The Jerusalem LRT Bridge, Israel

Wind Engineering Study

Client	Engineer	Year Tested
Santiago Calatrava Valls S/A	Santiago Calatrava Valls S/A	2005
Length of Superstructure	*Main Span Lengths*	*Deck Elevation*
Approximately 200 metres	1 span at 140 metres	Approximately 10 metres
Pylon Height	*Deck Depth*	*Deck Width*
118 metres	3.82 metres total	14.8 metres

The Project

The Jerusalem LRT Bridge (also known as the "Bridge of Strings") in Jerusalem is a single span curved-deck cable-stayed bridge carrying Light Rail Train vehicles in Jerusalem, Israel. The bridge is 140m long, supported by 70 cables attached to a 118m high pylon. The single mast steel pylon has a distinctive shape in that the upper part is inclined at a different angle to the vertical than the lower part (i.e. below the level of the cable anchorages).The cross section of the steel deck is an asymmetric box, with a curved soffit. The bridge deck also has a pedestrian walkway in addition to the two LRT rail beds.

The Wind Tunnel Studies

A wind climate study was carried out for the Jerusalem LRT Bridge. The design probability distribution of surface wind speed and direction was developed on the basis of full scale meteorological records from nearby weather stations.

The Wind Tunnel Studies (cont'd)

The 1:100 scale full bridge aeroelastic model was designed to reproduce the structural and dynamic characteristics of the prototype bridge.

An open country exposure and an urban exposure were used to model the general terrain conditions upstream of the project. A proximity model was constructed to include the significant structures within a 250m radius of the centre of the bridge. Tests were conducted for six wind azimuths in open country exposure and nine wind azimuths in urban exposure.

Three additional tests were conducted in "smooth" flow (low turbulence intensity), in order to identify any potential for vortex shedding induced response and flutter instability. Flutter instability was not observed in any of the tests for which the highest mean hourly wind speed at the top of the pylon was 76 m/s, corresponding to a mean hourly wind speed at deck height of more than twice the equivalent 100 year mean hourly wind speed.

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