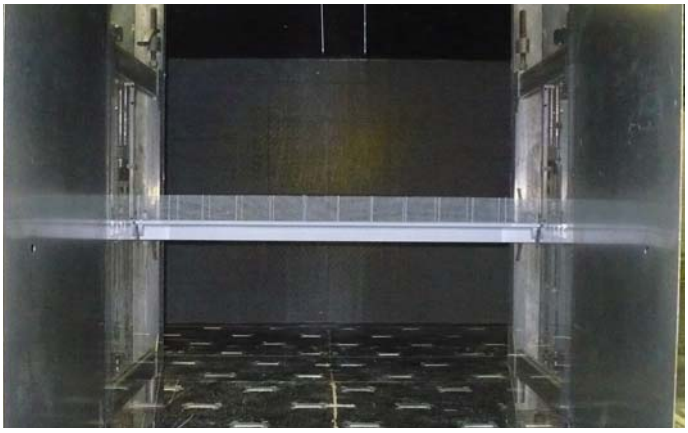
Country Hills Pedestrian Overpass, Calgary

Wind Engineering Study



Smooth Flow Set-up

Turbulent Flow Set-up

Clients: Cohos Evamy Partners	*Year Tested: 2008*	*Bridge Span Length: 109.9 m*
Deck Width: 3.6 m at Midspan	*Deck Depth: 1.05 m at Midspan*	*Deck Section Model Scale: 1 to 18.4*

The Project

The Country Hills Pedestrian Overpass has a 64.4 m long main span and two 22.75 m long side spans. The deck consists of a “Ductal” concrete precast “T”-shaped drop-in girder, 33.6 m in length and supported by 15 m variable-depth cantilevers and continuous side spans. The deck at midspan is 3600 mm wide and 1050 mm deep. Curved approach spans flank the main structure which are not part of the study.

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

The Wind Tunnel Studies

Section model of the bridge deck was designed and constructed at a geometric scale of 1:18.4. The purpose of the study was to provide: a) estimates of the sensitivity of the bridge to wind and recommendations of the loads for the design for wind effects and b) estimates of the response of the bridge to pedestrian excitation.

The Wind Tunnel Studies (Cont.)

The primary objectives of the section model study were to investigate the aeroelastic stability characteristics of the deck in high wind conditions and to define the wind speeds associated with possible flutter (or galloping) instability and / or vortex shedding induced oscillation. An aim of the investigation was also to define the dynamic response characteristics of the bridge deck to turbulent wind over a full range of wind speed. Analytical estimates of the critical wind speeds for flutter (or galloping) and the responses of the bridge to turbulent buffeting, as well as the equivalent static wind loads were carried out using a 3-D multimode analysis, which integrates the findings of the experimental study with the dynamic modes and frequencies of the structure.

An analysis of pedestrian-induced vibrations was also undertaken, using empirical and analytical methodologies to assess whether users of the bridge would be adversely affected by vibrations of the bridge deck as a result of pedestrian excitation.

The Boundary Layer Wind Tunnel Laboratory

Western

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