



SENIOR THESIS PROPOSAL
Alternative Methods and Research

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EXECUTIVE SUMMARY

The following is a proposal for what I plan to accomplish on my senior thesis project in the spring semester. Discussed are three analysis, a construction research topic, and a weight matrix. Through my three analysis I hope to add value to the project by improving methods and materials used in the construction and reducing the schedule. By reducing the schedule of the project I hope to allow the owner to be able to take over the building at a earlier date consequently allowing them to begin bringing in revenue sooner.

The first analysis will look at the numerous different façade systems called for in the building and propose alternate design and systems to help with coordination and possible reduce the schedule. Analysis two and three will propose a new foundation system and structural system in parts of the building to help reduce the schedule allowing the building to be able to be turned over sooner.

The construction research will look at the use of BIM and it's benefits on a project. Research will be done on how BIM has been used in the past and how affective it is. This research will help show how useful BIM is and allow industry member to be able to see the broad range of ways BIM can be used in the construction process.

The weight matrix shows how I plan to distribute my time in throughout the spring semester to complete each of these analysis and the research topic.



ANALYSIS 1: Façade Investigation (BREADTH)

The goal of this analysis is to find the best way to manage the many different types of facades on the building to help avoid leaks at the joints. This may involve having less variations of façade types in the building or just fining alternate types to help the building seal better. The alternate systems found should perform as well or even better mechanically to help with heat loss in the building. By changing the façade system I hope to be able to add value to the building through value engineering, schedule reduction, constructability issues as well as make the building more energy friendly.

The following steps will be taken to complete this analysis:

- Analyze the existing façade looking to minimize the number of joints between different facades and alternate façade systems such as precast systems.
- Consult with mechanical option faculty to do a heat and moisture loss comparison between the two systems
- Perform a U-Value analysis of the current and proposed system.
- Do an architectural design comparison between the two systems.
- Complete a cost and schedule comparison between the current and proposed systems to look at a schedule to cost comparison.

The benefit of the new system will be seen in the reduction of risk of leakage between joints as well as a schedule reduction helping the building façade system to be completed earlier.



ANALYSIS 2: Excavation/Foundation Investigation (BREADTH)

The goal of this analysis is to help get the building up out of the ground faster. I will do this by analyzing the excavation schedule/design, the excavation support system and the type of foundation used to support the building. I hope to find alternative means for these areas to help the building get out of the ground faster helping to expedite the construction schedule.

The following steps will be taken to complete this analysis:

- Consult with structural option faculty members to design a mat foundation to support the building.
- Analyze a new excavation plan to best help work with mat foundation system.
- Complete an estimate of the new mat foundation system compared to current caisson system.
- Calculate the schedule reduction for the new mat foundation system.
- Complete an analysis of the cost comparison of the two foundation systems and the money the owner can make by opening the hotel sooner due to the schedule reduction.

The benefit of the new system would be seen in the schedule reduction allowing the owner to take the building over sooner helping to bring in revenue earlier.



ANALYSIS 3: Structural System Analysis

The goal of this analysis is to reduce the schedule through the use of precast structural members as oppose to the all cast in place structure. Through the use of precast members the structure can be erected faster allowing construction to move on to the façade and interiors work faster. The main focus for these precast members will be the common floors 8-12 of the hotel. The cost added for these precast members would then be compared to the profit the owner earns by being able to open the hotel sooner.

This analysis will be completed by the following steps:

- Analyze common floors 8-12 and any other area where repetition occurs in the concrete system and the cast in place concrete can be replaced with precast concrete.
- Consult with structural faculty members to design precast members to replace the current cast in place members being used.
- Complete a cost and schedule analysis of the existing cast in place system and the proposed precast system.
- Compare cost difference of the two systems with the revenue the owner can generate by opening the hotel earlier due to the schedule reduction.



CONSTRUCTION RESEARCH

From the PACE roundtable I was able to see how implanting BIM on a project was a huge task for many contractors. I understand many of the benefits of BIM and would like to be able to communicate these benefits to the industry members. I feel the best way to communicate these benefits is to show examples of how it has effectively been used on past projects and show how it could positively affect current projects. By showing these success stories hopefully members of the industry will buy into the fact that the BIM model is worth the time and money it cost to be developed and maintained.

For this I would like to take the BIM model Holder Construction Company has developed for the Aquarium Hilton Garden Inn project and use to further communicate the benefits of BIM to the industry. With the model I would be able to show the different uses of the model and get real world. The main tasks I would like to do include:

- Showing a comparison of takeoffs between a BIM and traditional plans and the time associated with each.
 - This would be accomplished by acquiring takeoffs from the contractors who did the takeoffs. I personally will also be doing takeoffs from the standard construction documents issued on this project. These takeoffs would then be compared to the takeoffs I will do from the BIM model to compare both accuracy and the time it takes me to do each.

- Show how it can be used by a Superintendent to communicate with the subcontractors in meetings.
 - This will be accomplished by speaking with different superintendents with Holder construction on how they have affectively used a BIM model to communicate/coordinate with their subcontractors.



- Save time in the construction process by using collision detection catching collisions early to keep delays from happening.
 - This will be done by looking at many projects that have used BIM modeling and analyzing the number of collisions detected using the collision detection tool offered in Navisworks.

Through these task I can show how affective a BIM model can be and give an idea of the value it brings to a project.



WEIGHT MATRIX

The following is a breakdown of how I believe my time will be spent completing these the research and analysis's above.

Description	Research	Value Eng.	Const. Rev	Schedule. Red.	TOTAL
Façade		5	5	5	15
Excavation/Foundation			5	15	20
Structural System			5	15	20
BIM	35		5	5	45
TOTAL	35	5	20	40	100