

Waynesburg Central High School



Thesis Proposal (Revised)

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Analysis 3: Structural Redesign

(Structural Breadth)

A. Problem: Precast concrete was chosen as a structural system and caused several constructability issues.

Precast concrete is a structural system that is not common practice in Western Pennsylvania. Waynesburg Central High School was designed with a precast concrete structural system which caused for several problems during the construction project. The primary construction method in western Pennsylvania is a structural steel system with a block infill. As a result of contractors not being familiar with the unique construction techniques required for precast concrete erection, many of the columns were set incorrectly.

B. Goal: Analyze and compare a structural steel system to the implemented precast concrete system, to determine the constructability issues associated with both as well as determining the most economic system.

C. Research Steps:

Step 1: Redesign building G to a steel structure.

Step 2: Determine cost differences between the structural steel system and the precast concrete structure.

Step 3: Analyze differences in the construction method between both structural systems.

Step 4: Create a detailed spreadsheet for cost comparison and do a final suggestion based on the findings from the cost analysis.

Step 5: Create multiple site plans for the construction of Waynesburg Central High School for a steel structure.

D. Expected Outcome: Through the analysis of a structural steel alternative I expect to find that a steel structure will cost less. I expect to find that since the steel structure is more common in western Pennsylvania I expect there will be fewer mistakes during the construction process. After finding the constructability issues associated with each I do not expect there to be any sequence changes required because each material requires about equal lead time. After analyzing the data obtained through the analysis I expect to find that a steel structure in western Pennsylvania will be a better option than precast concrete.

Analysis 4: Energy Savings Analysis

(Lighting/Electrical Breadth)

B. Problem: Energy consumption in a building is a large cost.

LEED certification focuses on a few main areas of a building in order to achieve certification; one of the emphasized areas is energy consumption. With energy consumption being emphasized as an area of focus in the LEED certification process this is an area that needs to be further looked at on most projects. Though manufacturers are becoming more consistent and there is less deviation in the performance of products, some products still perform better than others do in terms of energy consumption. Lighting systems is not the only system that should be analyzed on a construction project for energy efficiency; mechanical systems are often the largest single consumer of energy in a building. This analysis will analyze the lighting system chosen at Waynesburg Central High School because this system is more visible and can be used more easily as an educational tool.

B. Goal: Choose a luminaire that will result in an energy reduction from the previously chosen one if possible, and then create a spreadsheet to calculate the energy savings.

C. Research Steps:

Step 1: Research luminaires and find the most cost effective.

Step 2: Compare possible luminaire options to the specified.

Step 3: Determine Energy savings with new luminaire.

D. Expected Outcome: I expect to find a florescent lighting fixture that will save about 5 percent in energy compared to the specified luminaire. The type will stay a florescent to ensure that the entire lighting system does not have to change as well as the service that is feeding them. At the end of this analysis I should have a spreadsheet with 3 possible lighting fixture alternatives and the originally specified fixture, along with the performance energy specifications, annual energy consumption, annual energy cost, and the initial cost for each luminaire type.