# The Ting Kau Bridge, Hong Kong

## Wind Engineering Study

Design: Schlaich Bergermann und Partner, Stuttgart, Germany

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| *Owner*<br>The Highways Department of the Government of Hong Kong, SAR, People's Republic of China | *Contractor*<br>Ting Kau Contractors JV, Hong Kong | *Year Tested*<br>1994/1995 |
| *Length*<br>1177 metres | *Span Lengths*<br>127, 448, 475, 127 metres | *Shipping Clearance*<br>62 metres |
| *Tower Heights*<br>167, 194, 162 metres | *Stay Cables*<br>4 planes of 96 cables | *Deck Width*<br>2 x 18.77 metres |

### The Project

The Ting Kau Bridge, Hong Kong is an asymmetric three tower cable-stayed bridge using four planes of cables to support twin parallel decks. Its slender single-leg towers are braced transversely with stay cables, while the tallest central tower also has longitudinal bracing. The bridge is located approximately 25 km west of Hong Kong Island and forms part of the route from both the new airport and the city of Hong Kong, northward into China. It is located in an area of the world that experiences typhoon strength winds almost every year.

The prime objectives of the wind tunnel studies were to demonstrate the safety of the structure once completed and under construction, both with respect to aerodynamic stability as well as the possible effects of extreme typhoon wind speeds.

### The Wind Tunnel Studies

• 1 to 80 scale section model of the deck. An optimisation of the leading edge was performed through the evaluation of 30 different fairing configurations. The selected fairing detail resulted in a 15% improvement of the overall flutter speed to 101 m/s. Tests were also performed with simulated traffic present on the bridge, to ascertain serviceability criteria.

• 1 to 250 scale full aeroelastic model of the entire bridge. The full model was tested in different stages of construction in turbulent boundary layer flow, complete with the local topography in order to model the wind conditions at the site.

Construction stage tests included the isolated towers, balanced cantilevers and single cantilever configurations. The model tests identified critical stages of erection that allowed the sizing and layout of the construction tie-down cables to be optimised.

**The Boundary Layer Wind Tunnel Laboratory**

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