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REHABILITATION OF THE EXISTING 4 SPAN CONTINUOUS GIRDER BRIDGE USING PRESTRESSING TECHNIQUE

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SUMMARY

In this paper, the rehabilitation and structural upgrading of the existing bridge over the Lim River in Montenegro is presented. The bridge is a reinforced concrete (RC) continuous girder bridge with four spans 24.6 m + 27.6 m + 27.6 m + 24.6 m and total length 104.4 m. Due to extreme flooding, erosion of river waters occurred at the first river column causing 640 mm of its uniform settlement. Serious damage occurred at the superstructure of the bridge. The structural upgrading of the superstructure is done using the prestressing technique. The arrangement of cables was selected, which favourably affects the load-bearing capacity, balances the bridge system and ensures its adequate safety. The advantage with applied prestressing technique are: almost negligible change in weight; the stresses introduced into the elements are opposite to the exploitation stresses; decrease in crack width as well as crack width limitation and consequently increase in bridge durability. Results are reported in the paper.

Keywords: *Rehabilitation, RC girder bridge, Structural upgrading, Prestressing.*

1. INTRODUCTION

In recent times, the need for upgrading and rehabilitation of concrete bridges is becoming more frequent. The reasons may be different, whether their load bearing capacity is affected by damages or it is necessary to upgrade load bearing capacity or both. Upgrading techniques are various and one of the possibilities is using prestressing. This technique is suitable for heavily damaged bridge structures or structures where a significant increase in load bearing capacity is required, since other upgrading methods have limited effects. Using prestressing is most suitable for beam structural systems. The advantage of this technique, with respect to other upgrading techniques are various: almost negligible change in weight; the stresses introduced in elements are opposite to the exploitation stresses; decrease in crack width as well as crack width limitation and consequently increase in bridge durability.

For simply supported bridge presstressing cables are polygonal. The cables are anchored to the upper zone of the transverse girder at the supports, while across the span the cables are placed through or over the transverse girders, depending on their number and arrangement. In continuous girder bridges, the system line of cables is also polygonal, and it is designed to cause the opposite action effects to the exploitation action effects. In both cases, the cables are placed symmetrically in relation to the main longitudinal girders [1].

In this paper, the repair and strengthening of an existing bridge over the Lim River in Montenegro is presented. The bridge is a RC continuous girder bridge with four spans and a total length of 104.4 m. The bridge was built in 1965. For this bridge technical documentation is not preserved, the required dimensions of structural elements were determined by measuring on the site. Due to the extreme floods at the end of 2010, uniform settlement of 640 mm under the foundation of the intermediate column bent occurred. Serious damage at the span structure is introduced due to the bent movement. The repair of the span structure was done using the prestressing technique.

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