CONSERVATION OF THE HISTORICAL BRIDGES IMPORTANT HISTORICAL SIGHTS

Researcher PhD eng. Anamaria FEIER, Researcher PhD eng. Monica BUZBUGAN,
Assoc. prof. Oana CHIVU
INCD URBAN INCERC, Traian Lalescu 2, Timisoara, Romania, Asociatia de Sudura din Romania
National R&D Institute for Welding and Material Testing, Mihai Viteazul 30, Timisoara, Romania
IMST Bucuresti

e-mail: anamaria.butisca@yahoo.com.au, mdobra@isim.ro, virlan_oana@yahoo.co.uk

Abstract: Lack of information about the history, the necessary data about the material characteristics and the presence of structural defects, leads to the need for detailed studies that have as a result more accurate determinations of the safety. The aim of this paper is to highlight the importance of a historic steel cantilever bridge in historical area from the city who host the structure.

Keywords: historical bridges, historical sights, Rehabilitation

1. INTRODUCTION

Bridges appeared at the crossing rivers, deep valleys, etc., and have evolved from tree trunks placed over the obstacle to complex solutions. Some natural bridges were formed by erosion of rocks, while some are still in operation today. An example of natural bridge is the so called "Bridge of God" from Ponoarele village.

After 1850 when the industry has developed a lot, the question of using mild steel in structure of bridges appeared. In Romania the first bridge of mild steel was built in 1895, it was named King Carol I bridge and it was built by Saligny. After 1900, more precisely in 1914, Traian bridge was erected in Arad.

Fig. no. 1: King Carol I and bridge Traian
2. DESCRIPTION OF THE TWO HISTORICAL BRIDGES FROM ROMANIA

Description of “King Carol I” bridge

Bridge "King Carol I" has 5 openings 4x140m +1 x190m consoles of 50 m

It was inaugurated in 1895, it was the first steel bridge built in Romania. Saligny made a documentary visit on the site of the Firth of Forth bridge, in order get same answers for the design and construction of the bridge “ King Carol I”. An attempt to start the project was in 1887 when it was the first design contest, but only after the second design contest the company that provides delivery of the deck was established. The name of the company was Fives-Lille from Paris. The material used was mild.

The most important structural rehabilitation was in 1963. Consolidation was achieved in continuous circulation since the bridge had a significant importance in the communication paths so that breaks in service for consolidation were short of about 90-180 minutes a day.

Description of “Traian” bridge of from Arad, bridge over Mures River

Traian Bridge from Arad has 3 openings, carriageway width is 8.05 m and the width of the bridge is 9.6 m There are walkways that are suspended circulating width 1.5 m each of them. Traian Bridge was carried out between 1912-1914, deck frame was machined in Resita in The Bridge Factory. Now it is one of the iconic structures of Arad, part of the city's architectural heritage.
Bridge’s curves form gives the impression of a suspension bridge, but in reality it is the classical system of trusses with Gerber type joints. The bridge has three spans and a total length of 185 m:
- central span 85.30 m
- marginal openings 50.05 m

The cross sections of the main truss girders are composed of angle sections interlocked and riveted strap conductors with the following sections:
- lower chord sections riveted with two vertical walls in the form of \( \Pi \)

Both bridges are Structural systems Decks with Gerber beams, cantilevers. A cantilever bridge is a structure using cantilevers, which are horizontal structures supported only on one end. Cantilevers must be anchored (or counterweighted) on one side in order to hold up the necessary weight on the free standing side.

Structural systems Decks with Gerber beams have the following characteristics:

Advantages:
- Best balancing of moments between spans and supports
- No settlements stresses
- Esthetic appearance

Disadvantages:
- Less rigidity
- Serious danger of deck fall during earthquakes due to narrow supports
- Special connecting systems, required to reduce possibility of fall

Structural verification of historical steel bridges is done by specific rules of the administration who have them in heritage.

It is important and necessary to maintain the operation of old metal road bridges.

Most of the steel bridges are built in the early twentieth century, with some great historical and artistic value as true monuments of the art construction. Their appearance is exquisite integrate harmoniously into the landscape. The current international trend is to keep operating safely the existing structures. For this purpose, information about the life and history of the bridge is necessary. In the western part of the country there are currently a large number of road bridges, built in the late nineteenth and early twentieth century, particularly bridges aesthetically capturing the elegance and slenderness. Structures still in good condition lasts, although in many cases poor maintenance is recorded numerous defects, collisions, broken parts, damaged and corroded some of them characterized by the total lack of documentation.

Rehabilitation of bridges is done by means of two methods:

- **direct rehabilitation**
  - Adding new material to the old riveted elements. This gives a higher load capacity. In general for old deck, the new parts are not welded, only in exceptional cases.
Indirect rehabilitation

- Introduced additional material by independent structural parts, works with existing structure as a whole becomes operative structures and especially for mobile tasks.
- Rehabilitation is usually indirect curved elements by introducing a prestressed tie the feet stretched.

CONCLUSIONS

The safety of structures, including many important aspects of vulnerability, is an issue of general importance for a society. When structure fails, the subsequent consequences can be severe, resulting in loss of life, damage to environmental quality and economic losses to society. A large number of bridges are located in cities as the flagship for the area. Once rehabilitated can be also integrated into the city's heritage.

REFERENCES


[15]. Butişca A.;Rominu S., ”Bridge King Carol I at 116 years” Scientific Bulletin of the Politehnica University of Timisoara. Transactions on Hydrotechnics, ISSN 1224-6042, ISSUE 56(70) No. 2 2011, pp.75-79