Thesis Proposal

Executive Summary for Spring Thesis

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Executive Summary

This report serves as a proposal for my spring senior thesis work. The semester will be spent researching, finding viable solutions to problems, and forming conclusions based on cost analysis, construction feasibility, schedule impacts, and value engineering. The theme for my thesis is adding value to the Washington Christian Academy by incorporating healthy, sustainable features into the building. Research has shown that students perform better when they are in classrooms with improved indoor air quality, better acoustics, and increased natural light. These points will serve as the foundation for my thesis research. The research analyses I intend to study in the spring are as follows:

Analysis 1: Consequences of the English-Spanish Language Barrier at the Jobsite
Critical Industry Issue
This analysis focuses on a critical industry issue which plagues the Washington, DC construction industry. The focus of the analysis will be on identifying the top five problems on a typical jobsite related to this barrier. The goal is to identify these challenges and address solutions to remedy them.

Analysis 2: Improve Indoor Air Quality
Mechanical Breadth
Analysis two addresses one of the three environmental factors discussed above. This analysis is based on researching and implementing a higher quality air filtration system into the mechanical system. The goal of this analysis to address the benefits of improved indoor air quality, improve the indoor quality by adding filters, analyze cost and construction constraints, and determine if prefabrication is available. This value engineering idea will have to be marketed to the owner based on value and life cycle cost savings.

Analysis 3: Better Acoustics
Acoustical/Mechanical Breadth
The second environmental factor that improves schools is addressed in this analysis. This analysis will focus on improving the acoustics in the gymnasium, which is a large open space with sheet metal ductwork. This ductwork will be replaced with fabric duct. The system will be analyzed from a cost, interior sequence schedule, and procurement/availability perspective. A mechanical takeoff will be necessary, and possibly resizing of the ducts. The acoustical and mechanical implications will be addressed to ensure that the quality of air and noise level in the gym is improved.

Analysis 4: Use of Natural Light to Reduce Energy Consumption
Lighting/Electrical Breadth
The final environmental factor addressed above is covered in analysis four. This topic will determine ways to use the natural light (already provided by large windows) to reduce energy consumption, save the owner money, and improve the space for students and teachers. By adding automatic switches and daylight photosensors that trigger dimming ballasts, the natural light can be used to illuminate the classrooms. Natural light will only save on energy costs when the lights are off or dimmed. Adding the dimming ballasts will have a significant cost and construction impact, and will need to be sized for the appropriate lamps and electrical loads. The electrical complexity of installation will also increase.