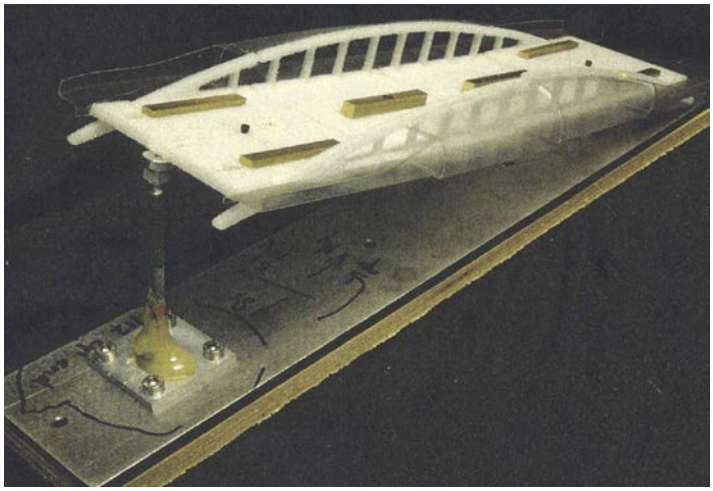
The Great Wharf Bridge – London

Wind Engineering Study



Client: Gifford and Partners	*Year Tested: 2003*	*Length of Span: 67 m*
Width of Covered Walkway: 4 m on either side	*Deck Width: 15 m*	*Bridge Aeroelastic Model Scale: 1:200*

The Project

The project consists of a lift bridge approximately 67 m span. The deck width is about 15 m plus two 4 m covered walkways on either side of the bridge. When in the lift operation, one end of the bridge is lifted by a hydraulic cylinder.

The Wind Tunnel Studies

The aeroelastic model of the Great Wharf Bridge was designed and constructed at a geometric scale of 1:200 to the prototype. The model was tested to provide the following information:

1) The directional characteristics associated with the wind climate model and the predictions of extreme mean hourly wind speeds for various return periods at the bridge site.

2) Specific responses of the bridge at measurement locations on the wind tunnel model.

3) Local peak pressure difference (external pressure less internal pressure) suitable for use in design of the cladding on the canopies.

4) Predictions of the wind environment in pedestrian areas around the site.

The Wind Tunnel Studies (Cont.)

The wind climate model for the London Docklands area was developed in conjunction with studies of other Canary Wharf projects by the Boundary Layer Wind Tunnel Laboratory.

The 1:200 scale aeroelastic model was built in detail and instrumented to measure responses including end reactions (moments, shears and uplift) and accelerations at the elevated end of the bridge. In the test, a detailed proximity model of the surrounding was built in block outline.

The structural responses were measured directly from the aeroelastic model. Since the model was designed with mass and stiffness similarity, the model scale responses can be directly related to the full scale responses of the prototype bridge.

Measurements were also made of wind-induced pressures and suctions at 14 locations on the exterior and interior surfaces of the pedestrian canopies of the bridge, using a stationary model of the bridge in representatively-scaled atmospheric flow conditions.

In addition, the test program for the study of pedestrian-level winds consisted of an evaluation of pedestrian-level winds for both existing and future Canary Wharf conditions.

The Boundary Layer Wind Tunnel Laboratory

Western

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