The Paso del Alamillo Bridge, Seville, Spain

Wind Engineering Study

Owner: The City of Seville, Spain

Client Vicrusa Consulting Engineers	*Designer* Santiago Calatrava Valls SA	*Year Tested* 1991
Main Span 200 metres	*Pylon Height* 138 metres	*Clearance to River* 8 metres
Deck Depth 4 metres	*Stay Cables* 13 pair of stays	*Deck Width* 32 metres

The Project

The Paso del Alamillo Bridge was designed by Santiago Calatrava as part of Expo '92 on a large island in the Guadalquivir River in Seville. The Alamillo bridge is a road bridge at the north end of La Cartuja island on which the Expo was held, with a 138m high pylon that has become a landmark visible from Seville's old town.

The Alamillo bridge's striking feature is its forcefully asymmetric design. Its single pylon inclines always from the river, and supports the 200m span with thirteen pairs of cables. The weight of the concrete and steel pylon provides a counterbalance for the bridge deck.

The single plane of parallel cables supports a hexagonal box down the centre of the road, maintaining the bridge's image of a harp. The roadway itself is cantilevered out from the central steel box on tapered steel beams.

The Wind Tunnel Studies

The wind tunnel studies were based on the testing of a 1 to 135 scale full aeroelastic model of the bridge. The model was shown to faithfully reproduce the cable stayed portion of the structure, dynamically simulating the vertical, lateral and torsional modes of vibration of the structure. The structural damping of the model was 0.25-0.75% which resulted in conservative estimates of bridge behaviour to wind.

The model was tested in boundary layer flow with a proximity model of the local surroundings under several different exposures, intended to bracket the expected site conditions. The results indicated that the bridge response was characterized by turbulent buffeting action, with no observable vortex shedding induced response nor instability up to mean wind speeds of 90 m/s. Estimates of the relative frequency of occurrence of pedestrian comfort was evaluated and found to be within acceptable limits.

The Boundary Layer Wind Tunnel Laboratory

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