Millennium Tower, Tokyo, Japan

Wind Engineering Study

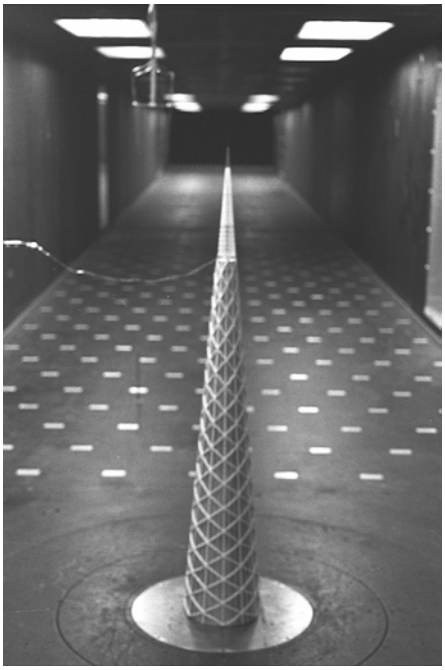

Photo Credit: Norman Foster Group

Owner Obayashi Corporation	*Footprint Area* 130 metres in diameter	*Architect* Norman Foster
Height 150 storeys, 800m	*Year Tested* 1992	*Model Scale* 1:500

The Project

The concept design requested by the Obayashi Corporation from Norman Foster was to create an off-shore commercial development pushing the bounds of construction technology. The site consisted of a 600m tall commercial and residential tower which would house a population of 50,000. The tower would be topped with a 200m tall antenna. The base of the tower included a circular marina which was to be 400m in diameter.

The Wind Tunnel Studies

Information on cladding pressures was determined for the tower and the associated low-rise structure. Measurements were taken at over 256 locations.

Force balance models were constructed for both the tower and the antenna. These models were tested for two terrain models. Measurements were obtained for the base shear and base moments in the along-wind (drag) and across-wind (lift) directions.

The Wind Tunnel Studies (continued)

Motion-induced forces were also examined by measurements at 16 levels with sinusoidal-induced motions of approximately 2.5 meters full-scale at the tip for both lift and drag motions.

Reynolds Number dependency was also examined and found to be weak and attributed to the roughened cylinder.

The overall testing supplied the clients with good preliminary estimates of the base moments and shears and wind-induced accelerations. It was also determined that aeroelastic damping was not of great importance. It appeared that this damping was likely to be positive but small.

This study provided the client with an initial estimate as to what wind loads could be expected for a structure of this type.

The Boundary Layer Wind Tunnel Laboratory

Western

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