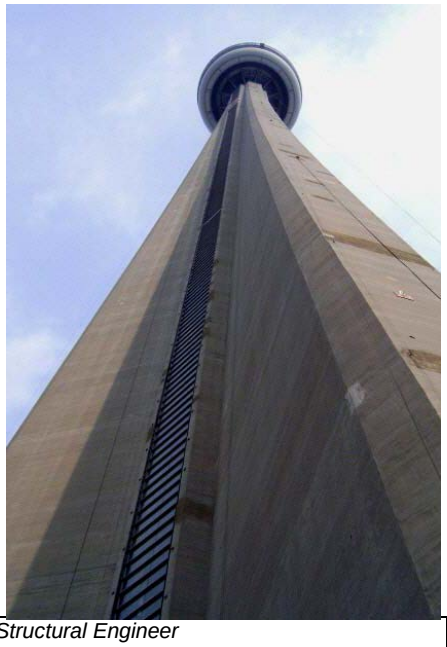
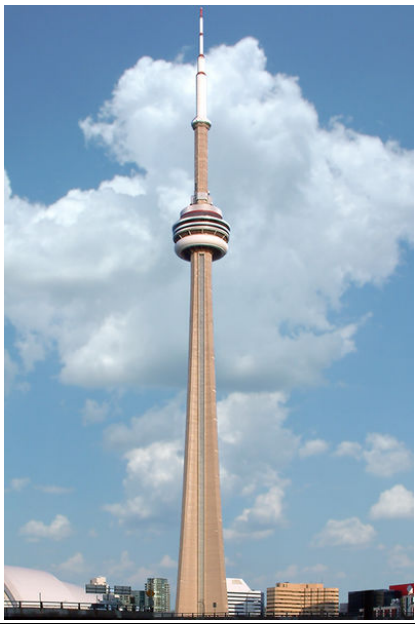
CN Tower, Toronto, ON, Canada

Wind Engineering Study





Client Metro Development	*Structural Engineer* NCK Engineers	*Architect* John Andrews Architects and WZMH Architects
Height 553m	*Year Tested* 1970 to 1974	*Model Scale* Full model of structure: 1:450 Partial model of Sky Pod: 1:60

The Project

The CN Tower, located in Toronto, Ontario, is the world's tallest freestanding structure on land.

The CN Tower consists of a hollow concrete hexagonal shaft containing elevators, stairwells and power and plumbing connections. On top of this is a 102m steel broadcast antenna. Below the Sky Pod, the concrete shaft is supported by 3 tapered fins or wings which give the tower the appearance of a slender tripod. The Sky Pod has several floors, including a glass floor and outdoor observation deck, café and look out level and revolving restaurant.

The Wind Tunnel Studies

Comprehensive wind tunnel model and climatic studies were carried out to provide information on various wind-related questions affecting the design of the structure.

A replica aeroelastic model of the tower was constructed at a geometric scale of 1:450 and tested in turbulent boundary layer flow conditions representative of wind at the project site from various compass directions. This defined the wind loads and response for the concrete shaft and the steel antenna.

The Wind Tunnel Studies (continued)

A static pressure model was tested at a geometric scale of 1:450 to provide information on the local peak pressures and suctions on glazing and cladding.

A study of pedestrian level winds indicated relatively high wind speeds near the three tapered wings of the shaft.

A partial 1:60 scale model of the Sky Pod and adjacent parts of the shaft examined the action of wind on the air-supported radome, enclosing the micro-wave transmission equipment just below restaurant level. The micro-wave radome was modelled aeroelastically.

Two tuned mass dampers were added to the antenna mast. These were designed to provide additional damping to the 2nd, 4th and 5th modes of vibration of the tower. This assured the reliability of performance of modes with a potential for vortex shedding excitation.

The Boundary Layer Wind Tunnel Laboratory

Western

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