## Executive Summary

The Borgata Hotel, located in Atlantic City, New Jersey, is a 43 story tower housing 2,002 guest rooms. These guest rooms combine for a total of 2.2 million square feet and serve the adjoining low rise Casino and Spa resort.

The buildings main structural system is comprised of a concrete frame with post-tensioned slabs. The building resists lateral loads with a network of shear walls in both directions of the building. A core of shear walls exists near the center of the building, as well as multiple shear walls scattered across the plan. The shear walls resist gravity loads as well and replace columns where they exist.

The focus of this thesis will be to refine the gravity and lateral systems of the building. Rather than redesigning the structure in steel, it has been decided to redesign floor systems using a precast filigree system. This redesign using filigree will reduce the overall weight of the building, in turn reducing the size of gravity members as well as seismic forces. In addition to redesigning the floor system, an investigation for the redistribution of shear walls will be done. This investigation will include relocating and resizing shear walls to evenly distribute stiffness throughout the building. With a more symmetric layout of stiffness in the building, torsion can be greatly reduced.

Two different filigree systems will be designed for this thesis. The building's new floor system will be analyzed using the direct design method and checked with computer programs. A filigree design guide provided by The Harman Group will be used for the design of the conventional filigree system. A design guide provided by The BubbleDeck® Group will be used to design the BubbleDeck® floor system. The lateral system will be reanalyzed using a new ETABS model. The members will be redesigned through a combination of hand calculations and the use of PCA programs.

An Architectural breadth study will be included in the relocation of the shear walls. The architectural program and plans will need to be considered while relocating walls for better distribution of stiffness. As well, a study to reduce the size of core will be done. By reducing the size of the core, it could be possible to fit an extra room per floor in the building. This would result in a total of forty or so extra rooms in the hotel. This increase could yield higher revenues for the owner with minimal initial cost increases.

The other breadth study will be in the construction management field. The use of the precast filigree system will greatly reduce the amount of time to erect the building. Every day that can be taken off the schedule can greatly impact not only the overall cost of the project, but also interest on loans for the building and revenue the owner can make by opening earlier.

## Breadth Studies

Two breadth studies will be conducted for this thesis. The structural investigation for this project has great implications for other areas of the building. A filigree floor system can substantially reduce the amount of labor, the over all cost, and the time to erect the structure. Since this is true, a breadth in the Construction Management Process would contribute to this thesis well. With a redistribution of shear walls in the building, an architectural analysis of the building must be done. Included in this analysis, it will be determined if the core of the building can be reduced in size.

For the breadth in construction management, a new schedule for the erection of the structure will be determined. The expected outcome will be a shorter erection time. Due to this shorter erection time, the building will be able to open sooner. Since the building will open sooner, the owner can begin to collect revenue sooner and make payments on loans sooner. Both of these effects will increase the overall monetary benefits the owner will earn from the building. In addition to a schedule investigation, an in depth cost analysis will be done for the new system. Included in this cost analysis will be the cost of the new floor system and the reduction in cost of other components due to the decrease in gravity loads.

For the architectural breadth, an in depth analysis of codes, building program and floor plans will be done to determine new locations and sizes for shear walls, as well an analysis in the reduction of the size of the core. If the can be reduced in size enough, it could be possible to fit another room per floor in the building. This would result in about 40 extra rooms in the building. With these extra rooms, the owner can collect extra revenue with minimal initial cost increases.