



Structural Wind Loads On Tall Buildings

Services:

Building Acoustics

Wind and Snow Loading

Environmental Noise

Air Quality Studies

Structural Wind Loading

Wind Tunnel Testing

Cladding Pressures

Long Span Roofs

Control of Mechanical Vibrations

Computational Fluid Dynamics

Microclimate Engineering

Design of Mass Dampers

Telephone:
(613) 836-0934

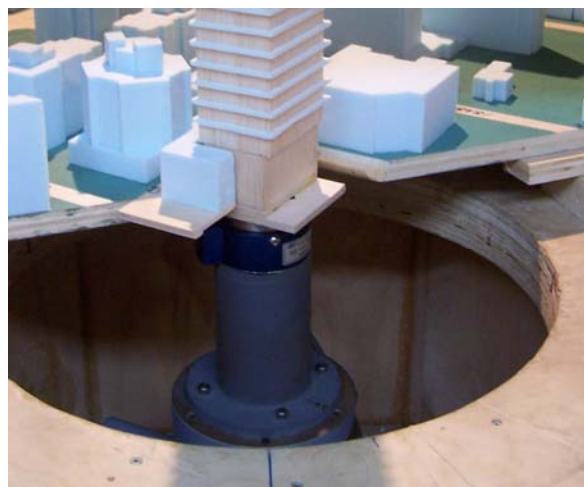
Facsimile:
(613) 836-8183

The design of tall buildings requires knowledge of wind impacts on the cladding and structural systems. For tall buildings wind loading is best determined by wind tunnel testing of a physical scale model of the study building placed among its surroundings. For most tall buildings, overall base forces and overturning moments, as well as floor-by-floor loads can be determined with the High-Frequency Force-Balance (HFFB) method. This involves fabricating a light-weight model of the building and mounting it on a stiff strain-gauge flexure. Base forces and moments are measured for 36 wind angles at 10° intervals. Corresponding full-scale values and floor-by-floor loads are derived from these measurements and knowledge of the building dynamic properties. Information about the building's motion, as it affects occupant comfort, is also derived from the basic measured data.

Accurate knowledge of cladding pressures is beneficial to produce a cost effective design for the building envelope. Surface pressure measurements are performed using a rigid geometric model of the study building installed among its surroundings. Data from the wind tunnel for each of 36 wind directions is integrated with a statistical model of the wind climate for the area.



View of Wind Tunnel Looking Upwind



Strain Gauge Base for HFFB Studies



Light Weight Building Model Installed On HFFB Base



Structural Wind Loads On Tall Buildings



Comparative Results & Potential Saving Code Wind Forces (Red Lines) Vs Wind Tunnel Tests (Blue)

