The Hoover Dam Bypass Project, Nevada, USA

Wind Engineering Study

Client	Structural Engineer	Model Scales
American Bridge, Inc.	Teng & Associates, Inc.	Aeroelastic Model: 1:46.1
Height	**Year Tested**	
335 ft	2009	

The Project

The Hoover Dam Bypass links Nevada and Arizona over the Colorado River on US Route 93 about 1500ft downstream of the Hoover Dam. On September 15, 2006, a collapse occurred of the High-Line cableway system used for the construction of the bridge, during a moderate wind event.

The High-line cableway towers damaged in the event are about 335ft tall with open truss forms. The Nevada South Tower has a mix of circular tube and Tee sections for the diagonal members in the structure, while the other three towers utilize only Tee section members. The main truss chords are comprised of angle sections. Each tower is independently stayed using a series of wind guys at the 255 foot elevation as well as two luffing cables, a backstay and a main track cable over the gorge.

The Wind Tunnel Studies

A comprehensive wind effects study was performed, including: 1) a static and dynamic section model study and a subsequent analysis of the equivalent static loads; 2) a topographic study of the wind speed and direction; 3) a Computational Fluid Dynamics study of the local wind flow characteristics; and 4) a Full Aeroelastic Model Study.

The primary objective of the full aeroelastic model study was to investigate aerodynamic stability and dynamic response to three dimensional turbulent winds expected to exist at the site. The 1 to 46.1 scale full aeroelastic model was based the dynamic properties of one of the towers. The model was tested in both smooth and turbulent boundary layer wind conditions: 1) with the storm cables connected and 2) with the storm cables slack. Instrumentation on the model provided estimates of full scale tower acceleration, bending moments and deflections.

The Boundary Layer Wind Tunnel Laboratory

Western

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