ALTERNATIVE METHODS AND RESEARCH

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EXECUTIVE SUMMARY

This third technical assignment takes a look at possible issues for next semester's research topics. The core of this assignment will include a critical issues analysis, critical issues research methods, problem identification, and technical analysis methods. By reading these sections the reader will learn what are the methods and proposed solutions to the research topics.

The technical assignment will first cover the critical issues analysis. The critical issues analysis describes the PACE roundtable held at Penn State. The purpose of the roundtable for the fifth year seniors at Penn State was to help them think and come up with critical construction industry issues. The issues brought up in the discussion groups can then be used for research topics. In this technical assignment, the reader will learn what groups I attended and what issues and concerns are going on in the industry.

Taking the information learned at the PACE roundtable I have come up with a research topic. The critical issues research methods section describes the methods and proposed solutions to the topic involving green health care facilities. This topic will be the focus of next semester. Through hours of research I plan to create a green point system for buildings that are health care and class room oriented. The intent is for the point system to be useful tool for owner, architects, and construction managers building a green health care center.

Next, the problem identification section will look at three issues that may be of concern to the Health Care Center. These three issues including infection control, excessive energy consumption, and a better effective use of the crane, will be used as three more research topics that will be analyzed throughout the course of next semester.

Lastly, the three issues addressed in the problem identification, will be broken down into my methods of research and goals that I hope to achieve. The concern is to make sure value engineering, constructability review, and schedule reduction can be positively influenced through my research. The number one goal is to save some money and some time on the Health Care Center project.

CRITICAL ISSUES ANALYSIS

Recently at this years PACE roundtable several interesting topics were raised and discussed. The roundtable was broken into two morning sessions and one afternoon session in which the topics of building systems challenges, building information modeling and technology, and building respect were discussed. These three topics were then broken down more into four sub topics. While at the roundtable I attended green building materials, BIM modeling and implementation challenges, and building respect with specialty contractors. I feel that throughout the course of the day I have taken a lot away from the entire experience. Many of the topics discussed in the sessions will help in my thesis research.

GREEN BUILDING MATERIALS

In the first morning session I attended the green building materials roundtable. Here we discussed the materials used and involved in the construction of green buildings. Many questions were raised such as, are specific materials called out in the specs, are these materials easy to come by, and how efficient are these materials over a long term? These types of questions are important because they will determine extra costs and longer durations. Also, some of these questions are brought up by the owner, and that's why it seems harder to convince the owner to build a green building. This brings up another topic which was discussed, lack of owner awareness or education. There needs to be a way to educate owners and become familiar with green buildings. The more the owner knows about green buildings the more likely they would be to implement green into their building. If owners have an understanding of costs and efficiencies then we could likely see more green buildings. Another topic that was up for discussion was the commissioning for green buildings. Commissioning for green buildings is much more extensive than a non-green building. This is important and must be taken into consideration when scheduling. An idea to shorten the commissioning process could be to bring in a third party commissioning agent who specializes in green buildings.

BIM – MODLEING AND IMPLEMENTATION

For the second morning discussion group, I attended BIM, modeling implementation and challenges. In this group I learned that BIM can be used to significantly help out a project. One of the GCs who attended the roundtable uses BIM to create a 4D model of the buildings systems. Using shop drawings each building system can be designed separately then put all together in one model. Then creating a conflict log the GC can see where conflicts exist and where coordination will need to be enforced. This also helps the installation of a system without going out of sequence. BIM also allows for better scheduling because you can actually visualize the construction. Again, by actually seeing and visualizing a building system a more accurate estimate and bid can be developed. When developing an accurate estimate you limit the amount of change orders and RFI's on a project compared to a project that was bid too low.

CRITICAL ISSUES ANALYSIS

BUILDING RESPECT – SPECIALTY CONTRACTORS

In the last and afternoon session, I attended the building respect with specialty contractors roundtable. Here the main idea was respect for both CM/GC and specialty contractors. Respect is earned, not given, on how work is performed. A way for specialty contractors to earn respect from CMs or GCs is by completing their task on time and ensuring good quality. An easy way for the CM/GCs to earn respect by the contractors is by celebrating the contractor's success. Another way is to make sure the contractors are being paid and on time. Respect for one another starts from the procurement phase of the project and should last until the completion. If everyone is willing to work together and have the same goal, the project will run much smoother.

CONCLUSION

Throughout the day I feel that I have gained a better understanding of the construction industry and how to help the industry be more efficient. The PACE roundtable was a very useful and helpful tool for the companies to share their ideas and improve upon processes in the construction industry. I have also been able to take away good ideas and issues that can be applied to my thesis, such as the green guide for health care and using BIM simulation.

