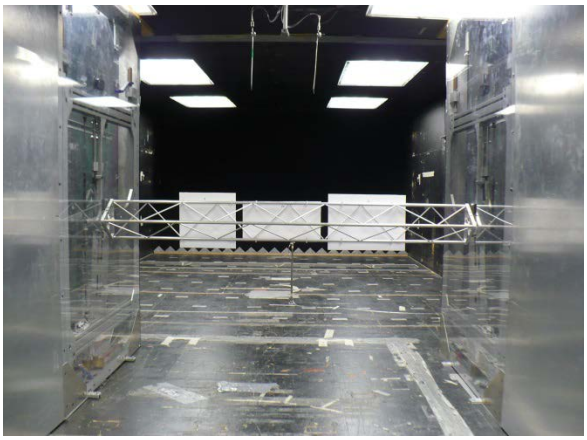
Tri-Chord Cantilever Sign Support Structures

Wind Engineering Study



Owner: Ministry of Transportation, Province of Ontario
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Client: Ministry of Transportation, Province of Ontario

Section Models	*Sign Structure Specifications*
1 to 11.1 Scale of Tri-Chord Cantilever Sign Structures	*a) cantilever spans from 12 to and including 18 m,* *b) maximum total sign panel area of 26.7 m^2 and* *c) a depth of sign panel up to 2740 mm*

The Project

Tri-Chord truss overhead sign supports are used to support static sign panels in the Province of Ontario. These trusses are fabricated in hot-dip galvanized structural steel and designed to the requirements of the Canadian Highway Bridge Design Code (CHBDC). The sign supports that are the subject of this investigation are designed for cantilevered sign support structures with: a) cantilever spans from 12 to 18 metres, b) a maximum total sign panel area of 26.7 square metres and c) a depth of sign panel up to 2743 mm.

The Wind Tunnel Studies

The objective of the study was to provide information for design against wind effects and to ensure aerodynamic stability over a full range of wind speeds. The assessment of the likelihood of cross-wind galloping / vortex shedding induced oscillation was a primary focus of the investigation.

The investigation was also intended to define the dynamic response characteristics of the structure to turbulent wind and provide information concerning wind loads for the design of the largest of the proposed cantilever sign support structures against wind effects. The investigation also provides a) criteria to ensure aerodynamic stability and b) simplified wind loading procedures that are compatible with the requirements of the Canadian Highway Bridge Design Code, with specific reference to wind conditions found in the Province of Ontario.

The study consisted of a 1 to 11.1 scale section model of the main truss with three different sign arrangements, as well as the bare truss for comparative purposes. Tests were performed in smooth flow to investigate the overall stability, and in turbulent flow to define the dynamic buffeting response characteristics of the structure. A load and design methodology was developed to incorporate the results of the wind tunnel tests.

The Boundary Layer Wind Tunnel Laboratory

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