The Çanakkale Bridge (Large Section Model), Turkey

Wind Engineering Study

Owner: Ministry of Transportation, Maritime and Communication, General Directorate of Highways	*Design: DLSY Joint Venture*	*Year Tested: Jan ~ April 2019*
Length: 4.608 km	*Main Span: 2023 m*	*Deck Width: 45.06 m*
Pylon Height: 318 m	*Main Span Deck Width: 45.06 m*	*Section Models: 1 to 30 scale*

The Project

The 1915 Çanakkale Bridge project is approximately 4.608 km long from start of the approach bridge on the European Side to the end of the approach bridge on the Asian Side, and connects the cities of Sütlüce and Lapseki across the Çanakkale Strait in Turkey. Upon completion, it will be the largest suspension bridge in the world with a main span of 2.023 km. The relative lengths of the spans of the bridge (side span – main span – side span) are 770 m – 2023 m – 770 m, respectively. The deck is separated into twin boxes with a gap of 9 m and connected by cross-boxes with a centre-to-centre spacing of 24 m. The design includes three traffic lanes in each direction.

A comprehensive study of the 1915 Çanakkale Bridge using a section model constructed at a geometric scale of 1:60 was performed in the Boundary Layer Wind Tunnel Laboratory between October 2017 and January 2018. This investigation was a continuation of this earlier work using a larger scale section model at 1:30, to examine the effect of Reynolds number on the peak amplitudes under vortex shedding induced vibration (VIV).

The Wind Tunnel Studies

The VIV tests performed for the 1:60 scale model have shown that Reynolds number has an effect on the magnitude of the vortex shedding induced response peak. It is therefore is an important consideration when estimating the susceptibility to VIV for the prototype bridge, when full-scale Reynolds numbers will be several orders of magnitude higher than those achievable in section model tests.

This wind study was consisted of a 1 to 30 scale section model. The aims of the study were:

1. the investigation of vortex shedding induced vibration (VIV) of the final deck section using a large scale model at correspondingly increased Reynolds numbers;

2. the investigation of the aerodynamic stability of the deck section with respect to vortex shedding induced vibration for different configurations of gantry rails;

3. to provide aerodynamic information in order for the design team to select the preferred gantry rail type and location.

The Boundary Layer Wind Tunnel Laboratory

Western

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