

## **Executive Summary**

The lateral resisting system for the building, Northside Piers, is the focus of this report. Northside Piers, a 29-story condominium tower located in Brooklyn, New York, is currently under construction utilizing a concrete structure design. It consists of two-way flat plate slabs, shear walls around the central core, and a pile foundation. There are four shear walls around the stairwell and elevator with one additional shear wall coming off of the core. The East-West walls of the core have large penetrations at every level that serve as doorways.

The wind load for the building was determined by a wind tunnel test, and the seismic load was calculated using ASCE7-'05. The wind loads were the controlling case, producing a maximum base moment of 194,000 ft-kips and a base shear of 1,140 kips. Seismic loads only create a base moment of 80,500 ft-kips and a base shear of 340 kips.

The lateral loads are distributed to the shear walls and columns through the floor slab which acts as a rigid diaphragm. The amount of load that goes to each element is a function of the element's stiffness. A simple calculation showed that the columns are expected to take less than 1% of the load, which led to the decision to model only the shear walls in the analysis.

An ETABS model was built in order to determine how much load goes to each element and how much the building drifts. It was found that the two North-South shear walls take almost 50% of the lateral load when the wind acts in the North-South direction. When the wind acts in the East-West direction, the two walls around the central core take about 30% of the load while the protruding wall takes about 40% of the load. It was also determined that torsion would not be a controlling load case in the design of the walls.

The drift was found to meet the industry standards of L/400 for wind drift and the ASCE code recommendation of L/160 for seismic drift. The building is expected to have a displacement of 3.89" in the North-South direction under full wind load.

Finally, the distributed loads were used to check the lateral system at some of its critical points. These included the shear walls at the base of the building and at the floor where the concrete changes strength. The spandrels were also checked above the penetrations in the wall. It was found that all of the members had sufficient capacity except for the elements at the base of the building. This could be due to the fact that there were a few additional openings near the base that were not included in the model, an aspect that will need to be analyzed more thoroughly.