

Josh Raphael | CM | Dr. Riley



Thesis Proposal

Holiday Inn Express

Absecon, NJ

December 11, 2009

Table of Contents

Executive Summary 2

Technical Analysis 1: Solyndra Solar Panels 3-4

Technical Analysis 2: BAS Systems 5

Technical Analysis 3: Wireless Controls 6-7

Technical Analysis 4: SIP Panels 8-9

Weight Matrix: 10

Breadth Study: 11

 Electrical 11

 Structural 11

Executive Summary

The purpose for writing this Thesis Proposal is to explain what will be researched during next semesters AE 482 Thesis course. For my thesis I will be doing in depth research on four technical analyses. These analyses are as follows: The installation of Solyndra Solar Panels, the implementation of Building Automation Systems, the conversion to Wireless Controls, and the installation of SIP Panels.

The primary focus of my research will be energy efficiency and value engineering. Using these analyses, I will attempt to reduce the project schedule and decrease initial construction costs and future building usage costs.

The Breadth Studies that will be covered are Electrical and Structural. Electrical calculations will be necessary to determine energy cost savings. Structural load calculations will be used to determine wall thickness and confirm that SIP panels will be an appropriate replacement.

Technical Analysis 1: Solyndra Solar Panels

Issue

The Holiday Inn Express addition is being built very traditionally, with no effort to reach a LEED certification, and no energy efficient ideas implemented. When I spoke with the construction manager of DRK Associates he informed me that the owner had expressed a great interest in the use of solar panels. The only reason solar panels were not implemented or further researched is because of budget limits. Therefore solar panels would be a great idea to research for my thesis.

There are two areas of the Holiday Inn where the use of solar panels could prove to be beneficial. A large portion of energy will be needed for the gym/pool area to power the exercise equipment and pool pumps. In addition a lot of energy will be needed for the hotels water heaters, which will be used often for showers and lavatory needs from the guests.

Methodology

During the PACE Roundtable Meeting a fairly new product was discussed called Solyndra solar panels. These cylindrical solar panels are installed on reflective roofs and because of their shape, absorb more solar energy because of their increased surface area. With the location of the hotel in an open area with limited shade from the south end, these solar panels would be appropriate for this project.



In order to determine whether Solyndra solar panels would be beneficial to this project, a lot of research must be made. First, researching organizations that will help fund initial costs of alternative energy sources could be a way to eliminate budget issues. Next, determining the location where the panels are fabricated is important for travel cost, schedule issues, and determining if Solyndra solar panels would be more cost efficient

than a traditional solar panel. Finally, the installation crew and time must be analyzed to determine other initial costs and schedule delays.

Expected Results

The goal of this analysis is to create future costs savings for the owner and higher resale value of the building. It is expected that the solar panels will significantly decrease the energy consumption of the new addition and possibly even the original building. It is likely that the schedule will increase but hopefully the energy savings will make up for the delays. Overall I expect that with increased energy costs the implementation of these solar panels will be paid off and be creating savings within 5-7 years.

Technical Analysis 2: Building Automation Systems (BAS)

Issue

A large issue with hotel buildings is the high energy consumption that is common in any multi-living complex. When individual guests have complete control over their unit's energy consumption a lot of energy can be wasted. With Building Automation Systems like motion sensors implemented, electricity and water usage could be automatically shut off when they are not in use by guests. If BAS systems are used the owner would see immediate water and energy savings making this a great value engineering study.

Methodology

The first point of research would be deciding the best BAS system with the cheapest initial cost. Next, areas of the building which would benefit the most from this implementation must be determined. Automation fixtures must be selected and compared for cost issues. Installation fees must also be determined to make sure added initial cost is not significantly increased. These costs will be determined using RS Means, fixture catalogues, and consulting with the electrical contractor.

Further research must be made comparing average energy consumptions of hotel unit guest with and without BAS systems. Using this information we can confirm the benefits of BAS implementation.

Expected Results

The goal of this analysis is to once again create value engineering opportunities for the owner. It is expected that the schedule would not be affected by this change but initial cost will be increased. However, savings will be noticeable once the hotel begins to run again at normal conditions and should quickly pay off the initial cost.

