

Executive Summary

The goal of designing a more efficient lateral and gravity floor system for the Franklin Square Hospital Center Patient Tower was a difficult one considering the excellent job the design team did. When applying that goal to the Franklin Square Hospital Center as located in San Francisco California, the research and design necessary leads to unforeseen complexities. One such complexity involved the choice of lateral system to use while another was the choice of floor system to use and how to make everything work as a whole package.

The lateral system types explored were a specially reinforced concrete moment frame system and a specially reinforced concrete shear wall system. Both systems contained positives and negatives but the negatives of the moment frame design proved too great to overcome when research was completed. The moment frame system, while perfectly applicable to the original design in Baltimore, was far too large and imposing with column sizes of 34"x34" and beam sizes of 34"x36" when sized for San Francisco seismic forces. The optimal lateral force resisting system turned out to be a shear wall system with a centrally placed core and supplementary shear wall segments located in the northern and southern wings of the building. These walls at their thickest were 22" and at their thinnest 12". The footprint impact of the shear wall system on the interior spaces was far less than the massive moment frame impact. However, the interior architectural layout of the interior spaces needed rearrangement due to the transplant of the elevator core to the center of the building. The architectural changes resulted in space arrangements that are similar to the original plan design and still offer the necessary flexibility and accessibility required in a hospital.

The floor system change was far less complex than the lateral system change was. An 8" PT flat slab was implemented with 4'x4'x2" drop panels over columns. This much thinner floor system resulted in a building weight decrease of 5,800 kips or roughly 10%. In addition to the benefits of reduced building weight, the PT floor system also cost slightly less when just materials and labor are accounted for by close to \$100 thousand. However, the length of construction is extended by four additional weeks with the post-tensioned system. With general conditions estimated around \$40 thousand a week, the change in schedule costs an additional \$160 thousand. Therefore the net increase in price of the post-tensioned floor system over the 10" regularly reinforced slab is \$60 thousand or around 22 cents a square foot.

Given that the cost increase from the post-tensioned slab is less than the cost increase from a more substantial lateral system, the ideal structural system for the Franklin Square Hospital Center located in San Francisco, CA would be a concrete shear wall system with an 8" post-tensioned slab.