Executive Summary

The William W. Wilkins Professional Building is a 6 story, 112,000 sq. ft. medical office building located in Columbus, Ohio. Costing approximately $7.4 Million, it is essentially an addition to the Grant Riverside hospital across the street. These buildings are connected by a pedestrian bridge from the third floor. Enclosed by brick veneer, precast concrete and spandrel glass panels the exterior is non-load bearing. The structure is made up of steel beams acting compositely. Loads are transferred through girders to the W12 columns that carry the load down to caissons.

This report is a comparison of several alternate floor systems for the Wilkins building. Each system has advantages and disadvantages. The purpose of this report is to determine which, if any, of these systems warrant further investigation to be utilized instead of the existing system. The existing system consists of a 5½" slab acting compositely with steel beams.

The alternate systems investigated are:

1. One-way concrete slab with concrete beams
2. Two-way concrete flat plate
3. Post-tensioned concrete slab
4. Precast hollow core planks
5. Precast Double Tee planks
6. Open web steel joists

The floor system in the Wilkins building has a one-hour fire rating requirement. A common advantage in all of these systems is that the concrete slab will effectively meet this fire rating. In addition, many of these systems will increase the overall building weight. This will increase the bearing on the foundations requiring further investigation. Lateral systems used in resisting seismic forces will also have to be looked at.

Using a one-way concrete slab with concrete beams allows for a slightly shallower slab at 4½" instead of 5½". However, the loads placed on the girder require it to be 30", which is deeper than the W24 used in the existing system. Overall, this will result in a deeper system. This is not a major disadvantage as there are no height restrictions on the Wilkins building.

The two-way concrete flat plate uses simple formwork making it easy to construct. Roughly square bays make a two-way slab appropriate providing a shallower floor system than the existing composite system. Since height

restrictions do not apply to the Wilkins building this is not a significant advantage.

The post-tensioned slab provides the shallowest floor system at 9". The higher rebar strengths allow for this shallower slab. Support for this system could be masonry bearing walls, steel beams or frames.

Hollow core spandeck with a 2" topping results in a total floor depth of 14". This system is easy to construct reducing labor expenses. The double-tee precast planks with a 2" topping require a 34" depth. Using double-tee planks will allow for greater floor spans opening up the floor space. As with the hollow core system, installation is quick and easy.

Open web steel joists have the advantage of openings for mechanical and electrical equipment. Due to their reduced strength capacity, however, a 22K7 is required. This is deeper then the existing beams. However, W24 girders can still be utilized. This will give the same overall floor depth.

After analyzing and comparing these various systems, I have concluded that with further research, four of the six alternatives could be considered. The open web steel joist system does not warrant further investigation as it has no real advantage over the existing system. The other option I ruled out was the one-way slab with concrete beams. This system results in a deeper ceiling cavity and a heavier building. Due to the higher labor costs associated with concrete, this system does not have enough advantages to compensate for the disadvantages.