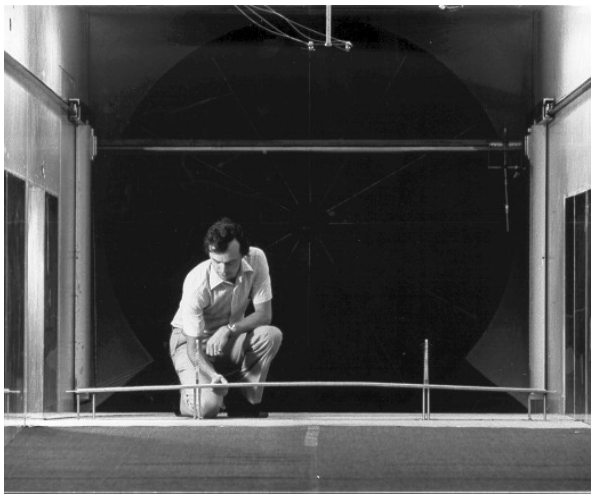
The Sunshine Skyway Bridge, FL, USA

Wind Engineering Study



Owner The Florida Department of Transportation	*Design* Figg and Muller Engineers, Inc Tallahasee, Florida	*Year Tested* 1981 - 1982
Length 2.7 kilometres	*Main Span* 366 metres	*Shipping Clearance* 53 metres
Pylon Height 131 metres	*Stay Cables* 21 stays each pylon	*Deck Width* 29 metres

The Project

The Sunshine Skyway Bridge, at the entrance to Tampa Bay, Florida is one of the longest prestressed concrete bridges in the world with a main span of 366 metres. The bridge is a vital link in Florida's transportation infrastructure and is located in a part of the world that experiences hurricane strength winds. Consequently, the safety of the bridge against hurricane force winds was a prime objective.

The Wind Tunnel Studies

- A Monte-Carlo Hurricane simulation was performed to define the wind characteristics in the Tampa Bay region. The 100-year mean hourly wind speeds at deck height were 105 mph.
- A 1 to 80 scale section model of the deck was tested in both smooth and turbulent flow conditions. The stability characteristics as well as the response to turbulence were evaluated.

The Wind Tunnel Studies (cont'd)

- Aerodynamic Derivatives were measured on the section, confirming the stability of the bridge.
- A design methodology was developed which integrated the results of the section model tests, the theoretical modal characteristics of the prototype as well as the wind climate. Equivalent Static Wind Loads were evaluated for the critical double cantilever construction stage as well as the completed bridge.
- A 1 to 375 scale full aeroelastic model of the entire bridge was designed and constructed. The full model was tested in turbulent boundary layer flow conditions, representative of those at the project site. Instrumentation on the model provided estimates of full scale structural responses that could be compared to design capacities.

The Boundary Layer Wind Tunnel Laboratory

Western

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