

Campus Square Building

Harrisburg, PA

Final Thesis Report

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Executive Summary

This senior thesis report provides background information for the Campus Square building, along with in-depth research and analyses of the construction and technical aspects of the project.

As part of the critical industry research in this thesis, applicable exterior wall systems were researched as potential additions to Campus Square as a means to make the building more sustainable and energy efficient. The results of the research concluded with many thermally advantageous wall systems and materials which could be applied to Campus Square; as well as constructability issues which must be overcome to ensure the system's success. However, the physical location of the building negated the performance of these technologies due to the lack of solar availability because of the orientation of the structure. Fortunately, the benefits of prefabrication, and EIFS technologies were applied to the following analysis portions of this report.

To further analyze incorporating a prefabricated exterior wall system, this second analysis applied the lessons learned in the critical industry research about wall systems to Campus Square. Cost analysis performed showed that a prefabricated wall system would have an increased initial cost of \$430,500 more than the wall system used for the project. However, the construction schedule was reduced by 9-weeks. This shorter construction schedule allows for tenants to move into the building, and for GreenWorks to begin profiting off of the leased space.

The third analysis of this thesis focused on the thermal efficiency of a prefabricated wall system, compared to the as-built method, as well as the curtain wall system. This was performed using heat loss calculations to compare the thermal losses during peak design temperatures. The data proved that a well constructed prefabricated system would reduce the overall thermal loss and gains throughout the year. The savings in operational costs due to the increased thermal efficiency of the building envelope would further mitigate the initial price increase of the wall assembly.

The fourth and final analysis of this thesis report included a structural redesign of the connections required to fasten the prefabricated panels to the superstructure. Through the use of QuickClips™, a product developed by Dietrich Metal Framing, a simple solution was discovered. The clips allow for a simple, yet durable structural connection. Furthermore, the clips could be welded to the steel studs of the prefabricated walls prior to their delivery on-site. This reduces the amount of on-site time which would be spent connecting the panels to the superstructure.