

Executive Summary

The Medical Office Building, in Malvern, PA is a six story concrete structure that is part of a larger corporate complex. As the third building in the growing complex, the Medical Office Building's design was largely influenced by its attached neighbors. In order to maintain the same exterior appearance as the two older buildings, the general design and construction methods were retained. In particular, the gravity system of concrete columns was continued, and the floor elevations were matched to make the transition between the buildings through the sky bridge unnoticeable. Despite the matching, some modifications were made to the non-visible systems.

The Medical Office Building introduces a raised floor on Filigree beams instead of a cast-in-place slab on beams system. In addition, open office spaces, and an auditorium were incorporated into the design. Although these systems all serve a purpose, some introduce unexpected complications, and others are not being used to their full potential. One example of a complication is that the Filigree beam system is proprietary, and thus cannot be designed for lateral loads by the engineer. This resulted in a complicated moment frame and system being overlaid to handle lateral loads.

In response to the complexity of this system, a shear wall alternative was suggested. The shear wall system was just as effective as the moment frames, and cost half as much, but it requires the addition of footings with underpinning, which may make the cost rise again. Another option to reduce the system complexity is to simply replace the Filigree beams.

A post-tensioned two-way slab was compared with the Filigree beam system to simplify the floor design. The proprietary nature of the Filigree system made it impossible to determine an actual cost and a comparison between the two-way slab and a banded beam system, which is similar to Filigree, was inconclusive. On the basis of simplicity, and reducing the overall floor depth, the two-way system is the better solution. The advantages of the two-way slab can also be carried to the mechanical system.

The mechanical system of the Medical Office Building is a conventional overhead system. Because the building already has a raised floor, implementing an underfloor air distribution (UFAD) system is a logical improvement. An effective UFAD system was designed for the open office area when the two-way slab had been implemented to increase the ceiling height by 2'-0" over the Filigree system. However, the system would not likely work correctly if the Filigree system were retained.

The last area considered by this project was the auditorium. As an alternative to traditional downlighting, a direct-indirect lighting system was designed. This system resulted in energy savings, which were used to add task lighting. At the same time, the system seems out of place in the auditorium because it is not the traditional design. In this case, the owner's opinion would have to guide the final decision.

Based on the results of the analyses, it is obvious that the current systems in the Medical Office Building are comparable to the new ones. Generally, optimizing the design requires that the whole building be investigated instead of its parts. For the Medical Office Building, both the existing and the proposed designs work just as effectively for the entire building.