

Loyola/Notre Dame Library, Baltimore, MD

Thesis Proposal



Sandra DiRupo

Construction Management

Dr. Horman

Dec. 18, 2007

Executive Summary

In this thesis proposal, my four analyses have been selected for further thesis research. I plan to concentrate on the following topics, two of which will be my breadth studies outside of the construction management option:

1.) Depth Analysis 1:

Case Study: Sustainability in Renovations (the Pentagon)

2.) Depth Analysis 2:

Construction Zones Occupied: Incorporating ICRA safety precautions into construction documents and planning.

3.) Breadth Analysis 3:

Life Cycle Cost Analysis: Load Calculations of Existing vs. New Energy-saving Cooling Tower (Incorporate Cost difference for CM)

4.) Breadth Analysis 4:

Prefabricated Curtain Wall: Analysis of affected structural elements such as slabs and columns (Incorporate schedule and cost problems for CM)

These four analysis proposals have been modified after speaking with Dr. Horman on Jan. 14th, 2008. I feel that I will be able to conduct the necessary research in order to complete my Senior Thesis by April 9th, 2008.

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I. Introduction

The Loyola/Notre Dame Library, located in Baltimore, MD, is an expansion and Renovation Project that began in the fall of 2006. The library is shared between the Loyola College of Maryland and The College of Notre Dame. Ironically, it is the only library in the United States that is shared between two universities.

Reason for Building this Facility: The main reason that The College of Notre Dame and Loyola College of Maryland have decided to undertake a joint \$19.6 million library expansion and renovation project is due to growing curricular enrollment demands and improvements in information technology.

Expectations for the Project: The goal of the new student-centered facility is to enhance teaching and learning by creating a library for the 21st century. The current 75,000-square-foot building will be enlarged to 100,000-square-feet, offering enhanced spaces for teaching, personal and group study, scholarly and cultural programming and informal gatherings. The new Library will be a welcoming place with a new glass façade enclosing the four story addition.

II. Analysis 1: Sustainability in Renovations

A. Problem Statement: More Sustainable Design Should be Taken Into Consideration for Upcoming Penn State Renovation Projects

The demand for building efficiency will continue to rise, since energy conservation will be implemented on a global scale in upcoming years. Energy conservation, in particular, is a problem that designers and contractors are going to have to work together on in order to keep life cycle building costs down. More and more owners are willing to pay higher costs for energy efficient buildings that will require less maintenance.

The goal of this research is...

- To determine why building owners are so concerned with sustainable applications for their building renovations
- Compare energy efficient solutions for existing systems compared to new sustainable systems
- Compare statistics for different building renovations

Building owners, contractors, and designers may all benefit from this research since LEED buildings are becoming so popular. Eventually, LEED may even be a requirement for all new buildings and renovations. Owners will obviously benefit since LEED buildings are meant to save money on life cycle and maintenance costs. Renovations are able to be LEED certified as well, but sometimes renovations are already complex and expensive, so sustainable solutions get neglected more often.

To further research this topic, I plan to do a literature review, using the university library databases offered to PSU students, to prove the importance of incorporating sustainable designs in building renovations. Talking to building owners, developers, and owner's representatives will also be helpful after I have done my research. Some owners are educated, and do realize that sustainability is the way of the future. For those owners that are not too familiar with LEED, I may be able to educate them somewhat after I have done some research. I also plan to conduct interview format questions for industry professionals to get some input on different sustainable solutions.

B. Goal: This Analysis Will Research Penn State's Future Plans Toward a Sustainable Campus and Why We Need to Make it Happen.

C. Research Steps:

Step 1: Review Literature and Periodicals about Sustainable buildings and their impact on the 21st century - what is in store for the future.

Step 2: After conducting research on a broad scale, I plan to meet with Penn State's OPP committee members to discuss what is in store for Penn State's future, in particular with upcoming renovation projects. I will have prepared relevant questions for the meeting, and I plan to use OPP as a direct contact for the duration of the spring semester. I spoke with John Bechtel at the PACE seminar back in October, so he may be able to assist me, or lead me in the right direction toward thorough research conclusions.

Step 3: My ultimate goal is to compare Penn State's future plans toward a sustainable campus to other universities throughout the United States. I plan to do some data collecting here to better explain my analysis.

Step 4: The results will include Penn State's strategic sustainability plan for the future, but I will also be comparing the results to other schools throughout the United States. I hope to prove that the institutional sector of building construction is moving toward sustainable and green building renovation solutions.

D. Expected Outcome: Try to raise public awareness that sustainable buildings are the way of the future. I would like to promote the design and construction of more sustainable renovation projects.

