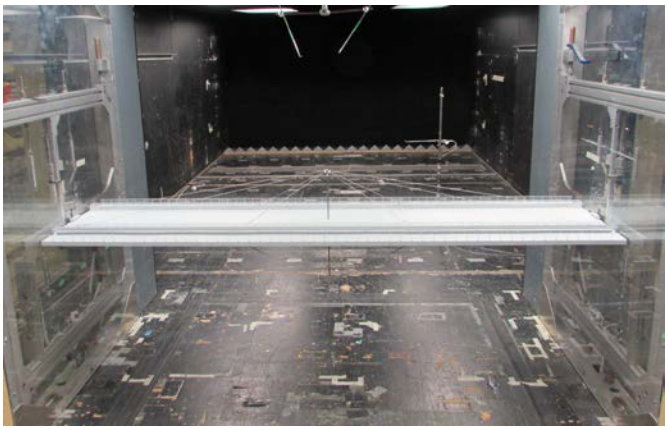
Dominick Street Bridge, Chicago

Wind Engineering Study



Clients: Rubinos & Mesia Engineers Inc.	*Year Tested: 2020*	*Main Span Length: 325 ft*
Arch Height above Deck: 90 ft	*Deck Width: 80 ft*	*Deck Section Model Scale: 1 to 45*

The Project

The Dominick Street Bridge is a 325 ft long true arch bridge with twin tubular truss arches rising to 90 ft above the deck. The deck provides a clearance of 23 ft to the mean high water level at midspan. The ties are comprised of two longitudinal girders at 52'-6" center to center spacing, directly beneath the main arches. Floor beams at 17'-4" support longitudinal stringers and concrete deck slabs. The deck is comprised of the portion between the main arches, which carry two traffic lanes and a bike path, with pedestrian sidewalks cantilevered on each side of the main trusses. The overall width of the deck including sidewalks is 80 ft.

The section model of the Dominick Street Bridge deck was studied at the Boundary Layer Wind Tunnel Laboratory of the University of Western Ontario.

The Wind Tunnel Studies

A meteorological / site analysis was performed to evaluate the expected wind conditions at the project site. The analysis of hourly wind data is detailed to develop characteristics of wind speed and direction at the bridge site. An evaluation of turbulence characteristics at the site is also presented.

The Wind Tunnel Studies (Cont.)

The primary objectives of the section model study of the Dominick Street Bridge were to investigate the aeroelastic stability characteristics of the bridge 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 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. Another major output of the analytical study is the equivalent static wind loads, which are used to verify and improve the wind load distributions used for design of the structure.

An assessment of the likelihood of hanger vibration due to parametric, wind and rain-wind excitation was also an important objective.

The Boundary Layer Wind Tunnel Laboratory

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