Wesley A. Brown Field House
Annapolis, Maryland

Peter Schneck
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A. Executive Summary

The spring semester is going to provide research opportunities for the construction and other industry issues that are incorporated with the Wesley A. Brown Field House. Time will be used to research these issues, determine value engineering possibilities, provide construction reviews, and possible schedule reductions. The issues that will be researched include:

Alternative Sport Flooring- Currently a there are three basketball floors that have been designed to be a traditional wood court floor system. There are other sport flooring system that are on the market that might be a better material to use in the Wesley A. Brown Field House. A comparison will be made between these different systems.

Fabric Ductwork- A traditional metal exposed ductwork system is currently designed for the Wesley A. Brown Field House. Fabric Ductwork offers many advantages over a metal ductwork system that apply themselves to the Wesley A. Brown Field House project. Researching and redesigning the ductwork system, will hopefully prove that a Fabric Ductwork system is a viable alternative to a metal ductwork system in this project.

Waterproofing- The Wesley A. Brown Field House is adjacent to a basin. Part of its foundation system penetrates into the water table. It is imperative that there is no water damage to the field house, especially the unique and expensive systems that will to installed in this facility. Taking a look at different waterproofing systems including new techniques being used in the industry like concrete admixtures, will perhaps reveal a more advantageous waterproofing system.

Penn State's Power Plant and Autoclave Aerated Concrete- Penn State currently operates a coal-fired power plant. The waste product that the coal produces is ash and needs to disposed of properly. Disposes of the ash is time consuming and can prove to be costly. There are numerous applications for this material that could provide Penn State

with a means to recycle their waster material. Once possible application is Autoclave Aerated Concrete (AAC). Investigation of the ash and AAC will hopefully provide a solution to the disposal of this waste material.

Lastly, the proposal includes a weight matrix. The weight matrix is a table that identifies that load of work that I will be completing in the spring semester. It illustrates the amount of investigation that will be done in research, value engineering, construction review, and schedule reduction for the four aforementioned issues.

B. Alternative Sports Flooring

Problem Statement-

Currently the Wesley A. Brown Field House design has three wood floor basketball courts in the design of the field house area. Wooden floors are expensive to purchase and install, expensive to maintain, and require a strict environmental climate.

Proposed Solution-

There are alternative sports flooring on the market that have the similar performance of wood. Using one of the alternative flooring systems be cheaper to install, cost less to maintain, and have less strict requirements for the environment they are installed.

Research Steps-

I propose to investigate alternative sport flooring options. Traditional wooden flooring, rubber sport flooring, and ceramic tile sport flooring will all be investigated. A comparison between all the different sport flooring options will be made. An initial cost estimate for each type of flooring will be used to compare the cost of material and installation of each floor. This will show which floor option which floor initially would be the cheapest. Courts are not easily maintained. Maintenance costs for an athletic could be astronomical when compared to the initial cost of the floor. A thorough investigation of the maintenance cost will have to be preformed, to see which floor would be maintained the easiest. Material Data sheets for each floor type will also be reviewed. The data sheets will provide information on the construction procedure and climate restrictions for each floor type. If the climate requirements are too strict, the mechanical system could potentially have to be resized to accommodate the requirements of the flooring system. Further research will also be done into the Naval Academy's true desire

for a wooden sports floor system. Then with all variables considered, I will make a comparison between all the flooring systems.

Expected Outcomes-

I believe that an alternative sports flooring system would be a better choice for the application that the Wesley A. Brown Field House requires. The courts are not the main function of the Field House area. Through research I think I will that there are many sport flooring system that offer very similar performance qualities that a traditional wood floor system does for less money, less maintenance, easier installation, and more flexible climate regulations.

C. Fabric Ductwork (Breadth 1)

Problem Statement-

Traditional metal ductwork provide numerous obstacles during the course of a construction project as well as post construction headaches. Metal ductwork requires large lay down areas, can be difficult to install, and sometimes add significant load on the roof structure above. After construction is completed, the cleaning and the maintenance of the ductwork is difficult, an exposed system can be easily dented from flying balls, and can be subject to condensation on the duct surface is a humid environment such as a field house.

Proposed Solution-

The Wesley A. Brown provides an excellent opportunity to use a fabric ductwork system. A closer look at a traditional metal ductwork system and a fabric ductwork system, will allow me to draw comparisons between both systems. I will also size and design the fabric ductwork system to allow me to fully understand the comparison of the two systems.

Research Steps-

I will begin my research by collecting information on both mechanical systems. Cost, ease of installation, hanger sizes, load on the structure, timing of installation, space requirements on site, delivery methods of the system to the site, lead times, maintenance, aesthetics, and other pertinent variables of the two different systems will be examined. These variables will be used to draw a direct comparison between the two systems.

