



Proposal

Widener University, New Residence Hall

12/6/2005

Kevin Engel

Advisor:

Dr. Messner

Construction Manager:

HSC Builders

304 New Mill Lane

Exton, PA 19341

Kevin Engel
12/6/05
Proposal
Advisor Dr. Messner

Proposal

Executive Summary:

The main topic of research in this thesis is to be the benefits of constructability reviews. In order to determine the effects of constructability reviews on projects, data will need to be collected on projects that have used the reviews and projects that have not used the reviews. It would be preferable to gain data for both data sets from the same companies in order to isolate variables associated with differing management skills of different companies. To achieve this it is recommended that a focused, rather than a shotgun, approach be used to gather data for this research project. The exact method of pursuing this is outlined in the Analysis 1 section. After data is collected, it should be a relatively simple task to compare the effects of third party reviews to the standard group. It will be more challenging to choose the best method of presenting the results so that they are more likely to be understood and useful to members of the industry.

To find the best LEED™ points for a residence hall, the methods that other projects have used will be examined, points that require little additional cost will be considered, and a redesign of the plumbing system will be performed in order to provide additional value while increasing sustainability.

Plans for schedule acceleration will be created so that if there should be a delay at any stage of the project, the time can be made up without affecting the final completion date. To speed up the entire project, the structural masonry walls could be changed to precast concrete with brick facing. If a delay occurs too late for the structural system to be changed, or can not be entirely made up, a SIPS schedule will be ready to speed the finishes through the building. Finally, if the delay occurs at the very end of the project, the cost of increasing manpower on the electrical finishes and lighting fixture installation will be known.

Analysis 1, Benefits of Constructability Review:

The first issue I would like to research for my thesis is the benefits of conducting a 3rd party review of design documents prior to construction. Many general contractors and construction managers are complaining of a recent decline in quality and detail of drawings produced by architects and engineers. This problem seems to be due to a shortening of the time allotted for design and owners not wanting to pay for design services. This shortening of the design process creates rushed designs that often have more mistakes than a set of contract documents should have. Many of these mistakes are likely to produce a change order later in the project. This leads to cost escalation and occasionally a lengthened schedule. I would like to compare the number of change orders on projects that have conducted peer reviews and the average total cost of change orders on these projects compared to projects that have not conducted third part reviews.

The best places to look for this information is from companies that regularly perform this service or owners who have chosen to require a 3rd party review. It seems reasonable to assume that this information would be a part of the marketing information used by a construction company to advertise their services to prospective clients and by owners as justification for requiring the review.

I have discussed the possibility of gaining data for my research from three companies that were at the career fair. The first company, The Foreman Group, seemed very open to providing data for me to analyze. Third party reviews are a major part of their operation. They almost always are able to save owners more than their fee by catching design errors before the construction of the building is underway. The second company I talked to, SGH, did not seem to keep track of the data in a way that I could use. This was because, as a design company, if they caught a mistake they just fixed it, they did not keep track of the number of mistakes that they found. The last company I talked to, Turner Construction, said that they did several different types of 3rd party reviews. They reviewed schedules, estimates, and performed constructability reviews. However, from our discussion they do not seem to keep records in a way that I will be able to analyze. They did offer to give me the contact information of two of the owners for whom they provided constructability reviews.

Although not all of the people I talked to will be able to directly provide data for my research, they all seemed very interested in seeing the results when I am finished. This level of interest should indicate a good chance of participation by any other companies that may have data that I could use.

Analysis Process:

1. Contact companies to see what data they have and who else they think may supply data
2. Collect information, obtain information on the number of change orders, the cost of change orders, and major problems on projects that have used third party reviews and on projects that have not used third party reviews
3. Compare data between the two groups of projects
4. Create effective method of showing the difference between the projects

Analysis 2, Gaining Additional LEED™ Points:

Although LEED™ sustainable concepts were included in the design, there was no effort to become LEED™ rated. Items such as geothermal heat pumps and power saving lighting are used throughout the building. It seems like they may have been able to gain LEED™ rating without a very substantial cost. According to the standard checklist, this building would score 8 points in its current condition. This would be well short of the necessary 26 points for certification, but these points are built into the building itself and there are many points that could be gained by simple planning that would not cost a significant amount.

There seems to be quite a few other points that are within reach at a very low cost. One of these is a redesign of the plumbing system. In order to incorporate low flow fixtures, the overall plumbing system could be reduced in size. This size reduction may result in a lower life cycle cost than the current system even though the fixtures will cost more at the beginning. This redesign will be used to show a breadth of knowledge in the design of building systems.

Because the apartments are typical throughout, I will need to choose new fixtures for the building and calculate the pipe sizes for a typical apartment. The next step will be to multiply the new loads by the number of apartments and use the demands calculated to size the main feeders to the apartments.

Analysis 3, Schedule Acceleration:

This residence hall is scheduled to be occupied during the fall semester of 2006. In fact, the rooms have already been assigned to students. Because of the cost of delivering this project late it is a good idea to know ahead of time how the project can be accelerated in case there are any unexpected delays. I would like to look at two methods of speeding up the schedule.

The first schedule acceleration method would be implemented in the design phase and would involve changing the wall system from CMU with brick façade to precast concrete with embedded brick. Replacing the time consuming masonry work with a much faster method will reduce the overall construction time of the project. The redesign of the structural walls will be used to meet one of my breadth requirements.

The second method is to create a SIPS schedule for the finishing trades. Currently the schedule simply gives a date where the finish trades are expected to be able to occupy a floor and a date when they need to have the floor completed. It would be much more efficient to create a flow of trades from one apartment to the next working down the hall. Besides being more efficient this would have the side affect of reducing

In order to help present the changes proposed, a 4D model of the building will be created. The 3D shapes will be created in AutoCAD and will be merged with a Primavera schedule using NavisWorks to create the 4D effect. Showing the results of the research in a visual form will allow those interested to actually see how the changes will affect the construction of the building and the final product.

Expected Effort and Grade Breakdown

Description	Critical Issues Research	Value Engineering Analysis	Constructability Review	Schedule Reduction/Acceleration	Total
4D CAD Analysis	5		5	10	20
Gaining LEED Points		10	15		25
Schedule Acceleration		10		15	25
Issues Research	20		10		30
Total	25	20	30	25	100