Executive Summary

The CityFlatsHotel is approximately 65,000 square feet, 5 levels above grade. Each story height ranges from 12' to 14', topping out at an overall building height of 67'-2". The current site of the hotel was chosen by the owner because its location near downtown Holland, Michigan. For the proposed design, the site will remain unchanged due to its attraction appeal.

The final thesis study examines the implications related to a redesign of the structural system for the CityFlatsHotel. The existing superstructure consists primarily of reinforced concrete masonry walls and precast hollow-core concrete planks, with interior steel frames when appropriate. For the purpose of the redesign, the concrete masonry structure was replaced with a steel moment frame system, maintaining the precast hollow-core plank floor. Braced frames make up the lateral force resisting system resulting in the utilization of a steel frame exterior, which requires a curtain wall or structural panel façade to replace the exterior shear walls.

Implementing the steel gravity system resulted in a decrease in overall building weight, which reduced the base shear and total moment. As a result, smaller loads are transferred to the foundation, meaning a foundation redesign isn't necessary. In addition, the total construction time to erect the steel structure was significantly shorter than the existing concrete masonry structure. However, the modification to steel does increase the cost. The lateral force resisting system was sufficiently designed, maintaining an allowable building drift based on code limitations. Overall, the redesign of the structural system proves to be an effective and efficient alternative for the CityFlatsHotel.

The façade breadth focused on the architectural impact of changing the existing structural system to steel by comparing natural daylight penetration against heat transfer for optimum guest comfort. Implementing the brick veneer system provided a lower heat transfer rate as opposed to the curtain wall system, making it the most suitable solution for hotel guests even though the brick veneer system lacks natural daylighting,

The overall goal of this thesis report was to design an effective and efficient structural system for the CityFlatsHotel. Based on extensive research and design, the data and results throughout this report prove the projects goals were clearly met. If minimal additions to up front costs and minor floor plan changes are not an issue to the building owner, the alternative steel structural system could be implemented as the final design as each study impacts the building in a positive way.