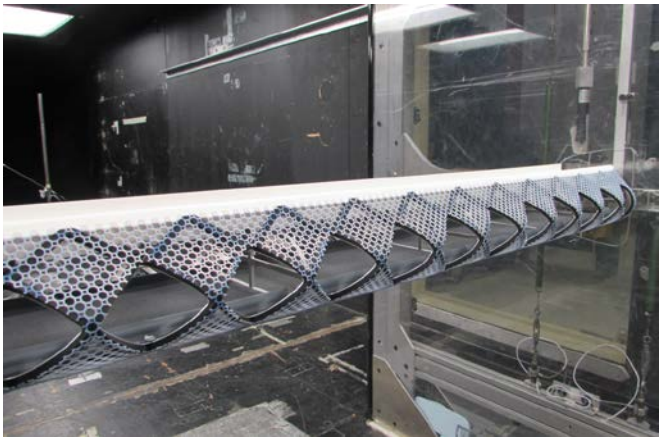
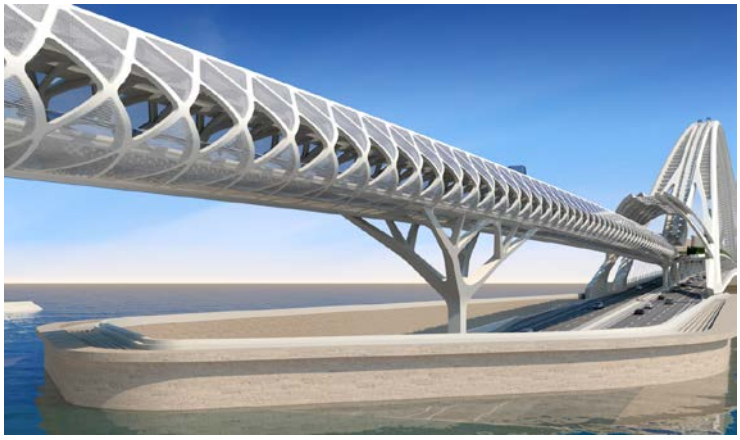
The West Bay Pedestrian Bridge (New Design), Doha, Qatar

Wind Engineering Study





Owner: Public Works Authority (ASHGHAL), State of Qatar	*Design: Santiago Calatrava Mideast LLC*	*Year Tested: September 2014*
Total Span Length: 458.9 m	*Deck Width: 14 m*	*Deck Section Model: 1 to 75 scale*

The Project

The West Bay Pedestrian Bridge is an elevated pedestrian bridge with its roadway below providing access from land to the main span of the West Bay Arch Bridge. The structure is designed to support the cable car system running inside the cross section of the bridge. The overall deck width of the bridge is 14 m, and the total deck span length is 458.9 m.

The section model of the deck of the West Bay Pedestrian Bridge was studied at the Boundary Layer Wind Tunnel Laboratory of the University of Western Ontario.

The Wind Tunnel Studies

The primary objective of the section model study is to investigate the aeroelastic stabilities of the bridge deck section in high wind conditions and to define the wind speeds associated with possible flutter and / or galloping instability as well as vortex shedding induced oscillation. The investigation also defines the dynamic response characteristics of the deck section to turbulent wind over a full range of wind speed and provides equivalent static loads, which are suitable for the design of the bridge structure against wind effects.

The Wind Tunnel Studies (Cont.)

The study was consisted of a 1 to 75 scale section model of the bridge deck. Static section model tests were performed to obtain the static coefficients. Dynamic tests were also performed in smooth flow to investigate the overall aerodynamic stability of the deck, and in grid-generated turbulent flow to define the buffeting response characteristics of the section. Aerodynamic derivative tests were performed to study the motion related aerodynamic force parameters. The static force coefficients and the aerodynamic derivatives were then used in wind buffeting analysis and in the development of the equivalent static wind Loads for the bridge structure.

The Boundary Layer Wind Tunnel Laboratory

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