Wesley A. Brown Field House
Annapolis, Maryland

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Construction Management

Technical Assignment 3

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Executive Summary:

Technical Assignment 3 will explore not just problems and issues that face the Wesley A. Brown Field House, but the industry as a whole. The assignment includes Critical Industry Issues, Critical Issues Research Method, Problem Identification, a Technical Analysis Method, and a Weight Matrix

Critical Industry Issues summarizes the PACE Roundtable event. There were three sessions. These summarized sessions include Structural Building Systems – Constructability and construction loads; Session 2: BIM: Team dynamics and Communication- Building respect with BIM; Session 3: Brainstorming: Building Respect with Owners and Operators. This section of the technical assignment also highlights possible research ideas.

Critical Issues Research Method introduces my research topic for the rest of the year. This section states an industry problem, opportunity for improvement, the research method, and who and how the research will effect.

The Problem Identification lists numerous problems the Wesley A. Brown Field House project faces. The problem list includes construction and design problems. These problems have an opportunity to add value to the project if solved.

Technical Analysis Method introduces the three problems that I chose to investigate further. This section also lays out a plan to investigate and compare with the current project.

The Weight Matrix is a graphical representation of the distribution of work that will be required to complete my senior thesis project. I will use this matrix to help organize and distribute my work load.

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Critical Industry Issues:

Session 1: Structural Building Systems – Constructability and construction loads

The session began by addressing new trends in the construction of the structure of buildings. These trends included

- Progressive Collapse- After September 11th many owners, particularly the government, are now requiring Progressive Collapse and Blast Resistance to be incorporated into the structure.
- Designers moving away from exotic concrete mixtures- designers are beginning to realize the complications that exotic concrete mixtures may cause. Industry members in the room saw at one time 10,000-14,000psi concrete mixtures, now designers are going back to using more normal weighted concrete.
- Post-tensioning- this concrete placement method minimizes slab thickness and therefore allows for more usable space.
- Integrated structural systems- the designers are now creating structural systems that incorporate a variety of different structural systems. The first few floors could be a concrete structure, but transfer to a steel structure a couple of stories up.

After talking about some of the recent trends, the conversation turned to the obstacles that were facing the construction of structural systems. If someone has to sum up the entire problem in one word, it would be COMMUNICATION. A large part of the construction managers' struggle comes from a lack of communication and coordination. Designers are no longer providing enough detail in their drawings to properly install a structural system with all supporting components attached. A major coordination issue today is the connection between the exterior skin and the structure. This is usually a large issue, especially on fast-tracked jobs, because the steel or structural design is usually completed before the skin design and details are. Who then becomes the designer of the connection? If a curtainwall designer designs a connection system, it is still ultimately the Structural

Engineer of Record responsibility. The Structural Engineer of Record cannot design a connection if he/she does not know what is exactly being attached to the structural system.

Many suggestions and possible solutions were also discussed for the lack of communication and coordination among trades. Industry members discussed bringing on specialty contractors earlier in a project, almost as a design-build team with a negotiated GMP contract. The construction managers also discussed that they added money to their contract to take into account the lack of detail in the drawings. The trick with adding more money for something like lack of design, is to convince the owner that extra money is needed. Industry members also discussed the internship opportunities for the design majors in Architectural Engineering, in the construction management field. They believe that getting field internship would a terrific experience for design majors.

Session 2: BIM: Team dynamics and Communication- Building respect with BIM

This session discussed many of the possibilities and problems with BIM technology, and more specifically how it related to construction teams. Many of the industry members were unfamiliar with BIM, so the beginning of the session was spent on discussing what BIM was. This discussion was helpful, but proved that BIM was a new and unfamiliar technology to the veterans in the industry. It also became evident, that although industry members believe that BIM has enormous potential, there is much doubt that BIM will ever actually catch on.

Many obstacles face the implementation of BIM on projects. For starters, the design process will take longer and cost more money. As of right now the design industry is not given enough time nor getting paid appropriately for the amount of time and

resources needed to complete a truly functional design using BIM. Another huge obstacle for BIM, is trying to place a monetary value added/saved to a construction project by using this technology. There are benefits that BIM affords a project, but they do not usually have a real monetary value to them. By using BIM, many sequencing and coordination issues are discovered before they occur in the field. These discoveries lead to the elimination of errors and omissions and change orders. Although these really aid a project, it is hard to prove the dollar value of these benefits.

