Technical Assignment #3

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Geneva, IL
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Executive Summary

This technical assignment covers critical industry issues discussed at the PACE Roundtable Meeting, the research methodology planned to follow up on a critical issue, a list of several other thesis issues as well as proposed analysis methods.

While at the PACE Roundtable Meeting this fall I attended two discussion sessions. The first discussion session focused on adding value to design. The second discussion session focused on critical design & construction steps for new for expansion of healthcare facilities, and which delivery or planning statements provide greatest opportunity to affect project costs. While both sessions were interesting, the first discussion was most relevant to my thesis work.

The critical industry issue I identified and proposed research methodology for was the greening of middle schools and the benefits that are associated with them. In addition to research, my plan included sending out questionnaires to school boards and architects who design green buildings.

Other thesis research issues include using a Nisterhouse Masonry Products, Inc. precast façade system as an alternative to the current masonry system, using a precast façade system instead of the current CMU system, as well as researching the efficacy of radiant tiles in combination and how a redesign would affect project cost and schedule.

Critical Industry Issues

Session 1 – Integrated Design Management I: Adding Value To Design

Key Topics:

1. Performance Specifications
    a. Distribution of liability if a system fails
    b. In design-build, could promote competition and innovation
    c. Requires subs to get on board earlier
    d. Over-detailed specs may narrow possibilities, especially for design builders. Hard-bid contractors would prefer highly detailed specs
    e. Detail level of the specs may be dependant on the type and sophistication of the sub. i.e. Southland Ind.

2. Evolution of Design-build
    a. How do you deal with an owner who uses almost the same spec for different builds? What if that spec is not appropriate?
    b. Early involvement of owner is key. Find the person to get a hold of, avoid the "absent owner" situation. Contact should be defined in contract!
    c. Improve communication process at the start. Create channels of dialogue

3. Design-builders
    a. CMs mostly hire A/Es, not the other way around. CMs are too expensive.
    b. Industry may be in search of someone to manage process from design through construction
    c. Exchange program: CMs send employees to work with A/Es for several weeks

4. Value Engineering
    a. Use life cycle costing if owner plans to keep building and not sell it off
    b. Green buildings may be more attractive to the owner if they plan on keeping the building → see benefits in reduced energy costs
    c. Need cost imput early on
    d. CMs don't feel that they're being asked to V.E. at the right point in the project. Maybe 5-10% of the time.
    e. What would V.E. look like in an ideal world?

The first session was my first glimpse at a PACE meeting brainstorming and sharing session. I was generally impressed by the level of discourse between the different contractors and architects. I was also surprised by the fact that although many of the professionals in the room might be adversaries in the field, they all had the common goal to advance their field and further develop the industry.

The issues I felt might be useful to my thesis project included: how the specifications affect the project and either promote or discourage innovation, developing communication with the owner, and value engineering on a project.

Specifically, I was most interested in the question posed by Dr. Riley – "What would value engineering look like in an ideal world." This question brought up several other questions regarding the value engineering process such as, what different types of value engineering exist, when is the proper time to value engineer, and is the proper time different for different project types? To refine this line of questioning to be more relevant to my thiesis, I asked: "What is the ideal method of value engineering in a typical middle school construction project?" My first feelings on the topic are that value engineering should be accomplished mostly in the design phase. If value engineering is being done after design completion and after construction has already begun it would be better defined as cost cutting.

Key Contacts: Dr. Riley, Michael Slattery, Laura Slingerland

Session 2 – Healthare Facility Design and Delivery II: Enabling Processes in Healthcare and Construction

Key Topics:

1. Critical design/construction steps for new/expansion healthcare facilities
    a. Early imput from owners
    b. Finding the right person to talk to (maintenance, end user, financier)
    c. Visit other facilities with end user to give them a better impression of what finished facilities look like.

2. What delivery/planning statements provide greatest opportunity to affect project costs
    a. A good schedule where deadlines for key equipment selection are highlighted. This allows end user to review the most up to date technology.
    b. Profit margins in healthcare are very slim – in the cost, schedule, quality triangle, focus tends to be on cost.

Going into the second session I had a better idea of what to expect. However, the second session was different from the first in that there were fewer people interested in this topic and the ratio of students to industry representatives was heavily in favor of students. The discussion was still fairly in depth and it gave students a better opportunity to ask questions.

