

## **I. Executive Summary**

This thesis focuses primarily on the curtain wall for Main & Gervais. The first analysis examines the two methods for constructing a curtain wall, stick-built (current method) and prefabricated (proposed method). The second analysis examines the design of the curtain wall by evaluating the efficiency and providing a better alternative.

### ***Curtain Wall Prefabrication Analysis***

The current method of curtain wall construction for Main & Gervais is the stick-built method. The first portion of this thesis compares stick-built construction and prefabrication of curtain wall systems to determine if prefabrication is a better alternative. There are several methods for comparing the two separate systems. First, a comparison of technical advantages and disadvantages for both systems is examined and indicates prefabrication has more advantages. Second, a schedule comparison points out that it takes a third of time to install prefabricated panels as opposed to constructing the panels on-site. Third, a cost comparison reveals that the material costs for prefabrication are higher than stick-built construction. Finally, the conclusion summarizes the basics of the analysis and states that prefabrication with schedule savings integrated into the estimate, will cost 8% more than stick-built construction.

### ***Curtain Wall Design Analysis***

The current curtain wall design for Main & Gervais is complicated in certain areas. The curtain wall on the west elevation is sloped and extends away from the building at  $5.63^\circ$ . This analysis examines the benefits and consequences of eliminating this angle. The following are important factors for this analysis. First, considering the additional area gained is important to understanding the benefits of extending the curtain wall. The total area added to the floor plan amounts to  $2756 \text{ ft}^2$ , which allows the owner to charge an additional \$57,876.00 to its tenants a year. Second, understanding the structural implications of adding area to the building footprint is important to verify if this addition is possible. The verification in this analysis proved that the new structural elements would support the additional loads and will cost \$30,828.07 for the construction of these elements. Third, switching the angle of the curtain wall changes the angle in which the sun shines through the glazing. The new energy demand of the air conditioning units to manage the hotter temperature inside is \$2,176.40 for the year. In conclusion, it would be beneficial for the owner to eliminate the slope in the curtain wall on the west façade as the owner will be able to earn more rent money with the extra floor plan area.

### ***Combining Both Analyses***

Suppose prefabrication is the chosen method and the curtain wall slope is eliminated. There will be an increase of upfront costs by \$351,842.40 for prefabricated curtain wall panels. The extra floor space available from eliminating the slope on each floor will provide an additional \$50,414.06 in revenue per year to the owner. The owner will break even after eight years if both actions are implemented on Main & Gervais. In the end, the finer quality of prefabricated curtain wall panels is worth the increased upfront cost because the owner will break even eventually.