

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 existing floor system is steel framing designed for composite action supported on W12 columns. Lateral framing consists of five braced frames utilizing tube steel. Two frames run North-South with the remaining three running East-West. Two of the frames running East-West are located on the exterior of the building.

The purpose of this thesis report is to consider the structural redesign of the Wilkins building to reinforced concrete skip-joists. The goals of this process are to determine if skip-joists are a feasible alternative to steel framing. Included in this is a look at the potential to open up all bays of the exterior for natural lighting by using moment connections.

Results of this study confirm that concrete skip-joists are a feasible alternative to steel framing. A 4.5" slab with 7"x14" joists framing into 16"x26" girders is sufficient in most places. Pan's with a slab span of 53" will be used creating a module size of 60" or 5'. The new lateral system, moment connections, presents no problem due to concrete's inherent properties. Columns ranging in size from 16"x16" to 22"x22" are sufficient to carry gravity loads while resisting lateral forces. The cost of the new system is \$400,000 less than the existing system. However, construction duration is increased by 75 days.

In addition to the main depth study of this thesis two breadth studies were performed. The first was a look at integrating some form of photovoltaics into the building. Roof top photovoltaic units were designed for placement as well as wiring to integrate the units into the buildings electrical grid. The effect the units have on the environment was also investigated.

The second breadth study performed was a construction management comparison between one-way concrete slab framing methods. This included a cost and schedule comparison between concrete skip-joists and concrete beams. The use of preformed pans to place skip-joists creates a small savings in material/labor costs over beams. However, more noticeable is the considerable savings obtained in the significantly shortened construction duration. This confirms why concrete skip-joists are the preferred one-way slab framing method in industry.