



## Summary and Conclusions

The floor plan of the Erie Convention Center and Sheraton Hotel provided the opportunity to use a staggered truss system as an alternative design consideration for the structural system. The original structural system, a steel frame with a precast concrete plank floor system proved to be efficient for both cost and time scheduling, however, the staggered truss system, in the end was found to be even more efficient, as well as offering additional benefits. The trusses used in the staggered truss system create open spaces that are two bays wide. Even though on the upper floors this is not taken advantage of because of the use of the small guestrooms, the first floor is left completely open. This is especially beneficial in the dining room and conference areas.

Within the staggered truss system, two floor systems were investigated: a precast concrete plank floor system, and a steel joist with steel deck and concrete slab floor system. Computer models using ETABS were created for both of these floor systems, and the members were sized. While the steel joist system sized some members slightly smaller than the model with the precast plank system, on average the member sizes were the same. In the end, the precast plank floor system was found to be the better alternative. The steel joist floor system would increase each floor height by one foot, creating an eleven foot increase in the total building height. This increase in height affects several factors negatively, including increased wind forces, increased cost of material for the exterior skin of the building, and changing the exterior architecture of the building. Using a steel joist floor system also provides the chance for increased floor vibrations, and more difficulty in fireproofing.

Lake Erie provides a beautiful setting for the Erie Convention Center and Sheraton Hotel, however, it can also provide cost savings with the use of a geothermal heat pump. Using the water from the lake in an air-to-water open loop heat rejection system, the electricity used to heat and cool the building are decreased by almost \$120,000 a year. After determining the first cost of installing the pipe and pump to take water from the lake, it was found that only a 3 month payback period will be needed. This system is extremely efficient and cost effective.

Acoustics and sound transfer between guestrooms is a concern in any hotel, however with no analysis results provided, it is not certain that the noise reduction between the rooms is enough for the comfort of the guests. By calculating the transmission loss between rooms, as well as the absorption and noise reduction, it can be determined whether or not human voices can be heard through the walls and above ambient noise such as an air conditioner. A full analysis proves that the wall construction between two typical rooms is acceptable for the acoustic requirements expected.

The Erie Convention Center and Sheraton Hotel was designed with the design requirements of a standard hotel construction. Overall, however, there are adjustments that could have been made to the structural and mechanical systems in order to make the building more cost efficient. In conclusion, looking beyond standard construction and design processes can open a whole new world of possibilities to make a building as efficient as possible.



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## Acknowledgements

I would like to extend my thanks to Angelo Maione, John Schneider, and Andy Verrengia of Atlantic Engineering Services for their aid in the selection of my thesis building, and providing me with the drawings of the Erie Convention Center and Sheraton Hotel. I would also like to thank Dr. Boothby, my thesis advisor, and Professor Parfitt for their help in my selection of a thesis topic and answering all of my questions along the way. In addition, I would like to thank the members of the thesis discussion board for their help and advice, especially Charlie Carter. Finally, I would like to thank all of my friends for their support, advice, and daily trips to McLanahan's.