Active protection system for Main cable of suspension bridge against HGV or Hazardous material fires

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Abstract

Road traffic fires may have critical impact on long span bridges. Especially for suspension bridges, critical damages on the main cable and the tower can be fatal and practically not be repairable / replaceable. In Osman Gazi Bridge in Turkey, which has the main span of 1,550m and opened for traffic on 1st of July, 2016, the necessity of fire protection on the main cable was revealed through the risk analysis with ALARP principle so as to keep the temperature of main cable below 400°C against HGV (Heavy Good Vehicle) fires or hazardous materials fires, where those flame temperatures can reach up to 1,200°C. Through several trials for details, an active fire protection was selected to protect the main cable. It is the first application for the suspension bridge in the world and the paper introduces the result of risk analysis, design, trial and application of the fire protection system for the main cable of Osman Gazi bridge.

Keywords: Suspension bridge, Fire protection, Main cable, HGV fires, Hazardous material fires

1. Introduction

The Izmit Bay Bridge (now named “Osman Gazi Bridge” in honor of Osman I (1259 - 1326) who founded the Ottoman Empire in 1299) located in northwest Turkey, consisting of the North Approach Viaduct, the Suspension Bridge and the South Approach Viaduct, will carry the planned Gebze-Orhangazi-Bursa-Izmir motorway across the Sea of Marmara at the Bay of Izmit between the Diliskelesi peninsula on the north and the Hersek peninsula on the south. The bridge construction has started in January 2013 and opened for the traffic at the end of June 2016. The bridge is located in high seismic zone in which magnitude 7.4 Izmit earthquake took place in

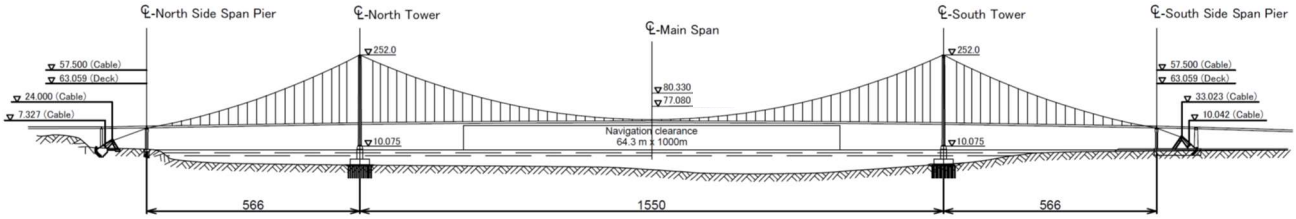

Figure 1. General layout of Osman Gazi Bridge

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