Because the discussion focused mainly on issues relating to healthcare, it was not very relevant to my thesis building which is a middle school. I had hoped that the conversation might focus more on LEED points and how to determine which LEED points are best suited for different types of projects. The process of attaining a LEED certification

on a building is one that definitely interests me, although at the moment I am still searching for a more specific focus within the topic

The one topic that I felt might relate to my thesis building was the issue of creating a detailed schedule with deadlines for the selection of key equipment, especially equipment with long lead times. While this is probably a more critical item for the healthcare industry, I feel it could be a benefit on any project.

Key Contacts: Dr. Horman, Dan Flickinger

Critical Issues Research Method

As school districts grow and become more populated, school districts often outgrow the space they have in their schools. In constructing new buildings, I believe that school districts tend to overlook operating and maintenance costs in favor of overall cost and schedule. Because the school district is typically the only owner of the building, creating a more cost efficient building to run and maintain can create a huge savings for the school district. I believe that added planning during the design and even the construction phase can create a cost savings that will be beneficial to the district over the lifetime of the building.

The goal of my research will be to use the new Geneva Middle School as a case study exercise in reducing operating costs and maintenance costs. I will then take these results and try to extrapolate what I learn to create best practices and methods for other new school buildings.

Research Steps:

- Search for literature on green schools, especially focusing on cost
- Search for literature on O & M costs for schools
- Interview architects involved with school design
- Interview school board members/school districts on how/if green design is an influence on construction decisions
- Conduct research on cost savings that can be generated by using different
- Summarize

Questions for Architects:

- How frequently does your firm design school buildings?
- When designing, what do you typically focus on?
- Do you tend to design “green” schools?
- When designing, do you consider operation and maintenance costs?
- If you do design a “green” school, is that a decision made by your firm, or is it something that is requested by the school district?

Questions for Schools:

- Are you planning on constructing, or recently constructed, a new school building?
- When negotiating what the school district wants from the new building, how much do you focus on cost, schedule, and operating and maintenance costs respectively?
- Have you considered “green” buildings as a way to reduce overall costs over the lifetime of the building?

Problem Identification

Schedule

- The current schedule puts turnover directly before the beginning of the 2006-7 school year. To ensure construction does not run past this deadline and delay the beginning of the school year, the schedule must be robust. Research methods of creating a robust construction schedule and critique current schedule.

- Building B, which utilizes a steel structural system with CMU walls, could potentially benefit from an alternate wall system. Laying the CMU is scheduled to take 50 days. Research constructability and schedule implications of using a precast wall system.

Value Engineering

- 2,340 linear feet of radiant ceiling tiles are being utilized in the new middle school. These are primarily placed in building B, which is the classroom area, along the perimeter. Research efficiency of combined radiant heating and fan coil units.

- Research cost and operating costs of switching the current radiant heating panel / fan coil unit system and converting forced air AC system into a heating and cooling system

- Because Geneva CUSD #304 will be the only owners of the building, operation and maintenance costs can become important. The design already uses durable materials such as terrazzo tiled floors to ensure maximum wear. Research reducing O & M costs by changing materials and increasing efficiency in mechanical systems and equipment selection.

Constructability Review

- Nitterhouse Masonry Products, Inc. had a presentation which included utilizing precast façade with veneer brick. This system erected much faster than traditional masonry work. Research the constructability of this option as well as if it can be made to match the existing adjacent middle school.

Technical Analysis Methods

Analysis 1

Study process of reducing operation and maintenance costs through "green" design as well as material and equipment selection. See Critical Issues Research Method for in depth discussion.

Analysis 2

Research the efficacy of radiant tiles in combination with the current fan coil heating units at the new Geneva Middle School. I will redesign a system that will be strictly forced air as opposed to the current design. I will then research how this affects both project costs as well as operating costs using a simple cost analysis as well as a lifetime cost analysis. I will also review how and changes would affect the current design.

Analysis 3

I will review the Nitterhouse Masonry Products, Inc. precast façade system as an alternative to the current masonry system. I will review any cost and schedule savings as well as research the constructability of the system.

Analysis 4

I will review using a precast wall system instead of the CMU system in place for building B in the new Geneva Middle School. I will calculate cost, and review constructability and any affect on the schedule.

Weight Matrix:

Description	Research	Value Eng.	Const. Rev.	Sched. Red.	Total
Analysis 1	16.25%	6.25%	1.25%	1.25%	25.00%
Analysis 2	5%	10%	5%	5%	25.00%
Analysis 3	3.75%	8.75%	7.50%	5%	25.00%
Analysis 4	0%	0%	11.25%	13.75%	25.00%
Total	25.00%	25.00%	25.00%	25.00%	100%