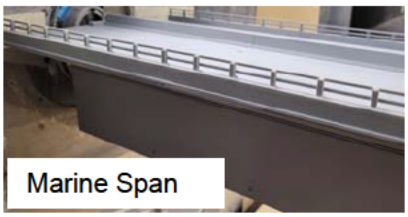
The Marine Spans, Bataan-Cavite Interlink, Philippines

Wind Engineering Study



Clients: T.Y. Lin International Inc.	*Year Tested: 2021 ~ 2024*	*Length of Marine Spans: 60 ~ 133 m* *Length of HLA Spans: 650 m*
Marine Span Deck Heights: 21.6 ~ 46.7 m *HLA Span Deck Heights: 38.6 ~ 66.2 m*	*Marine Deck Width: 20.9 m* *HLA Deck Width: 10.7 m*	*Deck Section Model Scale: 1:60* *HLA Twin Deck Gaps: 0.78 ~ 14.5 m*

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 Marine Span viaducts consist of three designs of continuous multi-span box girder decks which all carry four lanes of traffic. The Type 1 viaducts are used in deep water, which have a typical span length of 100 m and deck heights ranging from 21.8 m to 46.7 m above mean sea level. The Type 2 viaducts are used in shallow water near Bataan, which have a span length of 60 m with a uniform depth and deck heights ranging from 21.6 m to 23.0 m. The Type 4 (133 m) viaducts are used for a larger bridge over a 90 m-wide nearshore navigation channel. The HLA viaducts transition the approach viaduct Marine Spans to the higher-level North and South Channel Bridges (NCB and SCB).

The Wind Tunnel Studies

The wind study of the Marine Spans and the High Level Approaches (HLA) includes wind climate analysis, section model testing of the different types of decks and Equivalent Static Load analysis. A primary objective of the section model study was to investigate the overall aerodynamic stability of the different spans 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 various bridge spans 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 modal properties of the various structures. 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 Marine Spans and the High Level Approaches.

The Boundary Layer Wind Tunnel Laboratory

Western

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