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Franklin & Marshall College Row
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Research Proposal

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Executive Summary

Contained in this proposal are three topics for analysis that will be conducted based on the Franklin & Marshall College Row project in Lancaster, PA. Within each analysis topic are ideas for performing the research, along with expected outcomes from the research. An overall goal for this research is to find areas where schedule can be reduced and costs can be decreased. Being a higher education project, it is important to complete the construction in time for the 2007/2008 school year. Cost is also an important consideration in terms of remaining within budget and finding ways to add value and reduce costs for the owner.

The first area being analyzed is incorporating Building Information Modeling into the project and having the as-builts in model form and how this can benefit the owner. The next area of analysis is the flooring system and researching the difference between composite metal deck and precast plank systems. In analyzing the cold weather construction issue, areas of cost, schedule, and methods and materials will be considered. At the end of this report is a weight matrix with the distribution for each respective analysis.

Building Information Modeling Analysis

Utilizing Building Information Modeling (BIM) with an as-built model as the final product at the end of the project

Problem:

What are the benefits and drawbacks to utilizing BIM software at the beginning of a project that will result in an as-built model? What benefits are there for the owner to have as-built models for facilities management and future renovations? The idea of utilizing BIM's in a construction project and refining the as-built situation for the owner was introduced at the 2006 PACE Roundtable and further refined through conversation with faculty and peers.

Proposed Solution:

Currently it seems the industry is not completely informed on the subject matter and does not realize the benefits that using BIM could have on their projects. If persons were better informed, BIM's may become more popular on construction projects. The goal of this research is to provide information on the benefits of as-built modeling for facilities management and future renovations of the building.

Analysis Steps:

Research for this analysis will be performed using the following methods.

- Review literature on the subject matter
- Interview owners and contractors as to their perception on utilizing BIM's on a project

	Interview Questions
1	In general, how do you feel about utilizing BIM's on a construction project?
2	What are the benefits as an owner (contractor, etc.)?
3	What are the drawbacks?
4	Do you feel BIM's can be beneficial in the years after a project is completed?
5	Have you worked on a project previously or currently that has used a form of BIM?
6	Do you think it would be beneficial for BIM to be integrated into the curriculum?

- Review software costs and training
- Provide examples on the subject matter
- Develop conclusions from research on the subject matter

Resources:

- Utilize Penn State's Dickinson School of Law project as a case study
  - Gilbane Inc.
  - Office of Physical Plant at Penn State
- ASCE database
- Virtual Builders Roundtable

Expected Outcomes:

BIM's, when utilized at the beginning of a project can help to coordinate trades, help an owner to understand their finished product and therefore recognize changes they may desire early-on, and can also help to create a thorough set of as-builts. Owners are critical and need to consider the value of BIM's. They can convince the contractors of this by providing them with the funds for BIM development at the beginning stages of a project. On the other hand, BIM's can take on a negative reaction in a project by occupying inexperienced contractors' time, which may make BIM's uninteresting to contractors.

Flooring Systems Analysis

Composite Metal Deck v. Precast Planks

Problem Statement:

Currently the flooring system consists of a slab on grade, a slab on deck for the second floor, and the four remaining floors are precast planks. What are the cost and schedule impacts and how do they affect the project? What was the reasoning for the precast plank design and not continuing with composite metal decking for those respective floors? The idea for this analysis was based on the drawings for the College Row project.

Proposed Solution:

Provide information comparing benefits and drawbacks of the two systems.

Analysis Steps:

Research for this analysis will be performed using the following methods.

- Interview steel contractor
- Analyze the schedule
- Analyze the cost
- Analyze resource allocation
- Analyze design issues for penetrations through floor
- Interview both cast-in-place and precast concrete contractors and the owner

Resources:

- SteelFab Enterprises, Inc.
- Keystruct Construction, Inc.
- Nitterhouse Concrete Products
- High Concrete Structures
- R.S. Means 2006 Edition

Expected Outcomes:

Precast may help to accelerate the schedule, but not necessarily make an impact in this small amount. Sequencing of equipment and material may prove one solution better than the other for the overall goal of the project. Cost savings might come into play in both the material and in the resources for doing the upper floors as slab on deck. Expect that the design chosen was the best for the College Row project to meet the owner's desires.

Cold Weather Construction Analysis

Cold Weather protection needs and schedule duration

Problem Statement:

The construction schedule had a bulk of the cast-in-place concrete and grouting work occurring during what is potentially the coldest time of the year. What are the additional costs for protecting the concrete activities during construction? What schedule reductions can be made if the work is rearranged?

Proposed Solution:

Provide information detailing costs and scheduling.

Analysis Steps:

Research for this analysis will be performed using the following methods.

- Analyze the cost
- Analyze schedule
- Analyze methods and materials
- Interview concrete suppliers

Resources:

- Keystruct Construction, Inc.
- Nitterhouse Concrete Products
- SteelFab Enterprises, Inc.
- R.S. Means 2006 Edition

Expected Outcomes:

By adjusting the schedule in such a way to condense concrete work or to expedite the schedule so as to have the concrete and grouting work earlier in the construction schedule, there will be costs savings on methods and materials to protect the curing from the cold weather. With concrete on the critical path, adjust schedule to ensure that preceding items on the critical path do not fall behind schedule.

Weight Matrix

Below is a weight matrix of topics that will be researched and analyzed throughout the thesis research project.

Description	Research	Value Engineering	Constructability Review	Schedule Reduction	TOTAL
Flooring		10	15	5	30
Cold Weather		10	10	10	30
BIM	40				40
TOTAL	40%	20%	25%	15%	**100%**