Huallaga Bridge, Peru

Wind Engineering Study

Client: Oritia & Boreas, Spain	*Year Tested: 2020*	*Total Length of Bridge Span: 395.5 m*
Pylon Heights: 59.6 m	*Deck Width: 15.0 m*	*Deck Section Model Scale: 1 to 30*

The Project

The proposed Huallaga Bridge in Peru is a 395.5 m steel edge girder cable-stayed bridge with spans of 87.5 m - 220.5 m - 87.5 m. The bridge deck has an overall deck width of 15.0 m. The 20 pairs of cable stays are in a fan arrangement connecting the tower masts to the deck anchorages. The overall height of the towers is 59.6 m.

The study of the wind action on the Huallaga Bridge was a joint effort by the Boundary Layer Wind Tunnel Laboratory and the Oritia & Boreas, with all wind tunnel tests and analysis performed in the Boundary Layer Wind Tunnel Laboratory at the University of Western Ontario. The section model of the bridge deck was studied at the inlet to the high-speed test section of the BLWT II, located at the University of Western Ontario.

The Wind Tunnel Studies

A section model of the bridge deck was designed and constructed at a geometric scale of 1:30.

The primary objectives of the section model study were to investigate the aeroelastic stability characteristics of the deck in high wind conditions and to define the wind speeds associated with possible flutter instability and / or vortex shedding induced oscillation. An aim of the investigation was also to define the dynamic response characteristics of the bridge deck to turbulent wind over a full range of wind speed.

Analytical estimates of the critical wind speeds for flutter and the responses of the bridge to turbulent buffeting were also a primary focus of the investigation. A 3-D multimode analysis was employed, which integrates the findings of the experimental study with the dynamic modes and frequencies of the structure. Another major output of this analytical study is the equivalent static wind loads, which are used to verify and improve the wind load distributions used for design of the structure.

The wind criteria for the Huallaga Bridge were based on the wind climate study performed by Oritia & Boreas.

The Boundary Layer Wind Tunnel Laboratory

Western

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FSBR/ 88 / June 2021 / LK
Last Printed: June 24, 2021