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Final Thesis Proposal

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Executive Summary

In the following Proposal, the reader will be able to identify the three topics chosen to research and analyze for the Thesis Project on the Canton Crossing Tower. The content will show the audience the origin of my three topics, the goal intended for my research, the research techniques that will be used, and the outcomes expected. At the end of the document a weight matrix has been included to verify the intended distribution of time between the topics. A brief breakdown of the three topics is shown below.

Research Topic - LEED® Guide for Developers

An online guide for the LEED® system will be created to assist developers in their quest for LEED® ratings in their development. Interviews will be conducted with existing LEED® developers and non-LEED® developers to focus the content area of the guide. The guide is intended to be user friendly, even to individuals with no LEED® experience.

Technical Analysis #1 - Cast-in-place caissons vs. Pre-cast concrete piles

The existing foundation of the system of the tower is pre-cast concrete piles with cast-in-place pile caps. The analysis will be done on the advantages, both schedule and cost, of an alternate foundation system of cast-in-place concrete caissons. Actual data will be used from the Central Plant located across the street from the tower, which used a cast-in-place caisson system.

Technical Analysis #2 - Canton Crossing Tower as an Independent System with the Mechanical Rooms Located Near the Center

An analysis will be completed regarding the elimination of the Central Plant, which houses the mechanical and electrical equipment for the tower. The equipment will be placed in the tower instead, but another portion of the analysis is the relocation of the mechanical rooms from the top floors to floors in the center of the tower.

Research Topic

LEED® Guide for Developers

Problem

Despite the ever-growing participation of development teams to the LEED® classification system, these individuals are not equipped with a user friendly guide for the successful implementation of LEED® points on their building(s). Making this type of guide or tutorial available to both inexperience and experienced development teams would not only gain interest into LEED®, but also set the team up for success in the LEED® system.

Goal

The goal is to provide a developer a guide that, if used from the start of design, can help them to understand the LEED® classification system and to develop buildings and areas that excel under LEED® criterion. I gained an interest in this because of my direct involvement with Hale Properties, who is the developer for Canton Crossing, which is the 60+ acre area in which the Canton Crossing Tower was built. Hale Properties just built the first building of 14+ from the Planned Unit Development (PUD) of Canton Crossing. If the LEED® system could have been introduced to them at the design phase, they could have implemented it into their entire PUD. The guide I am developing will be a user friendly way for developers to be educated about the LEED® system and how to use it on their projects. I would like the guide to be an online guide that is interactive, where many different developers can share their lessons learned throughout the development of LEED® rated projects.

Research Techniques

1. Before I can develop a guide to educate individuals on the LEED® system, I must first gain an in-depth knowledge of the subject matter. Therefore, time must first be spent learning the system thoroughly, and its application to development specifically.

2. Interview up to three successful developers and find out what their interests, concerns, and ideas about using LEED® for their developments.
3. Discuss the topic with developers who have successfully implemented the LEED® system into their work in the past and get their suggestions on the subject matter. These suggestions could range from lessons learned to things they would like to learn more about themselves.
4. Compile the results from the previously mentioned discussions and get a basis of the direction I need to put my research into. For instance, if an overwhelming concern from the developers is the financial positives and negatives, then I understand this would be the issue my research would need to focus on.**This will be one of my three personal *checkpoints* during the semester to ensure the research is headed in the right direction.
5. Contact individuals who have developed similar online guides to better familiarize myself with the process of creating the guide, as well as clearing up any technical questions I have about the software I will be using.
6. Compile the information from the discussions and develop an in depth goals sheet for what I want the guide to teach the audience. **This will be another of my three personal *checkpoints* during the semester to ensure the research is headed in the right direction.
7. Develop the guide, paying attention to the idea of keeping it user friendly. A difficult guide would automatically turn the developers away from the LEED® system without realizing its benefits.
8. Test the guide by asking both LEED® experienced individuals and individuals completely new to LEED® to use the guide and answer survey questions about its effectiveness based on the goals sheet I created during the development stage. (Sample Survey shown later in this document)
9. From here, make any corrections needed as learned through the feedback surveys to finalize the guide. **This will be the final personal *checkpoint* during the semester to be sure the research has fulfilled the goal it was intended to achieve.

Sample Survey

- Was the online guide straightforward with respect to computer and navigating issues?
- Did the guide help you gain knowledge of the LEED® system?
- Are the items discussed and shown on the guide directed toward their intended audience, the developer?
- Were the topics highlighted the most important ones with respect to developing areas with LEED®?
- Do you feel the guide would be beneficial to a developer no matter what their LEED® experience?
- Do you have any suggestions to help make the guide better based on technology issues, i.e. site navigation issues, etc.?
- Do you have any suggestions about the LEED® content provided on the guide?

Expected Results

The expected results of this research topic are to provide an easy to use, yet education online guide that developers can use to begin using the LEED® system on their projects. The most difficult portion of the research will be locating and communicating with an ample amount of developers who have experience with LEED®. A lot of attention must be paid attention to this section because the knowledge and experience I can gain from these individuals will be critical in getting the new developers to partake in the system. Ultimately, I would like this introductory guide to be a catalyst for the LEED® system in development.

