ABSTRACT

"UTILIZATION OF ANTISEISMICALLY INACTIVE MEMBERS OF BRIDGES AIMING AT THE REDUCTION IN THE SEISMIC DESIGN ACTIONS"

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In the present investigation, the accommodation of the in-service and the earthquake resistant requirements of bridges is attempted by an innovative restraining sub-system. The innovation consists in the extension of the continuous deck slab between the wing-walls and its placement on tranverse walls on which it is possible either to slide or to be monolithically connected with them. The proposed system regulates suitably the serviceability requirements and reduces the displacements of the deck and respectively the distress of the piers and their foundations.

Chapter 1 is a brief introduction in the integral bridges. In Chapter 2 is described the bridge that was utilized as "reference" bridge for the investigation of efficiency of proposed system. It's about an Egnatia Street bridge at 2+220 km to 2+460 km of the section Araxthos-Peristeri. The bridge's overall length is 240 m with six spans. It is a box-girder bridge which the deck of is continuous and monolithically connected to the piers and is supported on the abutments on sliding bearings.

In Chapter 3 is described the proposed sub-system as well as the parameters of the investigation. The first parameter that was investigated was the number and the height of the transversal walls. The second parameter that was investigated was the number the spans. Based on the characteristics of the reference bridge with the 6 spans, model with 5 spans was simulated. The third parameter that was investigated, was the height of the piers. Integral bridges, whose heights of the piers were either equal to or double that of the piers of the reference bridge were analyzed. The fourth parameter that was investigated was the ground type and the Peak Ground Acceleration.

In Chapter 4 is described the simulation of the geometry of the convectional and the modified bridges in the static program SAP 2000. The geometrical data of the cross-sections that have been used are analytically presented, as well as the way they have been introduced to the program.

In Chapter 5 is described the Analysis of the previous systems with the Response Spectrum Method. The results are used about the design of the transversal walls.

In Chapter 6 is described the non linear dynamic time history analysis of the convectional and modified bridge systems. The aforementioned bridge systems were subjected to corresponding artificial soil-A, B and C-dependent Eurocode 8 elastic spectra, and two different peak ground accelerations a_g=0.16g, a_g=0.24g were considered.

Finally, in Chapters 7 and 8 are presented the results and conclusions of the parametric investigation.