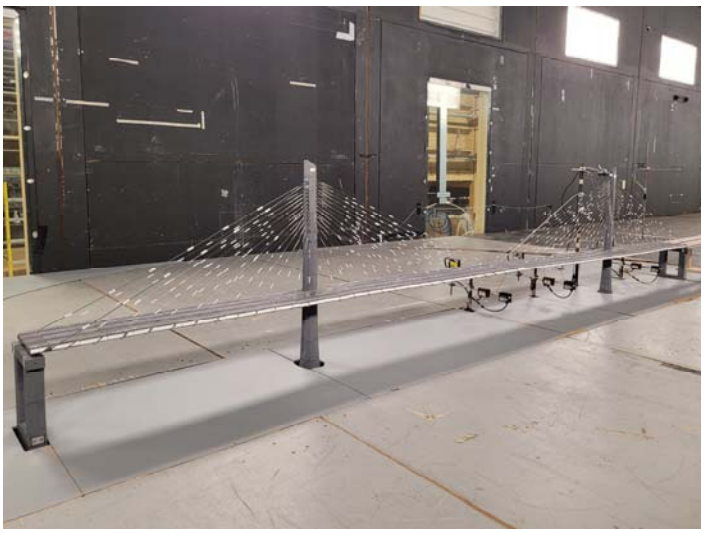
The North Bridge, Bataan-Cavite Interlink, Philippines

Wind Engineering Study



Clients: T.Y. Lin International Inc.	*Year Tested: 2021 ~ 2024*	*Length of Bridge Span: 736 m* *Length of Main Span: 400 m*
Tower Heights: 142.7 m	*Deck Width: 34.5 m*	*Full Bridge Aeroelastic Model Scale: 1:200* *Deck Section Model Scale: 1:60* *Pylon Section Model Scale: 1:65.3*

The Project

The proposed Bataan-Cavite Interlink Bridge (BCIB) connects the Bataan and Cavite mainland by way of Corregidor Island. The linkage will be comprised of a marine crossing of approximately 26 kilometers in length. Two approach viaducts and roads of approximately 6 kilometers, two cable stayed bridges, and several marine spans will cross the existing channels.

The North Channel runs adjacent to the Bataan province side of the entrance to Manilla Bay. It is located between Corregidor Island and Bataan and measures over 2 km in length. The North Channel Bridge (NCB) is a proposed cable-stayed bridge designed to cross a 300 m navigation channel for ship traffic in the North Channel, with a main span of 400 m and a midspan deck height of 48.4 m above MSL. The NCB towers extend 142.7 m above MSL. The NCB deck consists of parallel box girders connected by steel crossbeams and the composite deck, with transfer assemblies for passing around the towers. The above-deck portions of the NCB towers are linearly tapered while the below-deck portions are flared to the foundation level; the above-water portions of the tower are similar in aerodynamic shape over their heights.

The Wind Tunnel Studies

The wind study of the NCB includes wind climate analysis, full aeroelastic model, section model and Equivalent Static Loads. A primary objective of the section model study was to investigate the overall aerodynamic stability in high wind conditions and define the wind speeds associated with possible galloping, flutter instability and vortex shedding induced oscillation within the design criteria for wind. The investigation also served the purpose to define the dynamic response characteristics of the section to turbulent wind and to provide information for the design of the overall structure against wind effects.

A primary objective of the full aeroelastic model study was to investigate the behaviour of the bridge under low turbulence conditions as well as the overall aerodynamic stability in high wind conditions, for both the completed bridge and selected critical construction stages. The definition of the wind speeds associated with possible flutter instability and vortex shedding induced oscillation of the structure was also a primary objective. The investigation was intended to determine the response characteristics to three-dimensional turbulent wind in expected site wind conditions over a full range of wind speeds.

The Boundary Layer Wind Tunnel Laboratory

Western

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