The Behavior of Rion – Antirion Bridge Seismic Protection System During The Earthquake of "Achaia-Ilia" on June 8, 2008

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Summary

On June 08, 2008 at 15:25 a strong earthquake with moment magnitude Mw=6,5, named "Achaia-Ilia" occurred in Greece. The focal depth was estimated to be around 30km and the epicentre was located at a distance 36 km SW from the Rion-Antirion Bridge.

The Rion-Antirion Bridge, a five-span cable-stay bridge (286m + 560m + 560m + 560m + 286m), has been designed to withstand earthquakes with P.G.A. of 0,48g and tectonic movements up to 2m between consecutive pylons. In order to satisfy the above requirements the deck superstructure was made continuous for the full length of 2252m and fully suspended from the four pylons.

An innovative energy dissipation system, designed by Vinci and developed by FIP Industriale, connects the deck to the pylons and limits the lateral movement of the deck during an earthquake, while dissipating the seismic energy with huge – never built before - viscous dampers. The bridge is also equipped with a complete monitoring system capable of collecting high frequency data at critical parts of the structure during a seismic or wind dynamic event.

The paper presents evidences of the good performance of the dissipation system during the above mentioned earthquake. From the analysis of the monitoring data collected during the event and the thorough inspections performed after, it was confirmed that the behaviour of the bridge was in accordance with the analytical predictions and well within the serviceability limit states.

Keywords: Cable-stayed Bridge, Seismic Protection Systems, Viscous Dampers.

1. Introduction

A strong earthquake, called "Achaia-Ilia" earthquake took place on June 08, 2008. The epicenter of this earthquake with moment magnitude M_w = 6.5 was located at a distance of approximately 36km SW from the bridge and its focal depth was estimated to around 30km. Examination of available seismological data recorded during the main shock and theaftershocks indicated that the earthquake occurred on a dextral strike slip fault[1]. The peak ground acceleration recorded on site (Rion shore) was 0,127g.

This was the first major earthquake event experienced by the bridge initiating full scale inspection in order to identify potential damages of the structure. Given that tectonic movements might take place at this site, a geometrical survey was conducted to monitor permanent movements due to the event.

Additionally, the data collected from the instrumented monitoring system (permanent) were used to characterize the event, to evaluate its severity in terms of bridge response and to evaluate the

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