



Change of load-carrying capacity of real bridge structure due to modified reliability levels and planned remaining lifetime

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Abstract

The paper is focused on diagnostic and calculation of load-carrying capacity of bridge object in village Vitanova, Slovakia. The bridge is on the road II/520 connecting town Trstenná and village Suchá Hora near border with Poland and bypass the river Oravica. The bridge object was built in 1957, so, it was 60 years old bridge in time of calculation in 2017. It is reinforced concrete slab bridge of two single spans. In 2016, the Department of Structures and Bridges, the Faculty of Civil Engineering, University of Žilina, was asked to carry out the construction and technical survey and diagnostic of above mentioned bridge. The visual inspection, diagnostic, verifying real dimensions and material characteristics were requested. In 2017, the calculation of load-carrying capacity was done. For determining the load-carrying capacity, the standard approach given in Eurocodes was used. As an alternative, the modified (lower) reliability levels and their adequate partial safety factors according to Eurocodes were used.

Keywords: Diagnostic; load-carrying capacity; bridge; concrete; reliability levels; partial safety factors.

1. Introduction

In 2016, the Department of Structures and Bridges, the Faculty of Civil Engineering, University of Žilina, was asked to carry out the construction and technical survey and diagnostic of bridges on road of second class with denotation II/520 and on road of third class with denotation III/2311. The road II/520 of II. class connects town Trstenná and village Suchá Hora near border with Poland, so the road has a big local significance for cross-border economy and cooperation. It is the main transport traction from region Orava in Slovakia to Poland. The road III/2311 of III. class connects village Vitanová with village Oravice.

The visual inspections, diagnostics, verifying real dimensions and material characteristics and

calculation of load-carrying capacity were requested. There were overall 7 bridges on both roads to diagnostic. The administrator of the road including the bridges is Žilina self-governing region. The paper is focused on one bridge from set of bridges, which was diagnosed and verified by authors of the paper. The calculation of load-carrying capacity was done in 2017 in a diploma work [1].

2. Basic parameters about existing bridge structure

A road pavement of the width of 8.00 m is asphalted in a cross fall 2.0%. Its thickness was not accurately identified, but given the dimensions and assumptions measured, the estimated road thickness is about 100 mm. The pavement is