CHAPTER 5: SUMMARY/CONCLUSIONS

The overall objective of this thesis report was to determine if National Harbor Building M could be redesigned equally efficient and functional as a concrete based structure. In attempting to answer that question a structural depth, which was comprised of the design of a concrete post-tensioned building supported laterally by concrete shear walls, was completed. The theme of the report was then further touched upon in two breadth studies. An architectural precast wall study was performed to determine the most appropriate method to enclose the rear of the building. Also a construction depth analyzed the redesign's efficiency from a financial and construction standpoint. Listed below is a summary of the conclusions formed through the analysis of the completion of this report.

- From a purely structural point of view, an equally efficient building which conforms to the functional requirements of a retail/office building can be designed as a concrete based structure. The structure designed utilizes a post-tensioned slab with drop panels to combat shear issues and beams to add strength across the long span. While it is recognized that a more efficient tendon layout probably could be designed by an engineer with more post-tensioning experience, the design presented provides adequate strength and limits the slab depth to eight inches. The lateral system selected and designed successfully resists the calculated lateral forces, holding the building within mandated drift requirements. Additionally, the designed system was fit into the layout of the building without creating obstructions to the usable space. Finally, after some minor modifications, the foundation system originally designed is still capable of supporting the structure.
- After the investigation of the rear façade of Building M, it is clear that the precast system selected was the best choice for the redesign. The proposed direct bearing wall system met or exceeded the other systems in all categories analyzed highlighted by its ease of construction, financial benefits, and flexibility of design. The breadth research shows the variety of ways the precast system can be modified to most effectively meet the requirements of this specific application. One notable design tactic successfully employed was the utilization of the direct bearing panels which neglected the wall systems' implications on the structural slab.
- The construction breadth further confirms the efficiency of the concrete redesign through its cost, schedule and site analysis. The comparable cost of the two systems shows that the concrete based design can be constructed at similar or slightly lower overall price. Additionally, the redesign can be completed at this given site in a comparable period of time as compared to the steel-based structure.

- When considering all aspects investigated through the completion of this report it can be concluded that a concrete based structure could be substituted as an efficient alternative to the existing design of National Harbor Building M.