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# Modified traffic load models for reassessment of short-span highway bridges

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## Abstract

Towards the objective of a more differentiated and realistic approach for representing the actual traffic load impact on short-span structures for application in bridge reassessment, actual traffic load impact based on local traffic data, and the resulting structural demands on selected short-span bridge structures are analyzed. Structural models applied consider peculiarities of short-span bridges concerning bidirectional load carrying behavior due to a compact shape of their superstructure. To obtain robust results, additional scenarios are considered to simulate possible, unfavorable traffic constellations on the bridge. The resulting characteristic values of structural demand are used to calibrate a modified traffic load model. The paper presents results of this analysis for selected short-span bridge structures with varying span widths under different representative traffic types, and using different modelling assumptions.

**Keywords:** short-span bridge, reassessment, road traffic, load model, traffic simulation, extreme load effect, highway bridge

## 1 Introduction

Short-span bridges are of significant importance for every infrastructure network. In Germany, they constitute a major part of the bridge inventory along the network of federal highways (exemplary shown for federal highway BAB A92 in Figure 1). In the following context, short-span bridges are referred to as bridges with a span width up to 25 m.

There is a well-known and apparent difference between long-span and short-span bridge structures concerning the general characteristics of traffic load impact and governing traffic parameters for extreme values of resulting structural demands. This is mainly due to geometric constraints and differences in load carrying behavior, with special peculiarities such as distinct bidirectional load carrying behavior or significant effects of dynamic amplification for short span structures.

The load models for highway bridges specified in *Eurocodes* [1] and current guideline for reassessment (*Nachrechnungsrichtlinie*, [2]) in Germany, however, are uniform, to be applied universally, and do not allow for differentiation for short-span bridges (refer also to Figure 2). The background documents describing the related research work reveal also, that short-span bridges were apparently of minor importance in these investigations, and often considered with simplified modelling assumptions [3], [4].

This uniform load model is conservative for short-span bridges in many cases – often due to simple geometrical constraints of the bridge's superstructure. For the design of a new structure,

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