UNIVERSITY TRANSPORTATION CENTER

RESEARCH BRIEF

Impact of Autonomous and Connected Truck Platoons in the Pacific Northwest on Transportation Infrastructure

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Background

The operational characteristics of freight shipment will significantly change after the implementation of Autonomous and Connected Trucks (ACT). This change will have major impacts on mobility, safety, and infrastructure service life. Truck platooning is one of truck arrangements that will become feasible in the near future with the connected vehicle technology. It allows and enables trucks to be connected with themselves and with the surrounding infrastructure. The advantage of platooning is reducing traffic congestion, and improving transport and fuel efficiency. The literature lacks major information about the impact of truck platooning on the superstructure and substructure system. However, platooning may accelerate the damage accumulation of pavement and bridge structures due to the formation of multiple load axles within each platoon. The potential damage of infrastructure may arise due to various factors such as the number of trucks in a platoon, gap spacing between trucks and the configuration (similar or dissimilar) of truck platoons and many other factors are not clear in the literature. This damage if accumulates, will cost the country billions of dollar to fix and will affect the mobility of people and goods. The goal of this project is to develop a well-defined framework and data-driven solution of the influence of platooning on existing bridges in the Pacific Northwest to be ready for the near future implementation of ACTs and to preserve the current bridge inventory. The results of this project will be used to develop integrated load rating approach and a preliminary tool and new policies, and standards for professional practitioners.

Research Project

The main goal of this study is to investigate various truck platooning configurations on load rating of existing bridges' super and substructures. A proposed matrix will be presented in the approach section. The results of this proposal will answer the following questions:

1. How long a platoon can be before it begins to pose unacceptable risks to the traveling public?. For instance, if a platoon is exiting an highway, how does that affect other traffic access to the same exit? Will the exit ramp accommodate the platoon length?
2. What happens if a platoon backup onto a bridge?
3. Will a platoon of trucks consist of similar configurations (number of axles with the same axle loading) or mixed configurations will be permitted?
4. What is the minimum gap spacing between trucks? and the minimum spacing between platoon and non-platoon?
5. In addition, the stress range and the number of load cycles caused by a platoon may accelerate shorten the service life and deterioration of the bridge. This will increase bridge maintenance and rehabilitation activities overwhelming bridge owners.

ABOUT THE AUTHORS

The research team consisted of Ahmed Ibrahim of the University of Idaho.

ABOUT THE FUNDERS

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EXPECTED DATE OF COMPLETION

March 2022

FOR MORE INFORMATION

https://depts.washington.edu/pactrans/research/projects/impact-of-autonomous-and-connected-truck-platoons-in-the-pacific-northwest-on-transportation-infrastructure/