



# Standardised bridge weigh-in-motion data and its applications in bridge engineering

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## Abstract

Applying actual traffic data in bridge analyses will provide more accurate results compared to the results obtained according to the Eurocode traffic load models. Bridge Weigh-in-Motion (B-WIM) measurements are an excellent tool to produce such data. Using B-WIM data as a part of the bridge design or assessment processes has a large potential, but the lack of widely adopted standardised data format hinders broader utilisation of it. This study proposes a new standardised format to present the measured B-WIM data so that in the future, developed software can directly utilise any available B-WIM data. This would make calculations with multiple different traffic compositions and types straightforward and enable the basis for further utilisation of B-WIM data in bridge design/assessment. To demonstrate the benefits, a fatigue case study of an orthotropic bridge deck was conducted, and the results were compared to ones obtained according to Eurocode FLM 4.

**Keywords:** B-WIM; WIM; fatigue; traffic data; traffic loads; bridges; orthotropic deck; fatigue load model 4; FLM 4.

## 1 Introduction

Notable adjustments were introduced to heavy vehicle weight regulations in Finland during 2013. Within the regulations, changes were made to Gross Vehicle Weight (GVW) limits and maximum axle loads. To observe the effects of these changes, an axle load study was conducted by the Finnish Transport Agency (currently Finnish Transport

Infrastructure Agency). As part of the study, multiple Bridge Weigh-in-Motion (B-WIM) measurements [1] from different locations were conducted during the years 2013-2018, thus offering an extensive view of typical Finnish heavy vehicle traffic and development of it.

In B-WIM systems, the bridge is used as a measuring instrument to determine the properties of passing vehicles, such as GVW, axle weights,