Other discussion included the ability of BIM to be a central information source for the construction team. By having a central information source, the construction team would be forced to interact with each other. However, in order to have a central information center, all players in the construction team need the same technology. There is a danger to taking information from a source and converting it to the technology that the subcontractors have, and then returning it to the original source. By doing so, the forced interaction between trades is eliminating along with some of the discrepancies between different drawings of different trades. In a perfect world, there would be one design using BIM, where all team members could update in real time a central information source while interacting with other trades.

The session then progressed into discussion about owner benefits. Some owners now, including the GSA, are requiring a design utilizing BIM technology. Among the benefits discussed were virtual walkthroughs. These walkthroughs would give the owner a better idea of what their building will look like, and allow them to change something much earlier in the project, and therefore would cost less money. Also, there are post-construction benefits the BIM provides. BIM provides the ability to more easily update their building plans as things change throughout the years of operation.

Session 3: Brainstorming: Building Respect with Owners and Operators

The session began with discussing how to gain the respect of owners. Again, a common theme between all sessions appeared - communication. All the industry members agreed that communication between the general contractor and the owner was the most important part of gaining the respect of the owner. Not only was a open line of communication important, but the line of communication had to be an honest one. Trust can easily be destroyed if an owner discovers something that was either covered up or not brought to their direct attention. The owners in the room made it clear that they would rather have both the good and the bad news, then just to have the good news. Contractors, by telling the owners of the problems of the project, could gain trust of an owner by demonstrating that they are not trying to hide anything and that they are currently working on a solution to fix the current problems.

From there, the discussion flipped to indicators of owner respect. The different industry members in the room all had different customer service feedback programs. These programs included service scale cards and customer expectation forms. Whatever the program, it was clear that owner satisfaction was a key concern of the industry members present in the session. Another, possibly the clearest indicator of owner respect, is repeat work. Industry members agreed that there is an obvious respect when the owner of a previous project asks for them on the next project.

<u>Issues that could be applied to my project:</u>

Concrete Ad-mixtures:

In session 1, the topic of new concrete admixtures was brought into conversation. These admixtures included for cold-weather curing and watertight concrete. Both these admixtures could be applied to the concrete pours of the Wesley A. Brown Field. The cold-weather admixture mixture could eliminate some of the temporary heating costs during winter pours. Also, the NAVY is requiring a waterproof slab and pit area (for the

storage of the roll-out turf field). By using the watertight concrete, some costs could be saved by not needing to use other waterproofing techniques.

BIM:

Because Wesley A. Brown Field House is a design-build job, there are many meetings between trades. They are already functioning as a team, and could easily coordinate many issue at these meetings. If a design using BIM was prepared, many construction sequencing and coordination issues could be eliminated much sooner in the project.

Coordination of Integrated Structural Design:

The Wesley A. Brown Field House structure consists of a precast exterior system and steel erection to hold the roof. The coordination of the interaction between systems would be interesting, especially because the structure needs to be blast resistant. It would also be interesting to research the interaction between trades on other similar projects.

Critical Issues Research Method:

Problem Statement:

There is an inability to reduce the cost of steel through design changes on a project because of steel's long lead-time.

Proposed Solution:

To create a comprehensive list of the leading design-build steel manufacturers and fabricators, and attempt to discover why these companies are able to be more efficient, if they are even more efficient, than their competitors at saving project costs through later design changes.

Research Steps:

First, I will need to compile a list of steel manufacturers and fabricators that do design-build jobs. Then I will need to research the different jobs that each fabricator supplied. Data will need to be collected on structural costs for each building. The data will include cost savings, cost overruns, and design changes. A matrix that will take into account the data collected will be used to rank the different manufacturers and fabricators. A closer investigation of the topped rank companies will look at addition factors.

