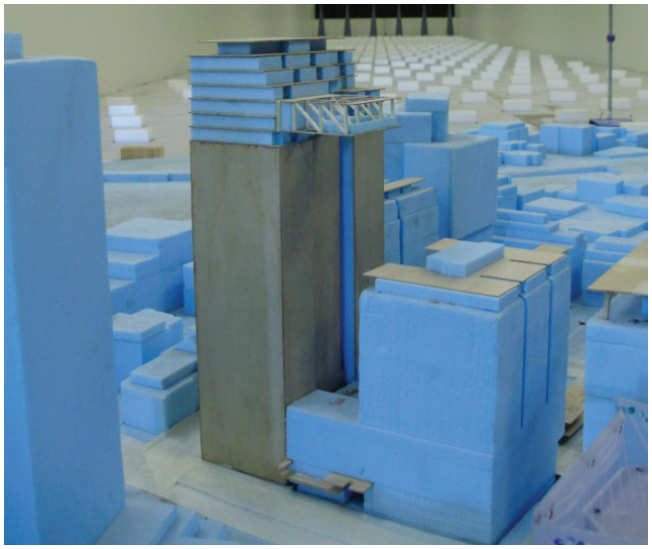

Wind tunnel testing 1:400 scale tests.

Testing the plant facade.

# Wind engineering at Central Park

One of the most distinctive features of Sydney's Central Park precinct, a joint venture between Frasers Property Australia and Sekisui House International, required wind tunnel testing to quantify the magnitude of the wind loads.

The precinct's cantilever projects approximately one building width from the top of the western facade to reflect sunlight onto the building podium. The cantilever contains a roof terrace and a secondary structure with 300 mirrors attached to a central support. As a large integrated system, there is potential for wind to excite one of the components into dynamic motion.

Wind engineering consultancy Cermak Peterka Petersen (CPP) was asked to predict wind loads over the entire building using wind tunnel testing to produce a safer and more economical design than could be done using wind design codes alone.

The tests comprised a 1:400 scale model for the dynamic wind loads on the entire building and the turbulence characteristics of the wind at the reflector rack location; a 1:125 scale for the dynamic winds loads on the cantilever and reflector rack; 1:6 scale for the wind interference between adjacent mirrors; and a full scale for the dynamic response of the individual reflector element. The results of the tests at the different scales were used to calculate the combined dynamic response of the entire structure to wind loading.

The building design also includes some of the largest vertical gardens in the southern hemisphere, and it was important to quantify the wind effects on the plants. In windier temperate climates, growth can be hindered by the constant air movement at elevated building locations.

CPP worked with landscape architecture company Oculus to develop a plant comfort wind criterion. The company then provided a facade wind map to assist landscape designers to select and position the plants over the facade.

Vines and supporting lattice work add wind induced drag forces, so plant drag coefficients for a range of wind speeds were determined through a series of mock up tests in the wind tunnel.

One of the most important applications of wind engineering in modern building design is the requirement for clean, healthy air. A building's plant and equipment can produce toxic and/or odorous emissions, from kitchen grease hood exhausts to diesel backup generators and boilers. In addition to these usual exhausts, Central Park also has a tri-generation plant.

Wind tunnel tests were run to ensure contaminants are dispersed in accordance with acceptable guidelines. In these tests, a tracer gas was released from emission sources for a range of wind speeds at rates producing plume dispersion characteristics consistent with the full scale development.

Concentrations were measured at fresh air intakes and other sensitive receptor locations around the Central Park site, and compared with appropriate design criteria under a range of meteorological wind conditions. This determined the minimum operating parameters to meet the various air quality criteria. ■