

Executive Summary

This proposal serves as an outline for the research and analysis topics proposed for the spring semester thesis. After the initial proposal ideas developed in technical assignment three, the research and analysis topics have been further focused into a few key concepts. The analysis descriptions highlight three main topics which will be the featured focus for the spring thesis with a consistent theme of quality control.

Analysis One includes an analysis of a precast brick exterior wall system as an alternative to the hand-laid brick system. The structural implications of adding a precast system to the building's structure will be analyzed and recommendations to changing the details will be performed. Also, the Quality, Cost, and Schedule impacts will be areas of study within this analysis. Finally, a cost and quality analysis will be performed to compare the systems.

Analysis Two includes the analysis of a selection of an alternative "cool" roof system to the current green roof. The critical industry issue of energy and the economy will be incorporated into looking at the energy efficient properties of the two systems. A cost analysis will also be developed to compare the two different systems. Quality issues with field installation will also be looked into. This will serve as the topic for M.A.E. research.

~~Analysis Three includes analysis on the benefits and ability of leveraging a Building Information Model (BIM) for prefabrication. Also, the comparison of field quality control strategies in conjunction with the BIM model can determine "best practices" which can make a case for using a BIM model on this project.~~

Analysis Four includes the analysis of the electrical loads on the building and sizing a transformer with the building's expected power load and the grid tie in mind. Also, a comparison of quality control strategies which can be incorporated during the electrical design can determine "best practices" which can be followed by project teams.

A weight matrix is provided to show how much emphasis will be placed on the core areas of research, value engineering, constructability, and schedule acceleration. A detailed explanation of breadth studies can be found within Appendix A. Breadth will be performed in the areas of structural and electrical.

Appendix A: Breadth Studies

The breadth studies topics involve analysis and understanding outside a students' distinct technical discipline/option within the Architectural Engineering major.

Breadth One: Structural

After analyzing a precast concrete panel system in place of the hand laid brick veneer, the increased structural load will need to be analyzed to determine if this alternate system is a feasible option. The structural details will have to be reviewed such as connection angles which will have to be re-designed and a new detail will be produced. If the current structural members cannot support the precast system, calculations will determine new sizes of the members in order to support this proposed system

Breadth Two: Electrical

The electrical design loads for the buildings' electrical distribution system will be analyzed. The comparison to the installed system and calculations for sizing the electrical transformer will be conducted. This will provide a required size of electrical transformer needed as compared to the 750kVa transformer that was installed to replace the original 300kVa transformer which failed due to a phase loss issue.

MAE Requirements:

To satisfy the MAE requirement, I will be demonstrating knowledge learned from AE 542: Building Enclosure Science and Design which focuses on developing an understanding of the nature, importance, functions, and performance of the building envelope in general. This will be valuable for my analysis of the Brick Façade and Roofing Systems.

I will also demonstrate knowledge gained from AE 597D: Sustainable Building Methods which focuses on strategies and technologies for green buildings and sustainable construction and an understanding of how to minimize the impacts of buildings on the environment. I will use this knowledge in deciding on alternative materials through value engineering such as a precast brick wall system and a light "cool" roof system.