Available online at www.sciencedirect.com

ScienceDirect

Procedia Engineering 156 (2016) 380 – 387

Procedia Engineering

www.elsevier.com/locate/procedia

9th International Conference „Bridges in Danube Basin 2016“, BDB 2016

The road steel bridge over Bosut river in Serbia Part 2 – Repair and Reconstruction

Vlastimir Radonjanin[a], Đorđe Lađinović[a]*, Dušan Kovačević[a], Mirjana Malešev[a], Andrija Rašeta[b], Radoslav Lekić[c]

[a]*PhD, Full Professor, University of Novi Sad, Faculty of technical sciences, Department of Civil Engineering and Geodesy, Dositeja Obradovića Square 6, 21000 Novi Sad, Serbia*

[b]*PhD, Assistant Professor, University of Novi Sad, Faculty of technical sciences, Department of Civil Engineering and Geodesy, Dositeja Obradovića Square 6, 21000 Novi Sad, Serbia*

[c]*Teaching Assistant, University of Novi Sad, Faculty of technical sciences, Department of Civil Engineering and Geodesy, Dositeja Obradovića Square 6, 21000 Novi Sad, Serbia*

Abstract

The paper presents an approach to repair and strengthening of the road steel bridge over Bosut river in Serbia. In the previous period, bridge structure suffered serious damages, including: corrosion of steel material, dysfunctionality of pillar bearings, deterioration of dilatations, cracked asphalt pavement layer and other mechanical damages. Firstly, in order to choose a proper repair technique, identification of basic material was performed by analyzing the mechanical properties of the samples, taken from the steel elements. Following the identification of a steel class, allowable stresses and ultimate stresses of structure were determined. All types of loads in the previous service life of the bridge, as well as possible loads for the future exploitation, were considered. The realization of repair is divided into three execution phases. The first phase includes restoring bridge to proper condition: the repair of corroded and deformed steel elements, repair of bearings, dilatation enabling, repair of river piers, anticorrosion protection and new pavement layer. Second phase refers to the improvement of traffic characteristics of the bridge, i.e. improvement of traffic flow by pavement enlargement. In addition, possible measures to improve the characteristics of the bridge structure were given and include the construction of new piers with supports in place of the current joints, which represents a possible replacement of the basic structural system (third phase).

Peer-review under responsibility of the organizing committee of BDB 2016

Keywords: Repair,damages; repair; durability, safety, load bearing capacity, serviceability

* Corresponding author. Tel.: +38163561527

E-mail address: ladjin@uns.ac.rs

Peer-review under responsibility of the organizing committee of BDB 2016

doi:10.1016/j.proeng.2016.08.311

1. Introduction

The paper presents the repair of road steel bridge from the XIX century in Morovic, Serbia [1]. The bridge was built at the beginning of the twentieth century and it is used for road transport. The appearance of the bridge is shown in Figure 1, while the basic data on the bridge structure are given in Table 1.

Fig. 1. Appearance of road steel bridge in Morovic

Table 1. Basic data on the brige over Bosut river – overview

Characteristic	Description
Location	The village Morovic, Municipality Sid. River Bosut
Construction period	Probably between 1900 and 1910. Built by the company Schlick DD, Budapest.
Bridge type	Road bridge for local traffic. Steel bridge structure made of mild steel, riveted.
Period of the first reconstruction	According to oral information of investor – the pavement structure was replaced in 1979-1980 period. The designer and contractor unknown.
Basic measures	ΣL = 10,77 + (27,20+69,00+27,20) + 10,77 = 144,94 m. Pavement width: b = 4,50 m. Pedestrian paths width: b = 2 x 0,75 m. The overall width of the bridge = 6,80 m.
Static system	Simpe beams with cantilevers and pivotally supported access beams (Gerber system).
Piers	Both coastal pillars: built of reinforced concrete. Both river piers: built of brick and stone blocks.

Within the first part of this work (Part 1 – Assessment) certain conclusions were drawn, based on which repair solution must fulfill following requirements:

- provide structure to act according to designed supports configuration, i.e. enable uninterrupted dilatation of structure, in the global structure system;
- raise the local stability of all main girders' truss members that do not meet both loadbearing capacity criteria: permissible stresses and ultimate limit state criterion;
- replace all dilatation devices with those waterproof;
- renew pavement surfacing, however do not choose asphalt;
- protect structure from corrosion;
- protect structure from the effects of harmful agents from the pavement;