PENNSTATE **Borland Laboratory Renovation**

Technical Assignment 3

Alternative Methods and Research

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Construction Management Option

Executive Summary

This paper will be the starting block for my final presentation of Fall Semester, and all of Spring Semester's research. Many of the topics brought forward in this paper have been brought to my attention through my attendance at the 2006 PACE Roundtable. This will also cover what topics where discussed at the 15th Annual PACE Roundtable, and the many things that I took away from this meeting with many companies from the construction industry.

This technical assignment will further research 3 of the problems that could arise on the Borland Laboratory Renovation at Penn State University Park. As has been discussed in previous technical assignments, this building is behind schedule again, and the contract for the General Contractor has just been awarded to Leonard S. Fiore, Inc.

Leonard S. Fiore, Inc. has worked on many astounding projects around the State College, Pa area, and has also completed many projects for Penn State. Some of their recent work for Penn State has been, Pattee Library, Community Arts Center, Research Center, and The Bryce Jordan Center. They are a very capable company and it will be a pleasure to work with them on this project.

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Critical Industry Issues

At the PACE Roundtable held on October 12th, 2006 I was given a chance to talk to many different professionals from around the construction industry. This meeting is held annually and invited are all of the Penn State Architectural Engineers, and all of the companies that belong to PACE. This attendance allows for very good discussions to occur talking about a variety of critical issues in the industry today. Due to time restrains, there are three sessions held with four topics discussed in different rooms. The three sessions for 15th annual PACE Roundtable were building system challenges, building information modeling technology, and building respect with different construction parties. I decided to attend the discussions that covered green building materials, education and workforce issues for building information technologies, and building respect with specialty contractors. The following will cover what was discussed at this years PACE Roundtable, and what I found useful from it.

During the first session of the morning, the topic was green building materials. I found this discussion to be very interesting because The Pennsylvania State University Borland Laboratory renovation is a green building. Many things were covered at this session including recent trends in LEED rated buildings, new materials being used for green systems, and how many more LEED rated buildings are being constructed.

Some of the things that I found particularly interesting where a lot of the new ideas that are being used in green buildings to earn more LEED points. Such as using recycled products for drywall and metal studs as well as different trends in green roofs. Another discussion that spiked my interest was a comparison between the prices of LEED rated buildings and non LEED rated buildings. I as well as many other attendees were surprised to here that not only can a green building save the owner money over a length of years, but how usually it can be cheaper to construct a LEED rated building as well.

Building information modeling technology (from here on known as BIM) was the discussion of the second session that I attended. This discussion looked more at the use of BIM in the work-force and in a teaching environment. The question of using BIM in the construction workforce was not taken easily by all of the construction industry members. Many felt that the successful use of BIM could be a few years away, and many are reluctant to learn the new programs or even hire someone to use them. However it was discussed to be a very useful tool in the classrooms, and is something very good for recent or soon to be graduates to know. Soon enough BIM will be introduced into the workforce and it is a very good knowledge for new industry members to have.

My personal opinion on the BIM technology is that it will never be a large factor in the construction industry aside from being used as a tool to better help the owners understand what is happening with there building. I believe that for the amount of time and money spent in developing a 4-D model, it is not worth the slight improvements that could be made in the industry. Any contractor should have enough experience in their perspective trades to be capable of designing and scheduling a project with-out any major problems. How-ever, this new technology can be very useful during the "Pitch" to a building owner and to explain the different stages of the construction that are happening.

The Final session for the day covered building respect with specialty contractors. This session contained a lot of students and also many of the specialty contractors that were present that day. A list was compiled of good and bad things to do on the site, and how communication should happen between contractors and their subs. The biggest topic of the hour was lying or calling someone a liar on the job site. I have been on many different jobsites and seen relationships between contractor and sub run many different ways. As discussed at this session, I believe the best method of running a successful job site is with give and take. A person must give respect to their peers in order to receive it back.

After the day was over I found myself very surprise of how well the PACE Roundtable was organized and how well the discussions worked. I feel that not only did the students in attendance learn many valuable things from this day, but there were also a lot of good conversations between industries members that I'm sure turned out to be very useful.

Critical Issues Research Method

Problem Statement:

As projects come to a close and the rush is on to get the work completed on time, tensions will run high between contractors and their subs. At this point in the project there is a lot of stress involved and the communication lines tend to be severed and this causes more problems and more stress on the site. However I believe that the problem begins in the early stages of work.

Proposed Solution:

I believe that with a detailed plan of action for the project, that any site could be run more smoothly and with less tension. If there was a plan of action that was thoroughly thought about and designed for each specific project, that many of the major problems that occur with communication on the job site could be handled easily.

For the last summer I have been an intern for The Pennsylvania State University Office of the Physical Plant. As I'm sure it is well known that the Office of the Physical Plant (from here on known as OPP) is in charge of all construction and renovation work that is done on all of the Penn State Campuses. As an intern in charge of helping out the Project Managers of OPP I found myself on many different projects around campus and in the company of many different General Contractors and Construction Managers.

In my observations I believe that there are a few main problems that could be caught in the initial job conference and solved before any of these problems occur. However with a difference in personalities between Construction Manager / General Contractor and any Sub-Contractors on the job, this could be difficult.

Research Steps:

In order to fully understand all of the problems that can occur in communication on the job site, I feel that it is necessary to survey various different contractors and sub contractors to retain incite from various different types of jobs.

