



Executive Summary

The Erie Convention Center and Sheraton Hotel is an eleven story, 132,000 square foot hotel and convention center, which is part of the Bayfront Convention Center complex, located in Erie, Pennsylvania.

The existing structure, a steel frame with a precast concrete plank floor system, proves to be efficient in its design and constructability; however a staggered truss system provides an alternative to this structural system and was designed and analyzed in depth in this report. A staggered truss system creates open, two bay spaces by eliminating interior columns with the use of floor to floor height trusses on alternating floors. In addition to designing the staggered truss system, the affects that various floor systems can have on the member sizes of the trusses was also investigated. Two floor systems, a hollow core precast plank floor system and a steel joist with deck and concrete slab floor system, were designed. Using these floor systems, two ETABS models were created in order to size the structural members for the staggered truss system based on the differences in the floor systems. Final conclusions were based on cost, schedule, and impacts on architecture.

My breadth topics in this report investigate an alternative to the current heating and cooling system used, as well as a study of the current acoustics and sound level in between two guestrooms.

A lake source open-loop geothermal heat pump was considered in replacement of the conventional air-to-air used. This air-to-water system is much more efficient and will save on electricity needed to heat and cool the building, therefore decreasing the amount of money spent. The money saved per year by using this geothermal heat pump was determined and compared with the first cost to calculate the payback period.

Sound transfer through hotel rooms is a concern, however appropriate noise reduction values were not given. In order to ensure the guests' comfort, I evaluated two typical adjacent guest rooms. The transmission loss through the shared wall as well as the noise reduction was found. Finally, based on the sound pressure of humans talking in one room, the sound pressure in the adjacent room was calculated and compared to ambient sound conditions.

From these studies, I concluded the following:

- The precast plank system is more effective than the steel joist system based on a small floor sandwich, constructability, cost, and affects on the exterior architecture.
- A staggered truss system is cheaper and will have a shorter construction time than the proposed steel frame structure.
- The payback period of approximately three months for the first cost installation of the geothermal heat pumps makes this a much better alternative to the existing heating and cooling system.
- The sound transfer in between two typical adjacent guest rooms is at an acceptable amount.