROJECTED END DATE: October 2025

PROJECT CHAMPION:
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RESEARCH IN PROGRESS

Determining the strength of U-bolts in overhead sign trusses will guide highway designers

As highways across the United States are widened and overhead signs become larger to accommodate the needs of more travelers, the sign trusses supporting these informational and directional signs must resist greater loads and span more traffic lanes. Digital message signs, which have more mass than traditional aluminum signs, are especially susceptible to strong winds and other significant stressors.

For more than 40 years, Iowa DOT has utilized U-shaped bolts for important structural connections in its overhead sign support trusses. To ensure these connections can safely resist the current design loads as well as the larger forces anticipated in the future, Iowa DOT initiated a multi-phase project to determine the

ultimate load capacities and fatigue performance of these connections.

“Although these U-bolts have performed satisfactorily in the past, we don’t really know their limitations,” explained Harold Adcock of the Iowa DOT Bridges and Structures Bureau. “As the signs get larger and the support trusses span wider roadways, we want to be confident the U-bolt connections will continue to hold up.”

In the first phase of the project, researchers looked into the ultimate load capacities of the U-bolts and identified a few issues for further investigation. In the second phase, the team will conduct a variety of laboratory and field tests and develop numerical simulation models to more accurately determine the ultimate load capacities as well as

the fatigue resistances for different types of U-bolt connections.

Once the research is completed, Adcock said the benefits will likely extend far beyond Iowa’s borders.

“These results will be valuable to other states that use similar designs for their sign support structures,” he said.

The research is expected to conclude in October 2025.

To learn more about this project and subscribe to updates, visit [Idea #3252](#).

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