NATIONAL WINNER

$100M OR GREATER

Torre Mayor

MEXICO CITY

JUROR COMMENTS:

State-of-the-art design using performance-based seismic criteria and in-line passive damping that addresses the issues of safety and damage control in a commercial building.

Located within Mexico City's major business district, the 225 m (738 ft) Torre Mayor is a landmark building, with 57 floors and a heliport. Four underground and nine above-ground parking levels accommodate about 2000 cars.

The building consists of 43 typical column-free office floors, with floor plates ranging from 1700 m^2 to 1800 m^2 (18,300 sq. ft to 19,300 sq. ft). A two-story retail concourse surrounds the entrance plaza.

The building has an 80 m-by-80 m (262 ft by 262 ft) footprint at below-grade levels, which is reduced to an 80 m-by-65 m (262 ft by 213 ft) footprint from the fourth to the 10^{th} level. Above the 10^{th} level, the footprint is further reduced to its typical tower size of 48 m by 36 m (157 ft by 118 ft) , where a geometrical combination of a rectangle merged with an arch segment at the south side of the building forms a curved façade at the south face.

The innovative approach taken in the seismic design of Torre Mayor embraces a performance-based criterion, which is becoming the standard of advanced seismic design. This criterion is concerned not only with the final safety of the building in an event of a strong earthquake, but it also expects the building to be operational after a strong earthquake.

The tower is designed according the latest Mexico City Building Code (MCBC) and its seismic provisions are among the most stringent requirements worldwide. It also complies with the Uniform Building Code-1994, and several of the latest FEMA 274 provisions.

The building's superstructure is a combination of steel and concrete. The columns at the interior and perimeter of the tower are encased in reinforced concrete for the lower half of the

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tower for added stiffness, strength, and economy.

Typical floor framing is comprised of 3″-deep composite metal deck with 2.5″ of concrete supported on steel framing connected via shear-studs, except at the mechanical floor, where thicker slabs are used.

The selected structural system is based on a redundant multiple system, which is a further enhancement of the "dual" concept recommended by seismic codes worldwide. This is accomplished by introducing a dual conventional (deflection sensitive) lateral-force resisting system in combination with a supplementary damping system (velocity sensitive). In effect, a "trio" system, composed of a primary super-braced frame at the perimeter of the tower coupled with a perimeter moment frame, forms an HSS system, and a trussed HSS at the core of the building is provided to respond to the seismic energy from an earthquake.

The bracing connecting the composite core columns creates a structural spine in the building core. The perimeter frame and the powerful super-diagonal system create an efficient HSS structure, joining the spine in resisting the seismic forces. This system is augmented by the supplemental viscous dampers that are highly effective in reducing the impact of seismic motion on both the structure and the non-structural elements. The system reduces the overall and inter-story sway of the tower, as well as the vibration and the seismic forces of the structural elements. ★

Read more about Torre Mayor in the April 2003 issue of *Modern Steel Construction*.