EXECUTIVE SUMMARY

The Fairfield Inn and Suites is a 10 story hotel located in downtown Pittsburgh, Pennsylvania. The building is approximately 80,000 square feet and reaches a height of 102' above grade with a typical floor to floor height of approximately 9'4".

The current site of the Fairfield Inn and Suites was chosen because it's adjacent location to PNC Park and close proximity to Heinz Field in Pittsburgh. For these reasons, the hotel was kept on the existing site. Upon investigation of the soil classification for the site, it was determined that the soil is classified Site Class D. This will significantly impact the base shear value of the building, due to the poor soil the foundation will rest on.

This final thesis study examined the implications related to redesigning the gravity and lateral systems of the Fairfield Inn and Suites. The current design of the building includes load bearing concrete masonry walls, transfer beams, and an auger cast pile foundation. The redesign completed in the structural depth study explored steel moment frames rather than the load bearing concrete masonry walls. This would eliminate the use of the transfer beams in the current design. The design also examined a modified layout in the shear walls that result in the lateral force resisting system of the building.

The steel gravity system resulted in a decrease to the overall building weight. Along with the decrease to the overall building weight, the construction time to erect the steel building structure was sufficiently lower than the concrete masonry bearing structure. The shorter construction time does sacrifice an increase in cost. Structurally, the redesign of the gravity system does prove to be an efficient option for the building. The decrease in building weight resulted in a reduced base shear value on the building. A lateral optimization study was included as part of the structural depth study to see if a modified shear wall layout would provide greater resistance to the loads. The modified layout proved to be the optimal design as it reduced the overall torsion present on the building and reduced the required number of piles in the foundation.

The façade breadth study focuses on improvements in guest comfort with respect to natural daylight penetration verse heat transfer through the wall system. By implementing the brick veneer system, the heat transfer through the wall would not be affected, as opposed to using the larger curtain wall system façade option which would increase the heat transfer but allow for more natural daylight. A lower heat transfer rate façade proves to me a more efficient system for the building.

The goals of this thesis were to create an efficient optional gravity and lateral system for the building. Based on the results discussed, these goals are clearly met. If cost was not an issue, it is the recommendation of the author to implement the changes proposed, as each study does impact the building in a positive way.