

Evaluating the performance of skewed prestressed concrete bridge after strengthening

Research Article

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Received 07 July 2012; accepted 15 February 2013

Abstract: The objectives of this paper are to explain the application of repairing and strengthening methods on the damaged members of the bridge structure, to analyze the static and dynamic structural response under static and dynamic loads after strengthening, and to evaluate the structural performance after application of strengthening method. The repairing and strengthening methods which are used in this study include treatment of the cracks, thickening the web of box girder along the bridge length and adding internal pre-stressing tendons in the thickening web, and construct reinforced concrete cross beams (diaphragms) between two box girders. The results of theoretical analysis of static and dynamic structural responses after strengthening show that the tensile stresses are decreased and become less than the allowable limit values in the codes. The values of vertical deflection are decreased after strengthening. The values of natural frequencies after strengthening are increased, indicating that the strengthening method is effective to reduce the vibration of the bridge structure. Therefore, the strengthening methods are effective to improve the bearing capacity and elastic working state of the bridge structure and to increase the service life of the bridge structure.

Keywords: Theoretical analysis • Box girder • Strengthening • Cross-beam • Deflection • Stress • Strain • Natural frequency
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1. Introduction

Skewed bridges are widely used in China and with the rapid development of urban communications; the actual bearing state of large numbers of bridges exceeded the initial design requirements due to the increasing in vehicle

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