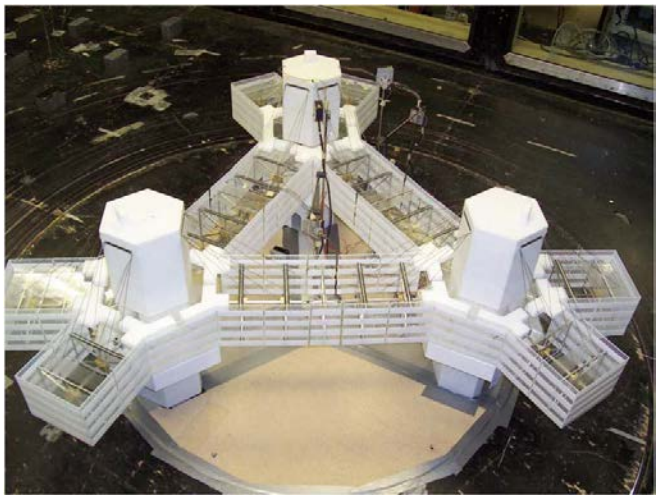
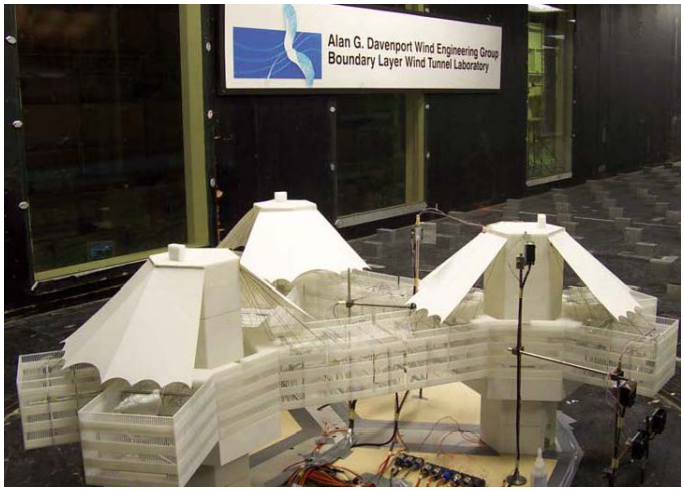
The Triangular Footbridge (Fullaero Model) – Middle East

Wind Engineering Study





Client: Canadian Professional Links & Xenel Industries Ltd. of Jeddah, Saudi Arabia	*Year Tested: 2005*	*Length of Span: 230 m*
Tower Height : 105 m	*Deck Width: 32 m*	*Full Bridge Aeroelastic Model Scale: 1:200*

The Project

The proposed Triangular Footbridge is a cable-stayed structure consists of four-level deck linked at three tower locations in a triangular arrangement. The three towers are identical with a basic hexagon shape and a height of 105m. The levels of top and bottom decks are 64m and 43m respectively. The tower to tower spacing is 150m and the cantilevered portion of the deck is 40m long. The typical deck width is 32m. The drop-in span of 14m in length situated midway between the towers and is supported on two expansion joints at the ends of the cable-stayed cantilevered portions of the deck.

The Wind Tunnel Studies

The full aeroelastic model was constructed at a geometric scale of 1:200. The model was tested in six configurations; 1) the completed structure with full water tanks and without tower canopies, 2) the completed structure with empty water tanks and without tower canopies, 3) the completed structure with full water tanks and with tower canopies, 4) the completed structure with empty water tanks and with tower canopies, 5) the construction stage of a single completed span, including the drop-in span, and 6) the construction stage of a single tower, with double cantilevered decks. Two upstream terrain conditions, open country and suburban exposures, were used.

The Wind Tunnel Studies (Cont.)

The proposed cable-supported structure consists of a four-level deck structure linked at three tower locations in a triangular arrangement. The aim of this study was to provide:

1. Wind climate and wind speed information at the proposed project site,

2. Response characteristics of the full aeroelastic model to three dimensional turbulent wind representative of the project site, over a full range of wind speeds and for the full 360° range of wind azimuth,

3. Structural response while under-construction and after completion,

4. Structural response of the completed structure under different conditions; a) with and b) without full tank of water on the tower, and c) with and d) without the tower canopies,

5. Response characteristics of the full aeroelastic model to low turbulence flow to identify the potential for vortex-induced vibration and flutter instability,

6. Predicted bending moments and deflections, as well as accelerations on the tower and deck.

The Boundary Layer Wind Tunnel Laboratory

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