# Thesis Proposal

## Voorhees Replacement Facility | Voorhees, NJ

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1/15/2009

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## Executive Summary

The following proposal is an outline that will guide my research for the spring of 2010. It identifies my 4 major areas of construction management analysis and provides research steps that will be taken to complete each analysis.

The first analysis is sustainability in healthcare projects and will determine if the design of LEED healthcare buildings is worth pursuing and what LEED areas within LEED are most applicable to healthcare projects. This analysis will also apply what is learned from the research to the Voorhees Replacement Hospital and attempt to add sustainable ideas into the building without compromising the architect's design.

The second analysis is the redesign of patient room lighting. Currently the patient rooms are design using fluorescent lighting but with owners continuously looking for energy saving ideas I will determine if using LED lighting is more efficient and cost effective then the fluorescent lighting in place. Also I will research the effect of lighting on patient's recovery and overall health and determine if the switch from LED to fluorescent lighting will have a positive or negative effect on patients.

The third analysis involves creating a short interval production schedule for the rough-in and fit-out of the bed tower and the final analysis includes determining if it will save the project time and money by switching the current stick built curtain wall system to a prefabricated.

My two breadth analysis's come from analysis 2: patient room lighting. The first breadth analysis will determine if switching from LED lighting to fluorescent lighting in the patient rooms will reduce the HVAC load and my second breadth analysis is the lighting design of the room.

# Analysis 1: Sustainability

### *Problem*

Although the Voorhees Replacement Hospital does incorporate some green design it is not attempting to achieve a sustainable rating of any kind. In a continuously growing green market is there a way to push the hospitals design to incorporate more sustainable ideas and possibly achieve a LEED rating?

### *Goal*

To determine if the design of a LEED healthcare building is worth pursuing and what the best LEED areas are to pursue without inflating the budget.

### *Research Steps*

Step 1: Determine percentage of hospitals in the northeast that are LEED rated.

Step 2: Research LEED certification and the points needed to achieve LEED certification.

Step 3: Analyze the feasibility of each point based upon healthcare construction requirements.

Step 4: Talk with industry professionals who have worked on healthcare projects to determine the feasibility of attempting to achieve a LEED rating.

Step 5: Analyze the Voorhees Replacement Hospital for current LEED design and determine where there is room for improvement and new LEED ideas.

Step 6: Analyze present costs and lifecycle costs of implementing new LEED ideas into the building.

### *Expected Outcome*

I expect that LEED certification on healthcare projects will be obtainable with careful preconstruction planning and good construction management. I also expect that it will be expensive to incorporate new LEED ideas into the building and this is the main deterrent for healthcare owners.

## Analysis 2: Patient Room Lighting

### *Problem*

The patient rooms are currently designed around the use of fluorescent lighting. As energy issues grow and owners continuously look for energy savings in their buildings I will investigate the use of LED lighting in the patient rooms. I will also ask if a patient feels more comfortable under the use of LED lighting than fluorescent.

### *Goal*

To redesign the current patient rooms to include more efficient and cost effective lighting and determine if the use of LED lighting will increase the patient's happiness and make them feel more comfortable in the hospital.

### *Research Steps*

Step 1: Determine the requirements for lighting in hospital patient rooms.

Step 2: Redesign the patient room lighting plan using LED lighting to meet lighting requirements.

Step 3: Conduct an initial cost analysis of the LED lighting verse the fluorescent lighting followed by a life cycle cost analysis.

Step 4: Research by articles and talking to healthcare professionals the effect of lighting on patients.

Step 5: Determine if patients would be affected positively with the use of LED's verse fluorescent lighting.

### *Expected Outcome*

I expect that the LED lighting will provide a better cost model then the fluorescent lighting and will ultimately provide more cost savings although the initial investment may be more expensive. I also expect that LED lighting will provide a more comfortable experience for hospital patients.

## Analysis 3: Bed Tower Short Interval Production Schedule

### *Problem*

The rough-in and fit-out of the bed tower is along the critical path of the project and is the last major portion of construction before substantial completion. Is there a way to manage the rough-in and fit-out of the bed tower to reduce the schedule time without causing clutter of subcontractors?

### *Goal*

To investigate if using a short interval production schedule for the bed tower rough-in and fit-out will effectively reduce the original schedule of the bed tower.

### *Research Steps*

Step 1: Evaluate the current schedule and determine the scheduled time for each floor.

Step 2: Determine the sequence in which rough-in and fit-out needs to be completed.

Step 3: Speak with subcontractors to determine the amount of work that can be put in place over a period of time for a particular activity.

Step 4: Determine zones on each floor for the schedule.

Step 5: Create the short interval production schedule.

Step 6: Compare the short interval production schedule to the original schedule.

### *Expected Outcome*

After completing the short interval production schedule I believe that the schedule will be able to be reduced which in turn would allow the building be substantially complete earlier then originally planned.

## Analysis 4: Curtain Wall

### *Problem*

The large curtain wall system at the bed tower was constructed in place and along the critical path of the project. Since water tightness controls when the rough-in and finish stages of the project can begin I believe that prefabricating the curtain wall can save the project time and money.

### *Goal*

To determine if switching the curtain wall system from stick built to prefabricated will save time and money to the project.

### *Research Steps*

Step 1: Determine the cost and schedule for the stick built curtain wall system.

Step 2: Research prefabricated systems by contacting and communicating with industry experts.

Step 3: Perform takeoffs and determine the cost to install a prefabricated system.

Step 4: Conduct a schedule analysis to determine the time required to install a prefabricated system.

Step 5: Conduct a site utilization plan for the installation of the prefabricated system.

### *Expected Outcome*

I expect that by switching from a stick built curtain wall system to a prefabricated curtain wall system the project will be able to save money and reduce the installation schedule allowing for rough-in and finishes to start earlier. I also expect that due to the wide open area of construction there will not be an issue with using a crane to install the system.

## Breadth Analysis's

***Mechanical Breadth – Analysis 2: Patient Room Lighting***

This analysis will include a mechanical breadth analysis. The breadth analysis will be determining the current HVAC loads in the patient room before and after the lighting change to see if there could be a reduction in equipment or duct size resulting in a cost reduction.

***Lighting/Electrical Breadth – Analysis 2: Patient Room Lighting***

This analysis will include a lighting breadth analysis. The breadth analysis will be the redesign of a patient room from fluorescent lighting to LED lighting.

## Weight Matrix

| Description | Research | Value Engineering | Const. Rev. | Sched. Red. | Total |
|---|---|---|---|---|---|
| Sustainability | 15% | 5% | 5% | | **25%** |
| Patient Room Lighting | 10% | 15% | | | **25%** |
| Bed Tower Short Interval Production Schedule | | | | 20% | **20%** |
| Curtain Wall | | 15% | 5% | 10% | **30%** |
| **Total** | **25%** | **30%** | **10%** | **35%** | **100%** |