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Paseo Caribe Condominium Tower and Parking Garage
Breath Topic 2

Breadth Analysis 2: Impact on Floor Vibrations and Mechanical Damping

The objective of this breath analysis is to determine the impact of the lighter hollow pre-cast concrete system on the absorption and transmittance of impact forces and vibrations over the current solid cast in place floor system. Major internal sources of vibration loads in a residential building are due to oscillation of machinery and the passage of vehicles. Therefore, considering the vibration characteristic of the new floor system is important for this project because of the residential floors are located above the 10 level parking garages and also the mechanical systems are on the upper two stories.

Monolithic concrete buildings are solid and efficient at absorbing impact forces and vibrations. As the structural mass and stiffness is reduced there is an increase in the period of the structure. This can result in larger amplitudes of vibration. Improper vibration control can result is human discomfort of the occupants. Structurally, excessive deflections may result in curvature or misalignments, fracture of architectural elements, and transfer of loads to non-structural elements such as curtain walls. Therefore, a study of the hollow-core system based on the published paper "Vibration Criteria for Assembly Occupancies" by Allen, Rainer, and Pernica to determine the lowest acceptable fundamental frequency of the floor system. The procedure is based on the density of occupancy and appropriate forcing frequency to determine and acceptable limiting acceleration ratio at the center of the floor. The lowest acceptable fundamental frequency will be compared to the actual natural frequency of the floor structure.