AE 481W : SENIOR THESIS

TECHNICAL ASSIGNMENT 3

ALTERNATIVE METHODS AND RESEARCH

Prepared for

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Construction Management
Penn State University

By

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Benner Pike Shops State College, PA

Executive Summary

This assignment focuses on more on critical thinking rather than technical work. It is the foundation of the final thesis proposal that I will be presenting later in next semester. The assignment was created so the students could identify their projects for research, alternative methods, value engineering, and schedule reductions.

Critical industry issues were introduced based on 2005 PACE Roundtable, and research plan was produced to identify challenges that could be faced in the construction industry. The issues articulated in this assignment include; how to form teams for projects, and how to motivate one another for better efficiency of projects. The research will be performed in the order of literature review, surveys and interviews, and summarization of the results with possible recommendations.

Several problems were identified for the Benner Pike Shops regarding value engineering and schedule reduction. Among the problems identified, three of them were selected to be part of technical analysis methods. The three analyses are use of precast CMU instead of cast in place CMU, new staffing plan with better communication involvement among the participants of the Benner Pike Shops, and switching the HVAC units system on the roof top. Those three analyses are put into weight matrix to show the percentage of work distributed among research, value engineering, constructability review, and schedule reduction. Based on the percentages, I am going to perform detailed work to create my final thesis proposal for the next semester.

Table of Contents

Critical Industry Issues

On October 14, 2005, the 14th annual PACE Roundtable took place in Penn Stater Conference Hotel with members from industry, students, and faculty. This year's theme of the meeting was "C.L.I.M.B: Changes in Leadership, Innovation, Markets, and Business." Several topics were focused within the theme and were broken down into different sessions for discussions. The reason why it is called "Roundtable" is that industry professionals and students are to share and discuss current issues of the building industry. For this year's PACE Roundtable, healthy and challenging discussions were created along with fine interaction among the members.

Team Building I: In-house Teams and Business Development

In-house teams form in different shapes and characteristics instantly where there is a construction project. They are one of the most temporarily formed teams in industries. Because of that uniqueness, members of an in-house team tend to be analytical thinkers and task driven workers. When a team is created for a project, very short time is given to the team to actually work on that project; for instance, short time to get to know each other, short time to prepare for presentation, and even short time to finish the project. This is one of the reasons why it is hard to make clients satisfied. If members of a team have experiences of working together, that team has advantage over other teams.

Speaking of forming a team, numerous ideas were discussed in developing a proposal team. First of all, a company must be realistic with a proposal being encountered with budget, size, technology, etc. Secondly, it is better for employees to volunteer for certain proposal rather than hand picked by supervisors. This will motivate team members and create more efficiency out of a team. And finally, scattered individuals of different characteristics are preferred rather than a 'dream' team. It is important to place experienced and inexperienced employees spread out so there is a good balance within a

Critical Industry Issues (Con'd)

team. Both of them could learn from each other. Also, human resources department of the company should be updating its status of employees rapidly.

For a successful team to be created, three objects should be practiced everyday: sponsorship, training, and mentorship. Taking responsibilities as a team member, keep on learning what you are lack of, and advising and assisting when members are in need; these are the key elements to develop a strong well-interacted team. For the best efficiency to be produced, members should be motivated for what they are doing. A strong leader should observe individual members carefully and know them well both physically and mentally. Each team member should have strong ownership and commitment for the project. It is also important for members to interact not only within the work space but also casually, out of the work space.

Team Building II: Project-Level Team Development

When constructing a building, many different kinds of teams are developed during the process. Such of them are teams from owner, architect, construction company, and numerous sub-construction companies. From a construction management point of view, it is quite crucial to know and study about other teams for a certain project. Communication is the most effective factor when dealing with motivation and efficiency. A CM team should listen and understand its client with soft skills. Members should study and learn about their client prior to starting the job. The team should also consider a design team for a project as part of construction process rather than a separate sector. CM teams and design teams often conflict each other because both of them do not consider each other as a part of their team and they lack in communicating each other.

Critical Industry Issues (Con'd)

It absolutely helps a company when creating a project team to have prequalification for prime contractors. It helps to coordinate team members to best suit a certain type of project. Several factors are put into consideration for prequalification, which are:

- Project type experience
- Project size
- Bonding capacity ($)
- Back-log of work
- EMR rating (safety)
- Previous clients experience
- Team experience

Key Contact

Key Contact
Richard K. Wille
Alexander Building Construction, LLC

I was nervous to attend the annual PACE Roundtable since it was a big event and numerous industry professionals were to join. By the end of the entire program, I felt so lucky that I was part of the program and wished it could last longer. The break-down session I attended really taught me well what I could not learn from school. I learned how important it is to form a right team for a right project and keep them motivated. I became more acknowledged to the construction world when Mr. Wille told me that it is as equally important to interact with your team members within the company and out of the company.

Critical Issues Research Method

After attending 2005 PACE Roundtable, my research for critical issues had been focused down to an issue of team building in construction industry. This is the issue that had been dealt in every construction project since long ago, and it will be dealt within a company in the future projects. It seems like forming a team for a construction project is not a big deal but it greatly affects the efficiency of a construction. For my thesis, I am going to research on how LSF General Contractor had formed a team for the Benner Pike Shops and how it had affected the construction. Several factors had come up for the research of team building for the Benner Pike Shops which include:

- How the team was selected for the GC?
- How frequently they held meetings?
- Who was participated in the meetings other than GC team members (architect, su bcontractors, client)?
- Any meetings with leased shop owners
- Any prequalification issues
- Motivation among the team members
- Technology involvement in building teams and proposals

The goal of this research is to analyze how the team had been created for the Benner Pike Shops and how they had incorporated each other to fulfill the need. The research will focus on the LSF General Contractors to enhance their ability to form a team for different types of projects they will face. For the next few months, the research will be conducted in step by step. First, a study will be done on the subject by reviewing literature. Secondly, a survey regarding the factors given above will be distributed among the construction industry people. Thirdly, a possible phone interview will take place with the team member from the GC of the Benner Pike Shops. And lastly, results from the previous effort will be summarized with any recommendations.