Problem Identification

This part of my research discusses the unforeseen problems that could appear during the construction of The Pennsylvania State University Borland Laboratory Renovation.

- This renovation has been designed to be the first LEED Certified rated renovation building in Penn State history. With further detail and design, a silver or gold certification could be earned.
- The existing roof is being replaced with a rubber membrane roofing system. A green roof would better help to cool the building during hot weather and earn more points toward a higher LEED rating.
- A more efficient recycling plan could be put into effect during the demolition phase. This would lower the amount of garbage taken to the landfill and also again earn more points toward a higher LEED rating.
- The construction team has planned on using un-renovated rooms inside the building for their office. A job trailer could save time on a tight schedule allowing the work to be done in a more sequential manner and not work around the offices.

- The current crane location on the north side of the building could possible interfere with the Agriculture building behind it. Also there is a remaining tree located with-in the reach of the crane not allowing it to complete a full swing. A more suitable location for the crane might be on the south side of the building.
- The section of campus of Curtain and Shortlidge Dr. is very congested and often a busy place for students to pass bye. This could cause problems for steel deliveries.
- The site is confined to a very tight layout with plenty of lay down space, but not a lot of room for deliveries or trash pick-up. A better planned site layout could be useful to make deliveries and pickups with large trucks more accusable.

Technical Analysis Methods

In this part of my research, I will look further into three of the major problems listed above that could occur on this project. Any of these problems could save time or money on the project, and in most cases turn out a better product. This is also known as value engineering. Although as all projects are designed they are put through a vigorous value engineering process in order to save money on the budget. How-ever I believe that a few things have been over looked and could create a better out come.

Obtaining a higher LEED Rating

Problem Statement:

The Borland Laboratory Renovation Project will be the first renovated Penn State building to have a LEED rating. After reviewing the specifications book for this project I noticed that the goal set for the amount of LEED points for this project is only five away from receiving a silver rating.

Proposed Solution:

By taking a few extra steps in planning, and a reasonable amount of extra money, this renovation could easily receive a silver rating. The existing roof is being replaced with a rubber membrane roofing system, and with this being done, a green roof could be put into effect. This not only pushes the building towards its higher rating, but also saves a lot of money in the future in heating and cooling costs. Also a more efficient recycling plan could be put into effect. With the amount of demolition that will occur on this project, there will be a lot of trash removal occurring. However if a more efficient recycling plan was put into effect this could also gain points for a better LEED rating as well as save money in trash removal.

Research Steps:

A more detailed exploration of the LEED website will allow a better understanding of how the LEED rating system works. By knowing this, what it will take to receive the extra points needed for a silver rating, can be found. Also a look into the amount of points needed for a gold rating will be researched and analyzed.

Construction Team Offices

Problem Statement:

The Current plan for this project is to house the construction team's offices inside of the building to allow for more room in an already congested site. I feel that this could cause problems in the flow of work being done. In the schedule a pattern has been set for how the demolition crew and construction teams will move around each floor. However with the offices occupying some of the rooms on the first floor, this causes everyone to back-track at a certain point during the project.

Proposed Solution:

With permission from The Pennsylvania State University, a section of an access road connecting the SALA parking lot and Curtain Ave. could be used to house up to three job trailers which would be plenty of room for this size of a project. This allowing work to be done in a more sequential manner inside the building, and still keeping the construction crew within a workable distance to the building.

Research Steps:

A letter will be sent to the review board in charge of the Borland Laboratory Renovation at Penn State Office of the Physical Plant, asking if the use of this access road would be perceivable. Upon receiving permission, more research would be done on the exact size of the average job trailer used, and a calculation would be done to determine how many trailers would fit in this section.

Then the General Contractor will be contacted to see if this is enough room for their team, and also to review this is a possible solution. After this is completed a new site plan will be construction and review by the board at Penn State Office of the Physical Plant. Then a new schedule will be made and will show the amount of time saved on the project by doing this.

Crane Location

Problem Statement:

The current location for the crane on this project is on the north side of the building. This location for the crane could cause problems interfering with the Agriculture building behind it, and with the many pedestrians that walk in this area. Also on the north side of the building, there are three very large existing trees that are to remain in place and not be harmed. This could also cause a lot of problems for the truck crane being used on this project.

Proposed Solution:

If the crane was to be moved to the south side of this building, after the demolition of the ice cream sales room has been completed, it would be able to avoid any other obstacles. This would allow the crane to operate more smoothly, and also solve another potential problem of steel deliveries. With the Steel lay down area being moved from the rear of the building to the front, this would cause less of a problem for the large trucks to deliver the steel and get it unloaded.

Research Steps:

This solution could cause one potential problem. Upon moving the crane to the front/south side of the building, it opens a larger area of pedestrian traffic to the crane. This could easily be solved by adding in a sidewalk cover. Further research will be done to find the price of renting such a cover to protect the pedestrians, and this will be examined along with the estimated savings in budget and schedule due to moving the crane. After that a new site plan will be designed showing the more accessible roots for delivery trucks and a more efficient lay down area.

Borland Laboratory Renovation Weight Matrix					
Description	**Research**	**Value Engineering**	**Constructability Review**	**Schedule Reduction**	**Total**
Jobsite Communication	20%	0%	20%	30%	70%
LEED Rating	20%	20%	50%	10%	100%
Construction Offices	20%	40%	15%	30%	105%
Crane Location	40%	40%	15%	30%	125%
Total	100%	100%	100%	100%	