The Baluarte Bridge, Mexico

Wind Tunnel Study

Owner: Ministry of Transportation and Communications, Mexico
Date Tested: 2009/2010

Client: Instituto de Ingenieria, Universidad Naçional Autonoma de México (UNAM).

Length *1124 metres*	*Main Span* *520 metres*	*Clearance to Valley Floor* *403 metres*
Pylon Height *169 and 151 metres*	*Stay Cable Diameter* *30 to 37 centimetres*	*Deck Width* *22 metres*

The Project

The Baluarte Bridge is a cable-stayed bridge located over the border between the states of Sinaloa and Durango, along the Durango-Mazatlan highway. It has an overall length of 1,124 m, and a cable-stayed main span of 520 m. It has a height above the valley floor of 403 m and is one of the tallest bridges in the world.

The cable stay bridge has a dual plane of stays from two delta-shaped pylons supporting the deck. The deck is comprised of concrete portions in the side spans and 44m into the main span as well as precast cast concrete deck slabs on steel edge girders for the central 432m portion of the main span. “Flap-style” fairings and vertical baffle plates beneath the deck are included over the central portion of the main span. The pylons are of reinforced concrete and are of rectangular cross section with varying dimensions with height.

The Wind Tunnel Studies

A primary objective of this investigation was to define the dynamic response characteristics of the bridge to turbulent wind over a full range of wind speeds and provided confirmation of the design of the structure against wind effects.

The study consisted of:

- A 1 to 250 scale full aeroelastic model study of the isolated under-construction stage of the pylon. Tests were performed in both smooth flow and in a turbulent boundary layer, representative of the site turbulence determined from scale measurements.
- A 1 to 250 scale full aeroelastic model study performed in the low speed side of BLWT2. A significant portion of the topography was modelled. Tests were performed both for under construction stages and the completed the bridge.

The Boundary Layer Wind Tunnel Laboratory

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