

## **Paseo Caribe Condominium Tower and Parking Garage**

Condado, Puerto Rico

### **Executive Summary**

This technical assignment examines the existing conditions of Paseo Caribe Condominium Tower and Parking Garage. This structure is a 14 story cast in place concrete apartment building that sits on top of 10 story parking garage. The building is located in the northern coastline of Puerto Rico making it both a severe hurricane prone region and a high seismic zone. Due to the high price and delay of importing steel to the island, most of the architecture in the island is made out of concrete. This building takes the strength of concrete on more level by incorporating a post tensioned slab system to keep the slab thickness to a minimum, increasing floor to ceiling heights. At the same time this system allowed for large bays that are unobstructed. There are no beams or columns in the apartment layouts. This was a determining factor of the design because the condominium is located in the most expensive location of Puerto Rico's every growing tourist sector.

Due to this and other factors, the building structural design has several factors that point towards a complex analysis and design. For this preliminary analysis a simplified model of the building was developed throughout the report and is the base of the lateral and gravity analysis. One important aspect that is kept in mind through out the report but that is not directly integrated is the effect of the shape that building has on the increased stresses experienced by the lateral resisting system. Instead of behaving like a square building, like the model that has used to calculate the seismic and wind loads, the building behaves more like an H-shaped building formed by the interception of 3 rectangular planes in a central point. This shape allows for more window, but low torsion restrain.

Structurally, the building both laterally and vertically supported by two dozen concrete walls that span around the perimeter of a very thick concrete core, 10' by 162' that span the middle of the building. The framing lattices of the concrete shear and bearing walls form a building frame that work together to decrease story drift deflections and increase the torsion rigidity of the building. However, without considering those two frames, East-West & North-South, acting together the building is not as effective in lateral distribution of the loads and a computer program would be best to model its behavior.

Similarly, it is still unknown whether this structural slab was design as a one-way or two way systems. It is believed that it was originally designed to be two ways but because of the arrangement of consecutive parallel shear walls spanning next to each other to take the high lateral loads, the bay sizes end up having length to width ratios very close to or equal to two. The slab then behaves more like a one-way system with the few tendons running the transverse direction helping with slab deflections and cracking.

This report does a good attempt at layout down a simplified method of analyzing the building structure. Emphasis is given primarily to lateral resisting system. This loads are much critical than the loads of just a gravity analysis.