CRITICAL ISSUES RESEARCH METHOD

PROBLEM STATEMENT

In today's world there is an increasing interest in making things environmentally friendly. Even the construction industry has gone into green thinking by adopting LEED as one of their criterion to determine whether a building is sustainable. Along with LEED other green organizations are developing including the Green Guide for Health Care (GGHC) organization, which specializes in the interest of medical facilities such as hospitals. But there are still some gray areas that the GGHC may not cover. This includes buildings like the Health Care Center, which acts as a medical facility and class room combined. There are no specific green guidelines for these types of buildings.

RESEARCH GOAL

The goal of the proposed research is to distinguish and establish a point system or guideline for health fare facilities such as the Health Care Center where medical and classroom are integrated in one building. By creating a point system, this research is intended to help owners, architects, and construction managers alike who are designing/constructing a health care facility.

RESEARCH METHODOLGY

- Compare the Health Care Center to similar LEED rated health care facilities such as the new Health Services building, located on Penn State's campus
    - Mechanical system used
    - Building envelope
    - Indoor air quality
    - Infection control
- Interview and evaluate different owners values and strategies
- Become familiar to the GGHC point system
    - Pick out most popular points
    - Learn why this points are most popular
- Take results and create a point system/guideline for health care facilities

CRITICAL ISSUES RESEARCH METHOD

TOOLS

The following is a short questionnaire that will be asked to owners of green or LEED rated health care facilities. Questions may be added or changed prior to the start of research.

QUESTIONNAIRE	
1	What is the intended use of your building?
2	Is this your first experience with a green building?
3	Why did you want to make the building a green building?
4	What were some of your goals for having a green building?
5	What were some of your strategies for the building?
6	What medical precautions have you taken into consideration?
7	What time of day will the building be operational?
8	What is the importance of indoor air quality to you? Why?
9	How do you intend to manage infection control?
10	What is your concern with operation and maintenance?

PROBLEM IDENTIFICATION

The following are problems and issues that may arise during the construction of the Health Care Center. These issues can be analyzed to improve the areas of constructability, reduce costs, and reduce the duration of the project. The Health Care Center is currently in the early phase of construction and has not run into any construction issues.

PROBLEM 1

- Infection Control (Mechanical system)
    - Infection control is extremely important to any medical facility. By constructing additions to the existing facility maximizes risk for infection.
    - The more field construction the more dust increasing the risk for infection.
    - It is possible for bacteria and other germs to build up and spread throughout the mechanical system if not properly cleaned and installed.

PROBLEM 2

- Excessive Energy Consumption
    - Being a medical facility, large equipment consumes an extreme amount of energy.
    - Most health care facilities, including the Health Care Center, are open twenty four hours to care for any medical attention. This in turn uses a lot of energy.

PROBLEM 3

- Re-sequencing of some activities to get the most effective use out of crane
    - Crane is used for the erection of steel for both the south addition and the gymnasium, but there is about a 5 month period where crane is not being used.
    - Inefficient use of crane will cause for higher construction costs.

TECHNICAL ANALYSIS METHODS

The following section will outline the analysis and proposed solution to the problems that were identified in the previous section.

PROBLEM 1 – Infection Control (Mechanical System)

Research will be conducted to analyze a prefabricated mechanical system to reduce the risk of infection during the construction of the Health Care Center. The research will test the possibility of fabricating parts of the mechanical system in an off site location, be cleaned then shipped on site for installation. Having the system fabricated off site will allow for less field construction which will decrease the risk of infection. Construction costs will be evaluated as well as the time that can be saved by fabricating the mechanical system before it is installed.

PROBLEM 2 – Excessive Energy Consumption

As mentioned earlier medical facilities, such as the Health Care Center, are energy guzzlers. The proposed solution to help the energy consumption is the installing of high energy efficient windows. An energy efficient window reduces the amount of heat loss and allows less operation of the mechanical system. Research will include a compared cost of the energy savings versus the up front costs.

PROBLEM 3 – More Effective Use of Crane

The third and final research topic will be the re-sequencing of activities to get an efficient use of the crane. The current schedule shows a five month time where the crane will not be used. Moving up the steel erection of the gymnasium to after the south addition should significantly decrease the duration of the project. Included in the research will be a constructability review and schedule reduction analysis. Also there should be some saving costs, since the crane will not have to be rented as long. Other areas may receive some benefits, such as the testing and commissioning of the mechanical system. A commissioning agent may only need to be brought on site once.

Description	Research	Value Engr.	Const. Rev.	Sched. Red.	Total
Prefabricated Mechanical System		5%	10%	10%	**25%**
Energy Efficient Windows		15%	5%	5%	**25%**
Crane Effieciency			10%	15%	**25%**
Green Points System	25%				**25%**
Total	**25%**	**20%**	**25%**	**30%**	**100%**