Pattullo Bridge Replacement, Vancouver BC

Wind Engineering Study

Client: Oritia & Boreas, Spain	*Year Tested: 2021 (Wacker Ingenieure)*	*Total Length of Bridge: 770 m*
Pylon Heights: 167 m	*Deck Width: 29.0 m and 35.95 m without and with wind fairings*	*Deck Section Model Scale: 1 to 100 (Wacker Ingenieure)*

The Project

The Pattullo Bridge Replacement project is a new four-lane cable-stayed bridge over the Fraser River in Vancouver, British Columbia. The total length of the bridge is about 770 m. The main-span of the cable-stayed portion of the bridge is designed with a fairing on both sides of the deck. The deck widths with and without the fairing are about 36 m and 29 m respectively.

The wind tunnel test of the Pattullo Bridge was performed by Wacker Ingenieure.

This desktop study of the wind flutter and buffeting analysis as well as the Equivalent Static Loads on the Pattullo Bridge Replacement was a joint effort by the Boundary Layer Wind Tunnel Laboratory and the Oritia & Boreas, with the analysis performed in the Boundary Layer Wind Tunnel Laboratory at the University of Western Ontario. The aerodynamic information of the bridge deck and pylon, as well as the estimated wind conditions at the bridge site has been adopted from the wind tunnel study performed by Wacker Ingenieure.

The Wind Tunnel Studies

The primary objectives of the current study were to investigate analytically the aeroelastic stability characteristics of the bridge in high wind conditions and to define the wind speeds associated with possible flutter. An aim of the investigation was also to define the dynamic response characteristics of the bridge to turbulent wind over a full range of wind speed.

A 3-D multimode analysis was employed, which integrates the findings of the experimental study (Wacker Ingenieure) with the dynamic modes and frequencies of the structure. Another major output of this analytical study is the equivalent static wind loads, which are used to verify and improve the wind load distributions used for design of the Pattullo Bridge Replacement.

The Boundary Layer Wind Tunnel Laboratory

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