Hydraulic Modeling for the Bataan-Cavite Interlink Bridge in Manila, Philippines.

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The Bataan-Cavite Interlink Bridge (BCIB) is a massive, 32.15-kilometer mega-bridge infrastructure project under construction in the Philippines. Spanning across the mouth of Manila Bay, the four-lane, dual-carriageway system directly connects Barangay Alas-asin in Mariveles, Bataan to Barangay Timalan Balsahan in Naic, Cavite.

The presentation will provide an in-depth overview of the key technical components, methodological challenges, and major lessons learned from a comprehensive two-year effort to conduct hydrodynamic studies of Manila Bay and selected areas of the West Philippine Sea. These studies were undertaken to support the engineering design of the proposed Bataan–Cavite Interlink Bridge, a large-scale infrastructure project intended to connect the provinces of Bataan and Cavite across Manila Bay in the Philippines.

As part of this effort, the project team carried out a suite of advanced hydrodynamic modeling activities to characterize the complex physical processes that influence water behavior in and around Manila Bay. These activities included numerical simulations of tidal elevations and current velocities under typical daily tidal conditions, enabling the team to understand baseline circulation patterns within the bay. In addition, the modeling framework incorporated wind generated waves associated with a design typhoon scenario, capturing the extreme wave climate that the bridge may be exposed to during severe tropical cyclones. A separate set of simulations evaluated the potential impacts of a design tsunami event, providing insight into rare but high consequence loading conditions.

The results of these hydrodynamic and wave modeling studies were subsequently used to estimate the hydrodynamic forces acting on the proposed bridge's substructure elements. These forces—driven by currents, waves, and storm related surges—were quantified to inform structural design requirements and ensure the long-term resilience of the bridge. Furthermore, the modeling outputs supported a detailed assessment of local scour potential at more than 300 planned bridge pier locations, allowing engineers to evaluate how extreme hydraulic conditions could affect seabed stability and foundation performance during critical design events.

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