



**Thesis
Proposal
Revised**

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**Emily Couric Clinical Cancer Center
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EXECUTIVE SUMMARY

The proposal below provides a detailed outline that will be used to guide research for the final thesis report for the Emily Couric Clinical Cancer Center project. The topics discussed include critical issues in the industry, value engineering, constructability review, and schedule reduction and/or acceleration. Four different analyses are provided to research in more detail and analyze the different topics.

ANALYSIS TOPIC 1: FAÇADE CONSTRUCTABILITY ANALYZED WITH BIM

Building Information Modeling (BIM) is becoming more and more popular in the industry but was not used on this building. This analysis will research and discover how using BIM technologies could have benefited the construction of the very complex façade that is designed for the cancer center.

ANALYSIS TOPIC 2: ALTERNATE FAÇADE

The cancer center has a very complex façade, with many different materials, which is hard to detail and comprehend all of the connections. A simpler façade will be considered which still meets the architectural design. The effects of a new façade on the structural system and mechanical system of the building will also be contemplated.

ANALYSIS TOPIC 3: FAÇADE SCHEDULE INCORPORATING PREFABRICATION

Lean construction and prefabrication are also becoming more popular and critical in the construction industry and can provide schedule acceleration activities. Because the façade is so complex, prefabrication will be considered to prefabricate the difficult connections and small areas of the façade to accelerate the schedule and possibly complete the project early. This is possible because the façade is on the critical path, which could save money to both the owner and contractors.

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ANALYSIS TOPIC 1: FAÇADE CONSTRUCTABILITY ANALYZED WITH BIM

ISSUE

The façade on the Emily Couric Clinical Cancer Center is a very complex façade including brick, stone, a curtain wall, storefront, punch windows, and three different metals: white, copper, and stainless steel. The details for each of these connections are very hard to understand and difficult to comprehend. The constructability of this façade is very difficult and time consuming. Building Information Modeling (BIM) was not used on this project and may have made the understanding of the façade construction a much easier task.

METHODOLOGY

The first step to analyzing the façade with BIM technologies is going to be finding contacts of people who have worked on projects that had complex facades. Ideally, these contacts will have experience on projects that have both used BIM and have not used BIM for the façade construction. Once these contacts have been identified, survey questions will be created to ask them specific details about façade construction using BIM. The questions will pertain to the effect on the schedule, costs, constructability and experience with BIM.

After the survey has been conducted, the information collected will be analyzed and applied to the Emily Couric Clinical Cancer Center. The information collected will not only help me to understand the perceived value to the project but also to the perceived value to the organization. Using BIM for construction on the project would definitely give the company an advantage over other companies in the future.

EXPECTED RESULTS

The goal of this analysis is to see how BIM could improve the process of the construction of the façade and hopefully add value to the project. The pros and cons to using BIM will be analyzed for the company and the project. A detailed cost analysis will not be conducted because the information from experienced companies is not public and it is difficult to calculate.

ANALYSIS TOPIC 2: ALTERNATE FAÇADE

ISSUE

As stated earlier this façade is a very complex façade and includes a variety of materials. Like most construction projects, the façade is on the critical path for the Emily Couric Clinical Cancer Center. It consumes a lot of time on the schedule because of the significant area of hand laid brick and the complicated connections of each different material to other materials. If a simpler façade was chosen, the project schedule could possibly be reduced and costs could be reduced.

METHODOLOGY

This analysis will focus on four different issues including the impact on the architecture, impact on schedule and costs, and possible impacts on the mechanical system. One or two alternate systems will be chosen to compare to the current façade.

First, research will be done using the internet to find different materials. One area that will be focused on the most is the curtain wall. A possible alternate would be to make the curtain wall a photovoltaic system. Another method of research is to contact companies to get details of the materials used to become aware of the different systems available on the market. One thing that will need to be kept in mind is to keep the same properties of the façade that was chosen. The architect designed the project in a specific way for a reason and the materials being selected as alternates should try to match the ones designed by the architect.

