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Structural Option
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Executive Summary

This report looked at alternative floor framing systems for the Medical Office Building. The original monolithically cast slab on beam system was compared to a composite slab on steel beam system, a slab on steel joists system, a flat plate system and a precast panel system. The systems were compared on the basis of cost, impact on usable space, and compatibility with the architecture.

The composite slab on steel beam system resulted in a 4" slab resting on W14x38 beams. Three beams spanned 28'-0" between W30x124 girders. The cost of this system was $3.69/S.F. higher than that of the original cast-in-place (CIP) slab on beam and the floor sandwich depth increased 16". Because of the increased cost and decreased usable space, this system was ruled a nonviable option.

The slab on steel joist system had a 2" slab over 16K2 joists. The joists were spaced 2'-0" O.C. and spanned 28'-0". The girders were classified as 24G14N8.5K joist girders. The steel joists did save 69 cents/S.F. compared to the original system, but they had major architectural shortcomings. First, the system could at best achieve a 2 hr. fire rating. Second, the system could not handle the architectural curve along the southeastern wall. Finally, the floor sandwich depth increased 8". If longer spans could be accomplished this system may be viable, but the current design does not offer enough benefits for further consideration.

The flat plate system is an 11.5" slab resting directly on the columns. The reinforcing in the slab is #8 bars spaced evenly across the section of the slab. Thermal expansion requirements governed for the positive section of the middle strip. The column strips required 15 bars on the bottom and 6 bars on the bottom. The middle strip required 5 bars top and bottom. The flat plate costs $3.27/S.F. less than the original system and offers several benefits. The most notable benefit is the 6.5" decrease of the floor sandwich depth. In addition, this system offers equivalent fire protection because its slab is thicker than the original, and it can match the architectural curve. However, this system would require a new strategy for lateral support in the building. Even with this shortcoming, this system offers a viable alternative to the CIP slab on beam.

The precast concrete system consists of 8DT24 with 68-S strands planks spanning 28'-0". The planks rest on a 28IT36 precast inverted tee beam. No topping was provided because a raised floor system will rest on the slab. This system saves $7.95/S.F. compared to the original, making it less than half the cost. However, similar to the joist system it would have difficulties managing the curve so some CIP work would still be necessary. Another draw back is that the floor sandwich depth increases 18", doubling in size. Switching to a hollow core slab could alleviate this problem, but that switch would require that the beams be CIP because no precast beams have a ledge with the same depth as the hollow core planks. Based on the possibility of using a hollow core plank on CIP beams, this system remains a viable option.