

Executive Summary

The main purpose of the Senior Thesis Proposal is to provide readers with a project background which is followed by an identification and overview of the four research analyses areas to be performed, over the duration of the spring semester, on the Concordia Hotel project. For each analysis topic, the problem and the goal are clearly defined. For each analyses the research that will be performed, the potential solutions and the outcomes and resources that will be used to gain these outcomes is discussed. A weight matrix at the end of the report, following the technical analyses descriptions, illustrates how efforts will be distributed among the four analyses and how they meet the core requirements as the following: research; value engineering analysis; constructability review; and schedule reduction. A time table will also be developed to help show the dates of which certain analyses steps will be taken. The timetable will be followed by a description of the breadth topics along with a description of the MAE topic that will be considered. At the end of the course the proposed analyses are presented to the Architectural Engineering Faculty and attending jury members. Below are brief descriptions of the problems, the solution, and the potential benefits of the solutions application. A further description and explanation of these analyses will be presented later in the body of the document.

Analysis 1: Building Information Modeling (BIM) Application to Renovations/Rehabs

There were several key activities that caused increased costs and schedule delays. These problems could have been overcome with greater utilization of BIM to facilitate prefabrication. BIM could be used to help apply prefabrication to the extensive Mechanical/Electrical/Plumbing (MEP) systems and the drywall/framing of the interior partitions. These issues will be discussed further in the following paragraphs. This BIM consideration will allow for advantages in construction and efficiency in materials. The benefits of applying BIM to conduct prefabrication would be the potential to reduce the schedule and project costs. The analysis will consider the role which BIM can play in initiating prefabrication on the Concordia project. The goal is to improve the project's construction efficiency to improve the project schedule and costs.

Analysis 2: Re-sequencing of the Demolition Efforts

The demolition of the Concordia project consisted of the removal of MEP systems, drywall partitions, interior finishes and several interior slabs. The demolition initiatives which took place throughout the structure were extensive and repetitious on several floors. Even though demolition of the interior slabs and several structural columns was somewhat repetitious this activity still delayed concurrent and succeeding activities from being completed. These delays resulted in the project being completed behind schedule approximately two months. The goal of this analysis is to consider alternate sequences to demolish the structural slabs and columns in order to accelerate the activities schedule and to result in overall savings to the project.

Analysis 3: Implementation of Mechanical, Electrical & Plumbing (MEP) Prefabrication

The extensive construction and installation of the MEP systems caused extensive delays on the project. The delays resulted in employing crews for overtime work during the week and weekends. These delays and costs could have been avoided if the MEP systems were fabricated at an off-site warehouse and then transported to the construction site using prefabrication techniques. This will result in several benefits which include cost savings from reduced labor, and prevention of overtime. It will result in greater productivity, safety, quality and efficiency of materials which will potentially result in greater Leadership

in Energy and Environmental Design (LEED) achievements. The analysis will discuss how to achieve the goal of putting the schedule back on track and to reduce construction costs. Since the project is about one month behind schedule, the generated 3D model used for 3D coordination and clash detection can be used to produce clash free shop drawings for MEP prefabrication.

Analysis 4: Alternate Roof Systems

The Concordia Hotel employs two different roofing systems, a green roof and a Thermoplastic Polyolefin (TPO) in different areas. Alternation of these roofing systems caused constructability issues and inefficiencies in the ordering of materials. The roofing system could have been optimized by utilizing one system over the other in order to capitalize on bulk order savings and labor efficiencies with repetitive tasks. Utilizing one system for the entire roofing area could have also optimized the potential to earn a greater amount of LEED credits. The goal of the analyses is to consider the advantages and disadvantages of applying either a cool roof, green roof, or a conventional TPO roof system to the entire roofing area. This analysis will also include a consideration of the effects on construction related to costs, schedule impacts, and constructability issues. Additionally, out of option breadths will arise during this analysis to determine how implementing a cool roof to the tenth floor roof will affect structural and mechanical systems that support the building's function.