Final Thesis Design Report – Executive Summary

Over the course of the past academic year I have been analyzing the Metropolis at Dadeland, Phase I with a focus on the structural system. After an extensive investigation of the structure of the existing building and brief analysis of the construction climate in Miami, Florida I am proposing an alternate system for the building. Since all of the construction of large buildings currently underway in the greater Miami area is concrete with post-tensioned slabs, I chose to analyze whether or not a steel frame work in the given situation.

One thing that I tried to maintain was the existing floor plans as much as possible. This was only a minor challenge when setting up the gravity members of the building. However, this did create a severe lack of ability to locate braced frames in my proposed structure which ended up being its ultimate demise. The moment frames that I was forced to use a lot of were not able to sufficiently carry the lateral load from the 150mph wind that was impacting the building.

I also investigated the electrical system in a typical condominium unit and estimated the difference in cost between the two structural systems. The electrical system was impacted because I chose to add recessed lighting into the dropped ceilings that I introduced to the building due to the steel frame. The result was that I used two more circuits than the existing unit, but the feeder and main breaker were unaffected.

In the estimates the concrete structure ended up being noticeably cheaper than the steel and that is independent of the cost for the new circuit breakers and light fixtures that I have proposed to introduce to the space or the possible savings from reduction in foundation, which could alter the price in either direction depending on exact concrete savings or quality of the lighting fixtures used.

Overall, if the floor plans had been arranged to accommodate the grid of the steel frame, the steel could have worked as a structural system. But as is, there is not enough lateral stiffness to resist the loads. The concrete is also a cheaper system which makes the developer and future tenants happier. In conclusion, there is a reason that all of the current large construction projects in South Florida are concrete even if steel could work given favorable circumstances.