

2022 Mid-Continent Transportation Research Symposium

Ames, Iowa

September 14–15, 2022

intrans.iastate.edu/events/midcon2022/

Evaluation of the Use of IRI Data to Estimate Bridge Dynamic Impact Factor (DIF)

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Abstract

Vehicles travelling over a bridge create a dynamic impact to the bridge structure which, during the bridge design process, is accounted by the Dynamic Impact Factor (DIF). One of the parameters that relate to DIF is the roughness of the road surface (International roughness index - IRI) on the bridge especially near the transverse joint at the entrance. This impact increases the load experienced by the bridge and sometimes, may lead to the damage of the bridge structure. However, determination of DIF through load testing for each bridge is not possible. To determine the DIF for a larger number of bridges without requiring a large-scale instrumentation and load testing data collection efforts, the goal of this project is to correlate readily available IRI data to the estimated dynamic impact factor. To achieve this objective, 15 bridges were selected for the bridge monitoring subject to undisturbed traffic. The data collected during the monitoring was used to estimate the DIF. The IRI data collected at multiple locations before (on and after) the bridge was analyzed and investigated to identify the relation between the IRI and DIF. This correlation allows for the efficient and broadly applicable estimation of dynamic impact factors for all bridges on the state highway system. This information is critical for load rating engineers, such that data-driven and knowledgeable decisions can be made with respect to heavy loads on bridges and the need for overweight vehicles to reduce speed when crossing various bridges.