THE TOWER
3900 WEST ALAMEDA BOULEVARD
BURBANK, CA

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One of the most important buildings in the history of American post-tensioned building construction was completed in 1988—a 32-story office building at 3900 West Alameda Avenue in the "Media District" of Burbank, CA, Fig. 1. At the time of completion, it was the tallest concrete building ever built in the country's most severe seismic zone—then called Zone IV—now Seismic Design Category F. This building opened the eyes of many decision-makers to the advantages of concrete in tall buildings and led the way for several subsequent tall (40+ stories) post-tensioned concrete buildings in California. It began to change the long-held perception among owners, developers, contractors, insurance companies, and structural engineers that all tall (20+ stories) buildings must be built with structural steel.

Called "The Tower," the building has 27 office floors and parking for 1342 cars on nine levels—five above grade and four below, Fig. 2 and 3. The parking levels cover an entire city block. Set at a 45-degree angle to the bounding streets, the 27 office levels provide 1.1 million ft^2 of rentable area. Structural framing is entirely cast-in-place post-tensioned concrete, with clear-span beam and slab framing in the parking levels and a 7 in. post-tensioned flat plate with typical 27 ft square bays in the office levels. Seismic

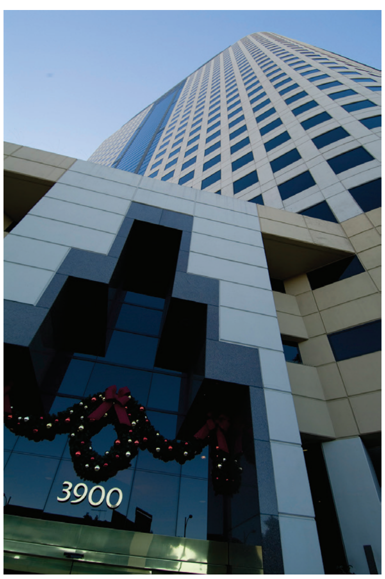

Fig. 1—The Tower, 3900 West Alameda Avenue, Burbank, CA.

Fig. 2—The Tower with 27 office floors and...

Fig. 3—...five parking levels above and four levels below grade.

Fig. 4—The Tower under construction.

framing on the office floors is with a perimeter concrete seismic moment-resisting frame (called a "ductile frame" back then), with 38 in. deep downturned beams cast monolithically with the floor slab. Lateral loads are transferred to perimeter shear walls at the top parking level. The building is founded on a reinforced concrete mat 4 to 6 ft thick. All post-tensioning tendons are unbonded.

The building was completed for a cost of $38/ft^2$, not including tenant improvements. At that time, comparable structural steel office buildings in California were being built for $50 to $60/ft^2$. It was estimated (by sophisticated southern California developers and contractors) that the use of post-tensioned concrete in this tall building saved at least $15/ft^2$ when compared with the cost of structural steel buildings. Some of the factors that contributed to the economy of this building include:

- The perimeter concrete frame beams and columns were exposed architecturally. This reduced the required amount of expensive curtain wall by approximately 25%.
- The use of post-tensioned concrete in the floor system reduced the total height of the building by approximately 30 ft (roughly 1 ft per floor) when compared to structural steel, resulting in savings in every vertical building component (curtain wall, plumbing, electrical, elevators, and so on).
- The reduction in building height also reduced the interior volume of the building by approximately 15%, resulting in future savings in heating and air-conditioning.
- The use of post-tensioning in the floor system minimized dead load and high-strength 6000 psi concrete (high for that time), resulted in reasonable column sizes (36 in. square maximum) and economically feasible rentable floor areas.

Other less tangible benefits that accrued in this tall building due to the use of post-tensioned concrete included:

- Exposing the perimeter beams eliminated the opening between the edge of the floor framing and the curtain wall, an opening usually necessary in structural steel buildings where the floor structure cannot be exposed. This opening provides a path for fire to spread vertically from floor to floor.

This factor became painfully apparent when later, in a 62-story structural steel office building in downtown Los Angeles, a fire started on one mid-level floor and then progressed upwards through the opening between the floors and the curtain wall, gutting three floors above.

- Fire resistance in the concrete beams and columns is provided by the concrete itself rather than sprayed-on fireproofing, which is much less durable.
- The redundancy and structural continuity of cast-in-place buildings such as this one offers significant advantages in resisting catastrophic loadings.
- The inherent stiffness of concrete buildings offers advantages in comfort for the occupants.

Construction time in The Tower compared very favorably with structural steel buildings of similar size, Fig. 4. The frame goes up rapidly in a structural steel building, but interior work (nonstructural partitions, finishes, plumbing, electrical work) cannot start until the metal deck and concrete topping is complete on each floor, and that work lags well behind the completion of the frame. In a multi-story concrete building interior, work can proceed immediately upon completion of each floor. More information about the construction of this building can be found in References 1 through 3.

This building has functioned well for 25 years now, although it is no longer the tallest concrete building in California. The Tower has been exceeded in height by several other post-tensioned concrete buildings, each with more than 40 stories.

Of particular note is the performance of this building in the 1994 Northridge earthquake. Located only 12 miles from the epicenter, the building suffered no structural damage in the earthquake. That is very notable because the earthquake caused widespread structural damage in buildings and bridges throughout the Los Angeles area, and it affected all types of framing.

In summary, the use of cast-in-place post-tensioned concrete in this tall office building resulted in significant economies, greatly increased fire resistance, improved resistance to catastrophic loading, and greater occupant comfort. It has performed well for 25 years, including the Northridge earthquake in 1994, which it resisted with no structural damage. It is a landmark building that led the way for other tall post-tensioned concrete buildings in California and in other areas of high seismic risk.

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