Expected Outcome:

I expect to find very few steel manufacturers and fabricators that supply design-build jobs with more effectiveness than their competitors do. Of the ones that do supply more effectively, I expect to find similarities in the process of manufacturing, fabricating, and delivering. The list of leading companies on design-build jobs will help design-build teams choose a manufacture and

fabricator wisely, to minimize their structural cost by maximizing their ability to alter the design later in the project. The study may also help provide the industry will information to increase the efficiency of the structural steel industry.

Problem Identification:

Unique Column Forms-

The Wesley A. Brown Field House has 8 large concrete columns on the façade facing the Santee Basin. The forms are unique and will be very expensive. Looking at the different types of forms that could be used for these columns might lead to cost and schedule savings. The forms could be steel or wood. Also, the forms could possibly be a three part form, so the column pouring could be phased, rather than pouring one huge column at a time.

Waterproofing-

The Wesley A. Brown Field House requires waterproofing. There are many different types of waterproofing for concrete. Looking at the different options for waterproofing could lead to a potential cost savings. Also, there is a new mix of concrete that is waterproof. If this mix was used, although it would be a more expensive mix, there may be an overall cost savings for the project.

Managing Spoils-

The Wesley A. Brown Field House sits on top of soil that is not allowed to be used as backfill. Any excavated dirt on site must be removed and discarded appropriately. Proper management of spoil removal could lead to huge savings. Also, looking at different ways to eliminate the amount of spoils might lead to cost savings.

Sports Flooring-

There are three wood basketball floors that will be installed on the east end of the field house. The sports flooring is currently designed to be a permanent system. There are humidity and temperature restrictions on permanent wooden sports flooring. Other materials exist that provide similar properties of a wooden sports floor. These materials do not have such rigid restrictions on temperature and humidity. The alternate sports flooring might be a more expensive material, but the cost would be made up in the potential savings of reducing the size of the mechanical system.

Lighting Systems-

The main field house area is large space that needs to be lighted for collegiate athletics. The field house is designed to be lit by metal halide lighting. There is fluorescent sport lighting available on the market that is able to provide lighting comparable to metal halide. The NAVY wants the field house to have variable lighting controls, because they want the facility to have multiple uses. The new fluorescent sports lighting might cost a bit more, but will provide more variable lighting for a multi-use complex. This may also lead to energy cost savings.

Mechanical System Air Socks-

Currently there are exposed air ducts in the main field house area. These are ducts are currently a standard metal duct system. A fabric air duct might be just as effective in a room such as a field house. A fabric air duct would have possible cost savings as well as being a more maintainable system.

Technical Analysis Methods:

Waterproofing-

The Wesley A. Brown Field House is located right next to the Santee Basin. The Navy is very concerned about the waterproofing of their new state of the art facility, containing a hydraulic track and roll-out football field. It is important that these two highly expensive and unique systems do not get damaged by water. I will investigate the different types of waterproofing systems that have been used on previous projects and perhaps new methods just reaching the market. The investigation will look at the cost, schedule impacts, and reliability of each waterproofing system.

Sports Flooring-

My research will investigate the use of different sports flooring in the athletic facilities in the Wesley A. Brown Field House. The investigation will include cost comparisons, schedule impacts, and the quality of materials. Research on each alternative floor type may include but is not limited to the analyzing material specifications, speaking with manufacturers, and interviewing companies that have previously installed the specific flooring that is being investigated. Further exploration could look at the affect of the floor upon the other systems of the building.

Mechanical Air Socks-

The Wesley A. Brown Field House currently has an exposed metal air duct system designed for the main field area. Fabric air ducts or windsocks would be able to provide the required air distribution for this type of building. I will size the windsock for the Field House to see if they would be a viable alternative. Further

study will compared initial costs, long-term maintenance costs, and possible schedule savings.

Weight Matrix:

Description	Research	Value Engineering	Construction Review	Schedule Reduction	Total
Waterproofing	5%	5%	10%	5%	25%
Sports Flooring	3%	15%	5%	2%	25%
Mechanical Air Ducts	5%	10%	5%	5%	25%
Research Topic	25%	0%	0%	0%	25%
Total	38%	30%	20%	12%	100%