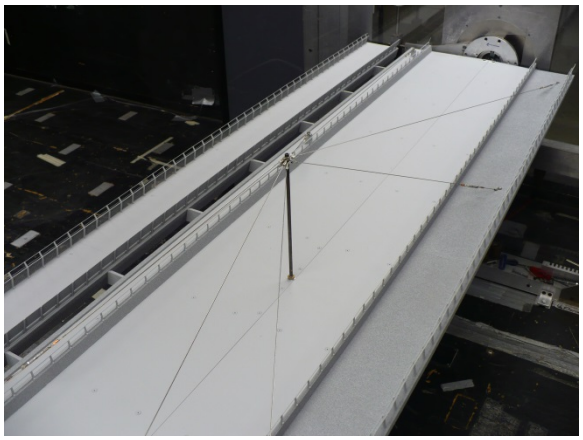
The Waterdale Bridge, Edmonton, Alberta

Wind Engineering Study



Owner: City of Edmonton, Province of Alberta
Date Tested: October 2012

Client: DIALOG (designdialog.ca), Edmonton, Alberta.

Arch Supported Span 240 m	*Section Model* 1 to 50 Scale Model of Deck Section	*Deck Widths* 26 m Roadway Bridge Deck and a Variable -width Shared Use Path Deck between 5 and 8.8 m Wide
Height of Arch 53 m		

The Project

The Waterdale Bridge spans the North Saskatchewan River in Edmonton, Alberta, connecting the 105th Street NW in downtown Edmonton and Waterdale Hill NW to the south. The Walterdale Bridge Replacement structure is a tied arch bridge with a main span of 240 m. Two rectangular main arch ribs (which are inclined to the vertical) and two planes of suspenders support a 26m wide roadway deck. The roadway deck is comprised of twin longitudinal box structural elements to which the cables are attached. Transverse floor beams, longitudinal stringers and a composite concrete deck complete the roadway deck. The shared-use pathway (SUP) has a variable width and is a trapezoidal steel box, which is connected to the main bridge and arch through supporting cables over the central portion of the bridge and cantilever box-beams from the main roadway.

The Wind Tunnel Studies

A primary objective of this investigation was to define the dynamic response characteristics of the bridge to “smooth” and turbulent wind over a full range of wind speeds and provided confirmation of the design of the structure against wind effects.

The study consisted of a 1 to 50 scale section model of the bridge deck taken at the mid-span location of the bridge. Tests were performed in smooth flow to investigate the overall aeroelastic stability of the deck section, and in grid-generated turbulent flow to define the dynamic buffeting response characteristics of the section. In addition, the response of the SUP was evaluated for pedestrian comfort in terms of acceptable vibration amplitudes. The potential for wind and parametric cable vibration was also examined.

The Boundary Layer Wind Tunnel Laboratory

Western

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