After the materials have been researched, they need to be narrowed down to a few that would overall improve the project. The properties of the new materials need to be compared to the properties of the used materials to choose acceptable materials. After the materials have been chosen, the prices and construction durations need to be collected. This can be done by contacting the manufacturers and asking for the information. Calculations will need to be done to compare costs and schedule impacts.

An alternate façade will impact two other areas including the structural system and the mechanical system. It is likely the new system will have different loads on the building structure where it is attached and building ties will need to be analyzed to see if they are acceptable for the new façade along with a cost comparison. The mechanical system could be affected by the new façade because of the different thermal properties. The system may need to be resized which could have either a positive or negative impact. A life cycle cost analysis will be conducted to see if it is feasible to substitute the new façade.

EXPECTED RESULTS

The goal of this analysis is to propose a new façade system to reduce the cost and schedule while meeting the architectural needs of the building. The cost and schedule are expected to be

reduced by decreasing the labor and complex details of the connections. A decrease in the schedule is to be expected because the new system will be less complicated and easier to understand which allows the construction of the façade to be faster.

ANALYSIS TOPIC 3: FAÇADE SCHEDULE INCORPORATING PREFABRICATION

ISSUE

The façade is on the critical path for the cancer center and is very time consuming due to all of the construction being done on site. Prefabricating parts of the façade could save time and also reduce the number of connections needed to connect the different materials. This could impact the schedule tremendously by reducing the time spent on details and RFI's. Overall by panelizing the assembly of the façade, it could be a much efficient process compared to a stick built assembly.

METHODOLOGY

One topic that is common in the industry is the concept of prefabrication and lean construction. Research will be done on these topics to assist with reducing the façade schedule, quality, and cost impacts.

Contacting a prefabrication company to gain a better understanding of the process of prefabrication will need to be done first. After understanding the process, designing the prefabricated façade will begin.

Grouping materials together for ease of construction will need to be determined. First, these materials could be grouped by fabricating the connections of the materials. Also, they could be grouped by breaking the façade into areas and fabricating manageable pieces of the façade.

After organizing the façade into manageable pieces, questions will be asked to a prefabrication company about the logistics and constructability issues of prefabricating the façade. Items that need to be considered are constructability, quality, costs, and durations. This information will assist in analyzing the pros and cons of using a prefabricated façade.

It is understood that different equipment will be required to install the façade in pieces. The equipment will need to be identified and priced to get an accurate cost of the construction. Calculations will be performed to compare the cost of the prefabricated facade to the existing façade.

EXPECTED RESULTS

Prefabricating units is expected to reduce the schedule of the façade which impacts the entire project since it is on the critical path. It should cost less because the pieces are created in a controlled environment and takes less time because everything will be within reach. A crane or scaffolding may not be needed to construct an area of the façade.

CONCLUSIONS

This thesis proposal is to provide four topics to analyze discussing four different concepts. These concepts include critical issue research, value engineering, constructability, and schedule reduction and/or acceleration. A weight matrix is provided below to show the amount of time planned for each topic and area.

Description	Research	Value Engineering	Constructability Review	Schedule Reduction	Total
Façade Constructability	10	0	15	10	35
Alternate Façade	0	20	0	10	30
Façade Schedule	10	0	10	15	35
Total	20	20	25	35	100

Table 1: Weight Matrix Representing Time Distribution on Analyses

APPENDIX A: BREADTH AREAS OF STUDY

MECHANICAL

A mechanical analysis will be performed within the alternate façade analysis (Analysis 2) to understand the effects of the façade on the mechanical system. An in depth analysis of the insulation impacts of the façade will be done along with the calculations of how it could impact the current mechanical system.

STRUCTURAL

The structural analysis takes place in the alternate façade analysis (Analysis 2) of how the façade ties to the building. The structural ties will be evaluated and redesigned if necessary. The loads of the new façade will need to be determined and compared to the current loads of the façade. The calculations will determine if the façade can be supported by the current structural system or if new system would need to be designed.