II. Analysis 2: Construction Zones Occupied

A. Problem: Control Construction in Occupied Building Zones:

One of the more difficult tasks to manage when dealing with renovations is having building occupants in a building that has areas under construction, which was the case for Loyola/Notre Dame Library. Libraries are supposed to be a quiet learning environment, so this made the task even more challenging. Everyone on board did all that they could do to make this process run smoothly, but there were still some other issues to be considered: bathrooms on each floor had to remain open and meet ADA requirements (with the exception of the floor under construction), library supply storage space, parking, safety of building occupants, and extra costs to implement safety.

B. Goal: In order to prevent conflicts that resulted among building occupants and construction processes, I am going to propose and present ways to adjust the schedule so that such conflicts may be avoided. One conflict was that restrooms were to remain open on each floor while one floor was under construction.

C. Research Steps:

Step 1: I will present the existing sequencing plan compared to a new sequencing plan that limits noise and construction in occupied spaces.

Step 2: Determine bathrooms that are to remain open during construction, if different from original sequencing plan.

Step 3: Rearrange the schedule or phases of the schedule so that the tasks are not slowed by the new sequencing.

D. Expected Outcome: The new schedule and zones may allow for less congested occupied zones if construction is limited in these particular areas.

III. Analysis 3: Life Cycle Cost

(Mechanical Breadth)

A. Problem: Lack of Energy Efficiency Efforts

Since one of the libraries main concerns for the new facility is that it would be an energy efficient building that would ultimately save some money in life cycle cost, it was surprising to see that there were not more sustainable efforts to try and make this happen. For example, light fixtures were replaced on each of the existing floors, but some of the mass quantity fixtures were not of the highest quality in the sense of energy conservation. Also, the cooling tower is to remain, while other mechanical features such as AHU's and ductwork will be replaced and/or added. There may have been more economical ways to go about staying away from maintenance costs of the existing cooling tower, but for the owner, a new cooling tower would be one less first cost item to worry about.

B. Goal: A good way to implement sustainable design into this renovation project would be to propose the purchase of a new cooling tower, rather than keeping the existing cooling tower.

C. Research Steps:

Step 1: Contact James Posey and Associates to discuss my proposal.

Step 2: Get accurate information necessary to run life cycle cost analysis. (Software program to check would be a plus)

Step 3: Get in touch with one of the mechanical professors to ask for assistance in calculating the life cycle cost analysis.

Step 4: Analyze solutions to prove that one cooling tower will run more efficient than the other. Weigh the pros and cons of each tower.

D. Expected Outcome: I am expecting that the new cooling tower will save more money over a long period of time. The life cycle cost of the new tower will prove to be less than that of the existing tower. The owner may be interested in altering the tower down the road.

IV. Analysis 4: Curtain Wall

(Building Envelope Breadth, addressing lighting and/or acoustics)

A. Problem: Curtain Wall Construction

The scheduled time for curtain wall completion was longer than expected. This was partially due to the long lead time on some of the glass panels. Some of the decorative fritted glass had a delayed installation due to manufacturer issues out of the contractor's hands, but it was nearly impossible to speed up this process. Once the glass did arrive, it created conflict with site work because the two subcontractors crossed paths. Grading and paving had to be negotiated within the schedule because of this causing some delays.

B. Goal: I will propose a prefabricated system to save overall schedule time, so that this task does not slow its successors.

C. Research Steps:

Step 1: Contact a curtain wall manufacturer and get pricing for a prefabricated system. (Dr. Riley suggested Harmon, Inc.)

Step 2: Try to pick sustainable materials so that this portion of the building may have some "green" qualities.

Step 3: Since the existing portion of the building is the library, I will also plan to propose more acoustically sound materials for the open gallery space walls and windows, so that when the sliding doors open, there is not a lot of sound bouncing off of the walls and curtain wall system with aluminum framing.

Step 4: If Step 3 does not work, then I will look into preparing a day lighting analysis for the new addition space. This may allow for the limitation of some of the many light fixtures in the gallery space.

D. Expected Outcome: This study covers construction and lighting or acoustical breadth, so I think that this analysis may be a bit more difficult because the design of the curtain wall will be altered, which may also have an effect on the construction and schedule.

V. Summary

For the spring semester, I propose four research analyses: Sustainability in Renovations, Occupied Construction Zones, Life Cycle Cost Analysis for existing vs. new cooling tower, and a thorough curtain wall analysis with emphasis on prefabrication, acoustics, and sustainable materials. For my thesis I will use existing project contacts, schedule, and cost information in addition to interviews and correspondence with new industry professionals, manufacturers, and faculty and peer consultants. Some expected outcomes for my thesis will include: schedule changes, occupied construction zone diagrams, prefabrication design, sequencing, and schedule adjustments, and life cycle cost analyses. The scheduled completion date for this proposal is in April 2008. I feel confident that I have selected sufficient topics for my senior thesis research.