

Real Time Simulation of Truck Loads for Reliability Based Code Calibration

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Keywords: *Bridges; Reliability; Truck Loading; Simulation.*

Abstract

A number of civil engineering practice specifications have been advanced to be based on reliability. They include the AASHTO LRFD Bridge Design Specifications and the AASHTO Manual for Bridge Evaluation in the US. An important feature substantiating the reliability concept in these codes is the accordingly calibrated truck load models and live load factors. On the other hand, the reliability based calibration process then was based on very limited truck weight data gathered in Canada. Due to lack of data, the statistical projection to the future maximum load was also done based on a number of assumptions that need to be validated.

It has been three decades or so from then and a large amount of truck weight data has been accumulated. The present research effort uses much more statistically significant truck weight data from many weigh-in-motion stations in the US collected in recent years. These data are used in simulating loads on typical bridge spans. More rigorous statistical analysis and projection are thereby made possible and applied on these data to examine the assumptions used in the calibration process of the AASHTO codes. It was found that many of these assumptions are actually not valid and over conservative. These results have been used to propose more realistic live load models to the AASHTO specifications and they also necessitate a new round of calibration for more reliable modeling and thereby based practice of bridge design and evaluation.