Thesis Proposal

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Executive Summary

The goal of this proposal is to show what I plan on researching on the new Washington-Lee High School next semester. For each analysis that is going to be done a problem is identified, my research goals are given, the tools needed to complete the analysis are given, and finally the expected outcome of the research is given. At the very end a weight matrix is given to show how I will be spending my time next semester.

Analysis #1: LEED Schools

In this analysis I plan to study LEED schools and create a guide for public schools looking to build a new building that will help them decide whether or not to pursue a LEED rating. The goal of this analysis is to research the advantages LEED rated schools have in providing a better environment for students.

Analysis #2: Prefabricated Masonry Façade (Breadth 1)

In this analysis I plan to compare a prefabricated masonry façade to the current façade. There are a lot of different façade elements currently on the new school which means there is an increased chance of leakage between the joints. There also is a significant issue with coordination between trades. The goal is to show that a prefabricated system will help reduce the schedule and will also help reduce the mechanical loads due to the quality of the work. The hope is that a reduction in mechanical loads would lead to the building qualifying for more LEED points.

Analysis #3: Lighting in Gymnasium (Breadth 2)

In this analysis I hope to create a better lighting design in the gymnasium of the new Washington-Lee High School. They are currently using the normal metal halide light bulbs which most gyms use. I want to find a better more effective way to light the gymnasium that will show the new school off in a good way. I also hope to save cost or at least add more value to the new gymnasium because it will be a major gathering spot for the community.

Analysis #1: LEED School Guide

Problem

One of the critical issues that I want to pursue with my research is Green Building in Schools. LEED buildings are becoming more and more popular, however there are still not many LEED rated schools throughout the country. This is mainly due to cost, availability of materials, and a lack of knowledge by owners and school board members on Green Design. If owners were more educated on LEED buildings and understood how to go about getting certain LEED points their might be more LEED rated schools.

Research Goals

The goal of my research is to show the advantages of having a LEED rated school to owners and school board members before they build a new school. This will be done by creating a small booklet on green building that will show board members which LEED points are most attainable and how to go about getting a building LEED rated. This booklet will also help school board members understand green buildings and how they can affect the learning environment for students.

Steps to Achieve Goal

1. Research LEED Criteria
2. Determine which points are most attainable for school buildings
3. Research LEED School Advantages
4. Develop Booklet
5. Give Booklet to Public School Owners looking to construct new buildings
6. Give Survey to Board Members to see if booklet worked
7. Make changes based on feedback

Tools

1. U.S. Green Building Counsel Website
2. Penn State Faculty

Expected Outcome

It is the hope that this booklet will educate school board members about the advantages of having a LEED rated school and to persuade more public schools to strive for a LEED rating. In the end the goal is to have more efficient school buildings and for students to have class in a better environment.

Analysis #2: Prefabricated Masonry Façade (Breadth)

Problem

There are several different types of façade elements including unit masonry, storefront windows, curtain walls, and metal panels. The exterior of the building took a very long time to complete because of all of the unit masonry and different elements. This means there needs to be a lot of coordination between trades and there is a bigger chance of leakage.

Research Goals

The goal is to show that a prefabricated system will help reduce the schedule and will also help reduce the mechanical loads due to the quality of the work. The panels are built in a controlled environment and should reduce the amount of wasted material which could also help maintain LEED points in that area. A constructability review will also be conducted to see if this is possible given the congested site.

Steps to Achieve Goal

1. Determine amount of bricks needed to be replaced
2. Choose Prefabricated system
3. Talk to manufacturer and compare price and schedule reduction
4. Compare R-values between the two systems
5. Estimate Mechanical load savings between systems
6. Compare results

Tools

1. Prefabricated system manufacturers
2. RS Means 2007
3. Penn State Faculty

Expected Outcome

I expect that the prefabricated system will have less mechanical loads that will save the school money. I also expect the prefabricated system to be better quality, be constructed in a shorter amount of time, and to cost less.

Analysis #3: Lighting in Gymnasium

Problem

Gymnasiums in schools almost never have proper lighting for all of the different activities that take place in them. Gyms typically use metal halide lights that are not the most efficient and are hard to reach and adjust. The gym is going to be a central gathering space for the community in Arlington and I want to explore different options for lighting the gymnasium

Research Goals

I want to find a better more effective way to light the gymnasium that will show the new school off in a good way. I hope to provide a different system that can be used in the future at other schools. I hope to save cost or at least add more value to the new gymnasium.

Steps to Achieve Goal

1. Look at current lighting layout
2. Design new layout using different materials
3. Estimate cost of new layout
4. Compare new layout to current layout

Tools

1. Lighting Websites
2. Lighting design software
3. Penn State Faculty

Expected Outcome

I expect that the new lighting layout of the gymnasium will be a better value for the new school. I expect it to be of better quality and will provide the community something to be proud of when watching all of the different types of events that are held there.

Weight Matrix

Description	Research	Value Engineering	Constructability Review	Schedule Reduction	Total
Prefab Masonry Exterior			20%	15%	**35%**
Green School Advantages	35%				**35%**
Lighting		25%	5%		**30%**
Total	**30%**	**30%**	**30%**	**15%**	**100%**