The Angus L. Macdonald Bridge, Halifax, Canada

Wind Engineering Study

Owner: Halifax Harbour Bridges
Date Tested: 1995, 1996, 2006

Engineers: Monsarrat and Pratley Ltd.

Length 2500 feet	*Main Span* 1447 ft	*Navigation Clearance* 153.9 ft
Tower Height 338 feet	*Main Cable Diameter* 10 inches	*Deck Width* 34.8 feet

The Project

The Macdonald Bridge was opened to traffic in 1955 as a two lane suspension bridge linking Halifax and Dartmouth, Nova Scotia. A major deck rehabilitation was undertaken in the mid-1990's, with the installation of an orthotropic deck system, increasing the capacity to three lanes of traffic. In addition, bicycle and pedestrian walkways were added outboard of the main deck truss. Subsequently, 9 ft. high fencing was added to each to ensure the safety of users of the bridge.

Full Scale Monitoring

Full Scale Monitoring of deck motions was undertaken in 1995 to identify natural modes of vibration, natural frequencies and associated structural damping to aid in the subsequent analytical and experimental studies.

The Wind Tunnel Studies

A primary objective of this investigation was to identify the critical wind speeds for flutter instability and vortex shedding for the rehabilitated bridge. The investigation also defined the dynamic response characteristics of the bridge to turbulent wind, pedestrian comfort over a full range of wind speeds and provided information for the design of the structure against wind effects.

The wind tunnel studies consisted of:

- a dynamic analysis of the completed bridge,
- a meteorological investigation to assess the wind conditions at the site,
- a 1 to 40 scale section model studies for various deck configurations and
- an Equivalent static load analyses

The Boundary Layer Wind Tunnel Laboratory

Western

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