Expected Outcome-

I believe that the Wesley A. Brown Field House will prove to be an ideal application for a fabric ductwork system. Through a comparison that will encompass all the different variables of construction and post-construction of both the metal ductwork system and the fabric ductwork system, I should be able to prove to audience that the fabric ductwork system is a better choice for the Wesley A. Brown Field House.

D. Waterproofing

Problem Statement-

The Wesley A. Brown Field House is located on adjacent to the Santee Basin. Parts of the concrete slab, where the hydraulic track mechanical system and the rollout football field are stored, penetrate below the water table. It is imperative that these unique and expensive items are not damaged by water.

Proposed Solution-

An investigation of multiple forms of waterproofing for the Wesley A. Brown Field House would provide insight on which system should be chosen for this particular job. Also, research into new waterproofing techniques, more specifically admixtures, will be conducted to see if they could be applicable on this project by themselves or conjunction with the more traditional waterproofing.

Research Steps-

The first step is to investigate all the waterproofing techniques and systems that can be used for this type of application. A traditional cost comparison will be completed for all waterproofing systems that I choose to investigate. Installation of each system will also be closely researched. Different waterproofing systems demand different time to install. Also, some systems are much easier to install than others. The quality of the waterproofing can be compromised by using cheaper materials for waterproofing. Research on new concrete admixtures that supposedly waterproof concrete will also have to be closely investigated. Case studies could provide insight on how effective the admixtures are on these projects.. Also, investigation of using both a waterproofing concrete admixture and perhaps a cheaper form of a waterproofing system in conjunction

with each other would be interesting to research to see if any costs savings could be made without sacrificing the quality of a more expensive waterproofing system.

Expected Outcome-

Standard waterproofing systems have been around for years, so contractors should be familiar with the cost and the quality of the waterproofing that is being used on the project. It is the newer techniques that have not been tested over the years that may provide some value engineering possibilities. I expect to find that the newer waterproofing techniques in the industry will have only been tried on a minimal amount of projects. These projects could provide key information on whether these new techniques will catch on in the future.

E. Penn State's Power Plant and Autoclaved Aerated Concrete

Problem Statement-

Penn State University provides 90% of its steam from a coal-fired power plant on campus. The waste product of the coal used to produce the heat and energy, is approximately 10% fly ash and 90% bottom ash. This ash costs approximately $35 a ton to remove and place in a landfill.

Proposed Solution-

Ash from coal can be recycled and used for many different applications. One application for this ash is the use of it in concrete. Autoclaved Aerated Concrete (AAC) uses fly ash as a replacement for Portland cement. If Penn State can adopt the use of AAC in all of its construction projects, local concrete companies will be interested in the waste products produce by our coal-fired power plant. Even if the ash cannot be used in concrete, the ultimate goal is to find a use of the ash here on Penn State's campus.

Research Steps-

To properly solve the problem that is faced by the Penn State coal-fired power plant on campus, I believe I must understand the origins of the problem. Site visits to the plant and meetings with the manager on-site will give me an understanding of the operation. It will also provide me with information why the ash is and has been a problem at the power plant. Data can also be collected from the visits to help determine the chemical characteristics of this waste product. From there I can begin to research the chemical characteristics of the fly ash that is currently used in AAC. I may be able to draw comparison between the materials that are currently being used and the material that the power plant is producing – they may even be the same material. Next, I will continue my research on AAC. This research will consist of the chemical properties, strength,

workability, durability, costs, environmental affects, and other pertinent information that I discover through my research. After, gaining the information needed to understand the properties of AAC I will hopefully be able to complete a feasibility study for the use of AAC here on Penn State's campus.

Expected Outcome-

Working closely with the power plant on campus, I believe I will be able to find viable solution to their problem of disposing of the waste ash. I expect to find that only the fly ash produced from Penn State's coal-fired power plant will have the carbon levels suitable for use in AAC. However, there may be means to make the bottom ash become suitable for use in AAC. Through a feasibility study, there is a chance that I could help convince Penn State to use AAC on their projects on campus, and perhaps provide the power plant with a solution to their waste problem. My hopes are ambitious for the amount of time I have to accomplish this task, but if I can get my foot in the door and provide a path for people to follow, I believe a solution can be discovered in the near future.

F. Weight Matrix

Description	Research	Value Engineering	Construction Review	Schedule Reduction	Total
Sport Flooring	5%	15%	3%	2%	25%
Waterproofing	5%	8%	7%	5%	25%
Mechanical Air Ducts	5%	5%	8%	7%	25%
Power Plant & AAC	25%	0%	0%	0%	25%
Total	40%	28%	18%	14%	100%