Critical Issues Research Method (Con'd)

Possible Survey Questions done by E-mails

- How does your company manage to form a team whenever a project comes up? Is it hand picked or volunteered?
- What are some prequalification factors of prime contractors your company takes i nto consideration when forming a project team?
- Are there any specific methods your company uses to motivate team members?
- How does your company handle the meetings with design professionals?
- Is there any technology issues considered when building a team?

Problem Identification

Precast CMU vs. Cast in Place CMU

Majority of the exterior finish was done with concrete masonry units cast in place. Since the exterior CMU has repetitive pattern, it is possible to switch its system to precast CMU instead of cast in place CMU. Current status of the CMU finish necessitates masonry job of the blocks, scaffoldings, and finish painting jobs. Also, masonry work takes up quite large portion of the schedule. There are issues on value engineering, constructability, and possible schedule reduction. Cost analysis must be performed between the two subjects including crane issues, and analysis on the rate of constructability between the two could be calculated. Overall schedule impact would be created to compare the two items.

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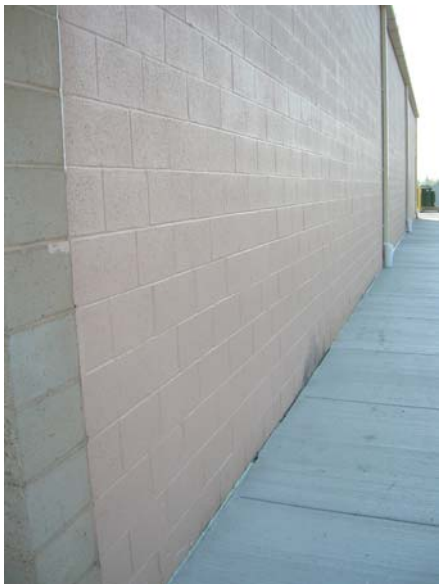

Communication Issues between the CM and the Owners of the Stores

There had been a schedule delay of a week or so because of the lack of communication between the GC and the owners of the stores. The main reason of the delay according to the CM was that the unit owners came in late for the interior fit out. If there had been enough communication going through, the delay could have been diminished.

Problem Identification (Con'd)

Staffing Plan Issue from LSF the GC

As the construction was going through its final finish phase, the LSF General Contractor had switched a superintendent to finish the project. The superintendent who had been working on the Benner Pike Shops since the beginning has been replaced by the LSF when there was about a month left in finishing the project. It makes more sense to let the original superintendent to finish the job instead of replacing since he knows the project better and has been physically at the site as the building went up. Wrapping up a project could be really painstaking and could need a good attention by a CM. The new superintendent needed to study the project in order to manage it to meet the dead line which could lead into delay of the work or bad quality of the work leading to value engineering.

Rooftop HVAC Units

Since the shops are consisted of one story, and each shop was dealt as a different sector, separate HVAC units had to serve each store. The current design contain numerous small capacity rooftop HVAC units distributed through out the building ranging 650lbs to 3000 lbs, and some of the stores have more than 5 units scattered on the rooftop. Considering each shop separately, some of the small capacity HVAC units could be summed up to reduce the number of units on the rooftop. The cost on the HVAC units could be reduced and installation process could be accelerated. Although, there could be issues on dealing with heavy equipment, and some of the ductwork might need to be redesigned in order to server the shops better.

Technical Analysis Methods

Use of Precast CMU instead of Cast in Place CMU

Thorough cost analysis will be created between the precast and the cast in place for the comparison. The cost analysis will include material cost involved in the two subjects, and cost of erection of precast compared to masonry work. Another analysis that would be performed is the schedule analysis of the two. It will show how long each method would take to finish the job with possible 4D models, and how it is going to impact the overall project schedule. Finally, the best recommendation will be presented to acquire the best efficiency for the project.

Reorganization of Rooftop HVAC Units

As mentioned in the problem identification section, I find that the HVAC units are excessive in quantity. In order to reduce the number of units with larger capacity systems, I will research on the prices of HVAC units from different companies and measure the total capacity of the revised system to make sure it serves the shops accordingly. Also, some of the ductwork systems could be redesigned to fit the new system, and it is possible to decrease portion of the ductwork. The constructability of placing the units will be examined with an analysis of schedule reduction of the new HVAC system.

Technical Analysis Methods (Con'd)

Staffing Plan and Communication

It is important for the GC company to handle their staffing plan well so a project flows well with some positive outcomes regarding value engineering and schedule reduction. For the Benner Pike Shops, new staffing plan could be created leading to better communication performed among the participants of the project. Research could be done on the LSF to study the formation of the team for the Benner Pike Shops along with the unit stores owners to find out how they had been communicating with the LSF.

Weight Matrix

Description	Research	Value Engineering	Constructability Review	Schedule Reduction	Total
Precast CMU		7%	13%	10%	30%
Rooftop HVAC Units	5%		15%	10%	30%
Staffing Plan/Communication	5%	5%		10%	20%
Issues Research	20%				20%
Total					100%