

Spring Thesis Project

Final Proposal



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Executive Summary

This final thesis proposal is the foundation of the research topics for next semester. Several topics have been researched and analyzed on how they could apply to Pasadena Elementary School. Three analyses have been identified that will be concentrated on.

The first analysis strives for Pasadena Elementary School to become a minimum of LEED Certified. Using LEED for Schools, prerequisites and credits for LEED points will be sought after.

Greenroofs can greatly help with credits in the LEED process. Pasadena Elementary school has a conventional roof in its initial design. The second analysis concentrates on designing a greenroof for the elementary school. This can count toward two of my breath studies. A look at the structural system will be taken into consideration due to a change in the loads the roof will provide. Also the mechanical system will be analyzed on how it will differ due to stormwater drainage control and design loads.

The final analysis studies if the existing elementary school would not have been demolished and instead have been reused for the new elementary school. This will take into consideration phasing and sequencing of the construction, schedule impact and construction waste reduction. Also a cost analysis will be conducted.

At the end of this report is a weight matrix on how the research topics are distributed. Each topic is weighted from 10-40% of the final thesis research.

Analysis 1: LEED Certification

Problem Statement

An analysis will be performed to achieve a minimum of a LEED Certified Rating for Pasadena Elementary School. LEED Rating status was not sought after at the time of design or construction. Minimal initial costs are ideal, but lower lifetime energy and cost savings are of utmost importance.

Research Goals

School boards and districts are hesitant to support the construction of a green and sustainable building. It is thought that there is a large increase in initial costs of the building. The goal of my research is to demonstrate that low initial costs are all that is needed and that there will still be a significant decrease in lifetime operating and maintenance costs. This will be done by investigating the barriers on both the owner and designer's side of the industry.

Research Steps

1. Generate a group of questions to ask public school district officials about the reasons they do not initiate green building design in their school district.
2. Generate a group of questions to ask designers who specialize in school buildings about how designing green buildings would have an effect on their job.
3. Interview industry professionals—both owners and designers.
4. Compare the desires of the owners to that of the architects to find common features of the building that can aid in LEED Rating.
5. Create a list of LEED Prerequisites and Credits that can be met based on the wants of the owners and designers that will achieve a minimum of a LEED Certification Rating.
6. Calculate the total amounts of points earned by adding the credits that were met.

Data Collection Draft

Interview questions to be asked to public school district officials:

- State your name, position in the school district and the name of the school.
- How many students will occupy the new building?
- What type of setting is the school building in (city, rural or suburban)?
- Which is more important to you: initial cost or lifetime cost of the building?
- What are the expected operation and maintenance costs of the building?
- What are some things that you would like to see change from the existing school that will be replaced?

- What features do you feel are absolutely imperative to the building and cannot be removed from the design?
- Do you have any hesitation and if so what is the largest when someone mentions the idea of constructing a green school?
- Do you have any intention of using a green building for student interaction in learning?

Interview questions to be asked to public school district officials:

- State your name, name of firm, job title and the name of the school.
- Are you a LEED Accredited Professional?
- Have you ever worked on a building that achieved a LEED rating?
- If so, what role did you play in the project?
- Does your firm take an interest in LEED projects?
- What are some things you would like to see changed from the existing school that will be replaced?
- What features do you feel are absolutely imperative to the building and cannot be removed from the design?
- Do you have any hesitation and if so what is the largest when someone mentions the idea of a green school?
- What barriers are there with green design?

Analysis 2: Greenroof Design

Problem Statement

A greenroof on an elementary school can aid in stormwater control and reduce the amount of thermal heat that is absorbed by the building. Pasadena Elementary School has a conventional roof in its original design. By implementing a greenroof it could assist in receiving 6-16 credits for a LEED Certification.

Research Goals

Greenroofs can significantly help buildings become LEED Certified. They apply to many credits that could be in consideration of being awarded. A minimum of 6 credits for potential of being awarded by adding a greenroof is the goal for this elementary school.

Research Steps

1. Research will be performed to obtain information of the different types of greenroofs.
2. A type will be determined that is the best suited choice for Pasadena Elementary School.
3. A greenroof will be designed.
4. Structural loads will be calculated and the structural system will be looked at to see if the system will hold the greenroof. If not, changes will be made.
5. Mechanical design loads will be adjusted and compared to how the original mechanical system will be sufficient. If not, changes will be made.
6. The construction sequence and schedule will be altered to accommodate the greenroof.

Analysis 3 Building Reuse

Problem Statement

Demolition is planned for the existing Pasadena Elementary School when construction of the new school is complete. To reduce construction waste, reuse of the building could have been performed to save such costs as materials and transportation expenses. Construction costs can greatly reduce as well.

Research Goals

To aid in LEED certification a minimum of 75% building reuse is required. This must include elements of the building such as the existing walls, floors and roof.

Also consideration must be taken into account that construction will take place while the building is occupied and this means that the learning environment cannot be disrupted. A phasing plan of how construction will take place will have to include temporary trailers while a section the building is occupied and another section is being constructed. These trailers could be used for different classrooms as the phasing plan progresses.

Research Steps

1. Develop a floor plan of the existing building highlighting the areas that will be reused.
2. Confirm that these areas can be reused.
3. Calculate surface area (square footage) of the reusable building.

4. Calculate a percentage of reuse surface area to original building surface area.
5. Develop a phasing plan for the construction process.
6. Develop a sequence for the construction process and produce a new construction schedule.
7. Develop a site plan for the construction of the elementary school.

Weight Matrix

Below is a table that summarizes how work on these three analyses will be distributed throughout my thesis work. It shows how much each of the analyses is studied during the project and also the amount that the following topics are addressed: Research, Value Engineering, Constructability Review and Schedule Reduction.

Description	Research	Value Engineering	Constructability Review	Schedule Reduction	Total
LEED Rating System	30	0	0	0	30
Green Roof	0	15	15	0	30
Building Reuse	0	15	15	10	40
Total	30	30	30	10	100

Appendix A

Breath Studies

1. Analysis of the structural system will be conducted to allow for the increased loads the greenroof will provide. If necessary an updated structural system will be proposed.
2. Analysis of the mechanical system will be conducted to allow for the different design loads produced by the greenroof. If necessary an updated or new system will be proposed. In addition stormwater drainage will be altered and therefore will be looked at.