STRUCTURE EVALUATION OF MEDIUM SPAN STEEL BRIDGES

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Summary

In last few years' a significant number of highway and railroad structures in Croatia were built and repaired. Among them are bridge ″Gacka″ (55m + 90m + 55m) and bridge ″Jasenovac″ (60.55m + 120m + 55,35m). Two bridges were constructed from steel and they are continuous static system over three spans. Superstructure consists of the orthotropic steel slab with box girders. Like all bridges in Croatia, these two were tested according to the Croatian regulations and norms before they had been opened for traffic. Static and dynamic load testing involved the process of loading and observation of the related reactions of an existing structure for the purpose of assessment load bearing capacity, safety and serviceability. Paper describes testing procedure (static and dynamic), measurements methods, and analytical models of structures. Each bridge has been modelled with different approach. Some results of comparing measured and calculated data of both bridges are also shown. This study were conducted to find out witch model matched better the actual situation of the tested structures.

Keywords: test load, static load, dynamic load, analytical modelling, assessment

1. Introduction

The most accepted mode for structural evaluation is the finite element approach. This approach consisted of modelling and comparing measured and calculated data if testing has been conducted. The finite element model could be subsequently improved to match to the actual situation according to the evaluation of measured data from bridge testing. Once a calibration has gained a certain level of completeness, analytical prediction provides a quantitative knowledge and hence is useful tool to support structural evaluation, decision making and maintenance strategies [1]. The initial stiffness of the service load level can be estimated by the fundamental frequency of the bridge structure obtained from vibration tests, static loading tests, and the major experimental information collected by the continuous monitoring system. This calibration of the analytical model is then adapted to the load-deflection response of the existed bridge structure. [2].

Those activities had been conducted on every important bridge constructed in last five years as regularly procedure of bridge condition evaluation in Croatia. Data's got in those testing will be used in process of development Croatian Bridge Monitoring System as a reference state of each bridge.

2. Technical data

2.1 Bridge Jasenovac

Bridge Jasenovac was built in late 1970's as a concrete box girder bridge structure. It crosses river Sava and it is part of important road between Croatia and Bosnia and Herzegovina. During War for Independence, bridge was completely destroyed. After the war, bridge was totally reconstructed but it was decided that main structure will be made from steel due to problems with existed foundations. Static system is continuous beam over three spans, 62+120+55 meters (Fig. 1). Bridge superstructure (Fig. 2) is a box girder with orthotropic steel plate. Height of cross section of box girder varies from 4.5 m above columns to 2.4 m in the mid of the main span and above abutments. The driveway is the orthotropic steel plate 14 to 16 mm thick with torsion stiff closed stiffening of 8 mm thick plate at 570

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