Technical Analysis 3: Wireless Controls

Issue

Since my thesis project is an addition to an existing building, the owner had expressed the need to be able to control the addition and existing buildings from one area. In order to do this the utilities had to be connected underground and routed all through the new addition. This process adds time to the schedule for the installation of underground pipes, conduits, and wires. In addition the pipes, conduits, and wires that are necessary for installation are also added costs to the project along with the crews that install them. With the implementation of wireless controls we could cut schedule time and material and installation costs.

Methodology

Wireless Controls were also suggested to me while in the Energy and the Construction Industry breakout session at the PACE Roundtable Meeting. In order to determine if wireless controls are appropriate for this project an interview with the electrical contractor would be useful. Some of the questions that would fuel my research are as follows:

- Does your construction crew have the experience and skills to install wireless controls?
- What connections must be made to the existing building to allow the controls to run both buildings simultaneously?
- Where can the materials needed for installation be procured from?
- How much schedule time can be reduced with this alternative installation?

If the controls can work with this building we must then calculate the time and cost savings to confirm that wireless controls will be beneficial.

Expected Results

It is expected that the wireless controls, material and installation cost will be cheaper than that of the original pipe, conduit, and wires costs. We could also expect to see a schedule reduction which in turn benefits the owner and the general contractor. The wireless

Josh Raphael / CM / Dr. Riley

Holiday Inn Express/ Absecon, NJ

December 1, 2009

controls should prove to be as easy if not easier for the owner to control both buildings simultaneously.

Technical Analysis 4: Structural Insulated Panels

Issue

The main issue with the existing wall system is the tight schedule which is based around framing inspections. With framing inspectors also on tight schedules there appointed visits must go well to prevent schedule delay risks. With Structural Insulated Panel installation these inspections could be less risky. Since the walls are prefabricated there is less chance for error. In addition since insulation and wall framing will be done simultaneously the schedule should be reduced.

SIP panels are also fairly cheap and highly efficient therefore we can see two benefits from this. We could potentially see cost reduction from material procurement and increased building unit size with thinner walls.



Methodology

The SIP panels were an idea discussed in AE473, the PACE Roundtable Meeting, and were suggested by Professor Magent. The first thing that needs to be done is locating SIP panel manufacturers near the project location. An interview with the Construction manager of DRK Associates would be useful to my investigation. Some questions that will help my research are as follows:

- Would you need addition equipment to install the SIP panels?
- Have your crews ever worked with SIP panels?
- If yes? Has it proved to be quicker or easier than the traditional wall installation?
- Which material does your crew prefer to work with?

The SIP panel website will be used to answer a lot of question about efficiency, costs, and installation issues.

Expected Results

It is expected that the schedule would be reduced greatly with the simplicity of the SIPs installation. I also hope to see a reduction in material costs as long as travel costs do not outweigh the savings. Hotel units are expected to see a slight area increase due to thinner walls.

Weight Matrix

The weight matrix will visually show how much time will be allotted for each portion of research in percentages. The greatest amount of research and calculations will be done on the solar panels and the SIP panels where they will be the backbone of my thesis analysis. Also a large portion of research will be dedicated to value engineering and savings.

Weight Matrix					
Description	Research	Value Eng.	Construct. Rev.	Schedule Red.	Total
Solar Panels	10	10	5	X	25
BAS Systems	5	15	X	X	20
Wireless Controls	5	X	5	10	20
SIP Panels	5	10	5	15	35
Total	25	35	15	25	100

Breadth Study

Electrical

There are two technical analyses that will fall in to the electrical breadth study. The two analyses are Solyndra Solar Panels and Building Automation Systems.

In order to determine the savings from the Solyndra Solar Panels many calculations must be made. The amount of solar panels that can be applied to the roof and the energy that the solar panels produce must be calculated based on size, location, and direction. The energy produced will be deducted from the typical hotel building energy consumption to determine savings. These savings will determine how long it will take for the owner to profit from his investment.

The Building Automation Systems will need to make calculations to determine how much energy will be saved and also how much water will be saved resulting in further cost savings.

Structural

The implementation of SIP panels will fall into the structural breadth study. The SIP panels are supposedly stronger, straighter, and more efficient than traditional framing walls. With that being said load calculations must be made to see how thin the walls can be constructed to carry the same load and insulation requirements.