



Conclusion

Recommendation

After investigating the four different systems I believe I can make a reasonable determination of which would be the best suited for the 'Erie on the Park' condominium complex. The steel system has a high potential for walking vibration issues and it is more expensive than any of the other systems, but it has the fastest erection schedule. The post-tensioned, frame-wall dual system has a floor slab that is heavy enough that there will not be any vibration from tenants walking about. It is also the most cost effective system, but the construction process takes the longest of the different systems due to tensioning of the PT strands. Of the other two systems neither of them will have walking vibration problems and their overall cost and construction schedule are between those of the steel and the PT frame systems.

There are other things to consider than just the cost and schedule. For instance, changing the structural system from a steel system to a concrete system increased the overall weight of the building by 50%. This additional weight is a huge concern when designing the foundation in an area like Chicago where the soil has little bearing capacity because of the river. In some cases this increase of weight may be the difference between a shallow foundation and a deep foundation which is an enormous cost increase. Since this building already has a deep foundation, the cost increase of strengthening the caissons would be minimal in comparison to switching from a shallow foundation. There are also the other trades to consider, such as the mechanical, lighting, electrical, and plumbing. In the original design they were run in the ceiling cavity, through the open-web joists. In the redesigned systems it is still possible to have these utilities run above the ceiling but either the ceiling itself will have to be lowered to increase the ceiling cavity depth or the overall building height will have to be increased to maintain the same floor to ceiling height. The second of those options is an option, but not one that I plan on entertaining when, for the PT frame system, the ceiling only needs to be lowered 2".

System	Steel	Shear Walls	RC Frame	PT Frame
Vibration	Yes	No	No	No
Cost	25.21	---	21.98	20.6
Schedule	7	---	8.4	10
Weight	19680	33250	32880	27560
Ceiling Cavity	12	4	4	6
Ease of Construction	Easy	Easy	Easy	Medium

Table 10: System comparison summary

I believe that the post-tensioned flat-slab working integrally as a frame with the shear walls is the best system for this building. I believe this because it is the least expensive system, they are already using a deep foundation, it is not as heavy as the other two concrete systems, and the additional construction time could be made up elsewhere in the overall building schedule. Most of all, though, is that this system truly offers the architects at Lucien Lagrange and the owner flexibility in the floor plan and totally unobstructed views of the city. Although the steel braces provide some flexibility they still have to be considered when designing the façade and laying out the interior walls. With the PT slab and integrated lateral system the shear walls are all confined to the center of the building near the elevator core and only columns dot the exterior of the floor plan.

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