EXECUTIVE SUMMARY

PREFABRICATION DEPTH

The major theme of my thesis will be prefabrication and the building façade. I intend to perform detailed research to investigate its current state in the modern day industry. Prefabricated systems have been around for a while, but I feel that many groups are unsure of how to utilize them to their utmost advantage. By looking at case studies, peer reviewed articles, and industry opinions I will determine some of the best applications of prefabricated brick systems as well as shed light on some cutting edge technologies that have not yet reached the masses.

ANALYSIS 1: PRECAST SLENDERWALL PANEL IMPLEMENTATION

As part of my prefabrication research I will redesign the façade of Wisconsin Place Residential to be a prefabricated brick enclosure. The reasons for doing this include the site congestion, coordination issues, and schedule constraints. After performing extensive research and speaking with manufacturers and engineers, I selected the Slenderwall® precast panel system due to its ease of construction and high level of façade unitization. My structural breadth is embedded in this area. I calculated and compared the weight of the new system to that of the old to ensure the superstructure is able to support the panel load. The connection details for the precast panels to the post-tensioned slab were designed and methods to improve the moisture resistive and thermal characteristics of the envelope were investigated, as these are areas of concern with prefabricated materials. A schedule review showed a 22 week reduction by switching to the Slenderwall® system. A budget review was performed and the overall cost savings due to implementing the Slenderwall® façade is $1,409,630. All of these results were processed to make a final recommendation of changing to Slenderwall®, the optimal system.

ANALYSIS 2: PHOTOVOLTAIC GLASS REPLACEMENT

A class about building envelopes brought me to the idea of using photovoltaic glass as a way to convert solar energy from the sun into electrical energy for the building. Yes, this solar cell glass is more costly than regular, but its benefits can greatly pay off over time. This analysis will look at the energy benefits to utilizing PV cell panels in a functional manner as windows. The idea is to replace all of the foot-level glass panels with PV glass since they will not obstruct the view from the apartments. As my mechanical breadth, I used the software program Energy10 to determine the energy savings per year from adding these PV panels to the façade. The cost of implementing the PV panels was considered, and proved to be a bad business move due to the 108 year return on investment. The reason for this is that the 50 Watt panels selected are not powerful enough o make any significant reductions in building mechanical loads and therefore will not affect the utility bills for tenants.