Technical Analysis #1

Cast-in-place caissons vs. Pre-cast concrete piles

Problem

The tower had a difficult schedule to adhere to from the start of the project. The foundation system used did not get the project started on a positive note. The pre-cast piles used brought about multiple issues throughout the foundation construction that could have been avoided. Issues ranging from barge deliveries to driving to engineered depth not only frustrated the team, but also put them behind schedule from the beginning. The Central Plant located across the street used a cast-in-place caisson foundation system. The construction process of this foundation went smooth, with only minor issues arising. Furthermore, the Central Plant's soil conditions, site logistics, construction crew, etc. are all identical to that of the tower. With these details known, the foundation system used on the Central Plant, at least initially, seems as though it would have been a better choice for that of the tower.

Goal

The goal of this technical analysis is to evaluate using the cast-in-place caissons as the tower's foundation system; the team would have saved not only time but money as well. The research will primarily be focused on the schedule impact the alternate system will have, but the cost issue will also be addressed. The added costs that occurred from unforeseen developments during the pre-cast pile construction will also be factored into the research.

This technical analysis will act as a structural breadth for the thesis research I will be completing.

Analysis Techniques

1. All relevant information from the tower's foundation construction, original budget, actual cost, actual schedule dates, etc. will need to be compiled and reviewed.

2. The actual construction details will need to be retrieved from the Central Plant team. This information, such as caissons/day, cost/caisson, etc. will allow a very accurate estimate for the tower to be completed.
3. The required quantity of caissons will need to be calculated, paying close attention the structural integrity of the tower.
4. Analyze any structural issues that will change due to the analysis.
5. Create a schedule and budget for the alternate system on the tower.
6. Compare the actual costs and duration dates of the existing schedule to the results from the alternate system.

Expected Results

The expected results of this analysis are to showcase the multiple advantages of the alternate foundation system discuss. Not only is it expected that the system will require less time, but also will be done with a lower cost and unforeseen construction issues. The ability to analyze the system with such accurate data as the Central Plant's allows this analysis to have a high chance at success. If it is correct and the alternate system is more beneficial, hopefully it will help the development team for the remaining construction in the Planned Unit Development (PUD).

Technical Analysis #2

Canton Crossing Tower as an Independent System with the Mechanical Rooms Located Near the Center

Problem

The Canton Crossing Central Plant currently houses the mechanical and electrical equipment for the tower. The Central Plant is an $8.7 million one story concrete building that is located across South Clinton Street from the tower. The technical analysis will look into eliminating the Central Plant and making the tower an independent, stand alone system. The cost of the building itself, along with financing issues that arose with the tower due to the Central Plant made the thought of eliminating it arise. Not only will the cost impact of the proposal be looked at, but also the tower's capacity for the change. For example, where the equipment will be housed and whether or not the structural integrity of the tower will be in jeopardy by the addition of all the equipment are items that will need to be checked before the cost impact of implementation can be checked. In addition, the new mechanical room located will be placed in the center of the tower. The existing mechanical rooms are located on the top floor and require sometimes over 300 feet of material for tenant contractors to run their feeds to the equipment.

Goal

The goal of the analysis is to illustrate to the audience that the tower could effectively operate as a stand alone system. The $8.7 million contract that was used on the Central Plant could be eliminated. Obviously a certain amount of that cost will still be needed for the tower, i.e. equipment costs, etc. but a cost savings will be made by making the tower an independent system. Also, the new location of the mechanical rooms will be a benefit to all of the tenant subcontractors in the tower in material and construction costs. Finally, by moving the mechanical rooms to lower floors, it opens up the top floors which are leased at higher prices to benefit the owner.

Due to the complexity of this technical analysis, it will act as a breadth topic in the mechanical, electrical, and structural areas.

Analysis Techniques

1. A list of all the equipment placed in the tower will need to be compiled, including the sizes, weights, assembly details, etc.
2. The new equipment floors will need to be selected, taking into account the existing structural steel design.
3. A construction plan will be created paying attention to all of the possible issues that will now arise from the new equipment, i.e. equipment placement techniques, etc.
4. The new structural loads resulting from all of the added equipment will then be calculated and analyzed for structural integrity.
5. An estimated schedule and budget will need to be created for the new construction plan, with help from the superintendent and project manager of the project team.
6. The results of the new plan's calculations will then be shown along with the existing system's numbers to show the advantages and disadvantages.

Expected Results

Even though this will be a rather in depth analysis, the results are expected to clearly show the advantages of construction the tower as an independent system. The time spent on the coordination of the two buildings will be eliminated, along with the issues that arose from integrating the two. Some of the most difficult times during the construction of the tower stemmed from concerns at the Central Plant. The positives of having the tower an independent system are sure to outweigh the positives of the Central Plant, which will also be researched and discussed.

Weight Matrix

Shown below in table form is a weight matrix of how I plan to distribute my workload while analyzing the issues I am proposing.

Description	Research	Value Eng.	Const. Rev.	Sched. Rev.	Total
Cast-in place caissons		10%	10%	10%	30%
Independent System		10%	20%	10%	40%
LEED Guide	30%				30%
Total	30%	20%	30%	20%	100%