

Paper ID: 91-22 Sazlidere Bridge Wind Tunnel Testing Assisted Design

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ABSTRACT

In the context of the Northern Marmara Motorway Section 8 Project, a new cable-stayed bridge, the Sazlidere Bridge, is being designed and works have already started on site. To support this fast-paced project, RWDI is collaborating with the design team and providing wind engineering services. The activities employ wind tunnel experiments and are focused on two main aspects: aerodynamic stability of the bridge and the risk of wind-induced overturning of large lorries crossing the bridge. With respect to aerodynamic stability, limited tests on a sectional model of the bridge deck were performed in one of RWDI's wind tunnels using a state-of-the-art sectional model test rig. Testing of a full bridge aeroelastic model with relevant topography was also conducted allowing for the simulation of atmospheric turbulence from any wind direction. This testing was used primarily to verify the aerodynamic stability of the structure for various wind directions and to measure the buffeting response of the bridge to turbulent winds. Further wind tunnel testing on a small-scale rigid transport lorry model was completed to measure the aerodynamic force and moment coefficients of the vehicle as a function of wind direction. These data were combined with a numerical model for the roll-over stability of high-sided vehicles to calculate critical wind speeds versus wind direction for lorries driving along the central span of the bridge.

Keywords: Cable-stayed bridge, sectional and aeroelastic model wind tunnel testing, vehicle roll-over study.

1 INTRODUCTION

The Sazlidere Bridge is a newly proposed cable-stayed bridge that will be built in the context of the Northern Marmara Motorway Section 8 Project. It features a maximum deck elevation of 83.5 m above the ground and is supported by two pylons having maximum elevations of approximately 196 m. The main span of the bridge is 440 m and the total length of the cable-stayed structure is 860 m. The deck will have a total width of 49.3 m carrying 4 traffic lanes in each of the Eastbound and Westbound directions. There will also be multi-use walkways on either side of the deck. Figure 1 presents the general elevation view of the bridge while Figure 2 presents a typical cross-section of the bridge deck.