



## STRUCTURES COMPLETED RESEARCH PROJECT

PROJECT NAME: TRUCK PLATOONING EFFECTS ON GIRDER BRIDGES  
PROJECT NUMBER: SPR-P1(20) M030

### RESEARCHERS

Joshua Steelman, Jay Puckett,  
Daniel Linzell, and Bowen Yang

### TECHNICAL ADVISER COMMITTEE (TAC) MEMBERS

**NDOT Leader:** Fouad Jaber  
**NDOT Members:** Mark Traynowicz,  
Babrak Niazi and Kpandji Lakmon  
**Industry Member:** Emilie Hudon-  
Olsson Associates

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### FINAL REPORT

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### PROJECT ABSTRACT

“Truck platooning – digitally linking two or more trucks to travel in a closely spaced convoy – is increasingly used to save fuel and reduce driver work and road congestion. Currently, the platoon load effects with several constant headways on bridges have been evaluated and compared to AASHTO design and legal loads. However, reliability assessment and a more rigorous investigation of headway spacing assumptions for truck platoons are lacking. This research provides a framework for determining how much a platoon permit load might be increased given strict control over the load characteristics and operational tactics. The present research evaluates the Strength I limit state for steel and prestressed concrete I-girder bridges designed with LRFD and LFD. Herein, platoons are assumed to be advanced not only with respect to traffic operations but also in their ability to weigh and report axle weight and spacing, mobile-WIM (mWIM). Consequently, the live load statistics (bias and CoV) differ from code assumptions, and are perhaps controllable, which poses significant opportunity with respect to operational strategies and associated economies.

A parametric study considered different girder spacings, span lengths, numbers of spans, types of structures, truck configurations, numbers of trucks, and adjacent lane loading scenarios. Reliability indices  $\beta$  were calculated for each load case based on the Monte Carlo Simulation Method. The results indicated that loads significantly higher than legal loads are acceptable for truck platoons with lower uncertainties while maintaining a traditional operating target  $\beta = 2.5$ , consistent with permit loading in the Manual for Bridge Evaluation. Live load factors were developed and presented for a potential new permit load, i.e., a platoon permit. This approach helps to inform owners of effective operational strategies to safely benefit economies on a state or multistate corridor basis.”

*As quoted by P.I. Joshua Steelman, in the January 2021 final report abstract –*



EMAIL

[NDOT.RESEARCH@NEBRASKA.GOV](mailto:NDOT.RESEARCH@NEBRASKA.GOV)



WEBSITE



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