Thesis Proposal

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The Washington County Regional Medical Center

11116 Medical Campus Road
Hagerstown, MD 21742

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Project Information

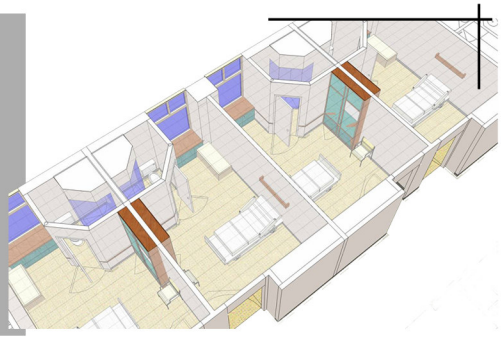
Size	500,000 sq. ft.
Height	5 levels
Project Cost	$150 million
Construction Dates	March 2008 - December 2010
Delivery Method	CM @ Risk

Project Team

Owner	Washington County Health Systems
Architect	Matthei & Colin Associates
CM	Gilbane Building Company
MEP Engineers	Leach Wallace Associates, Inc.
Structural Engineers	Abatangelo-Hason, Ltd.

Architectural Design

- Various facade types; brick, arch. precast, and glass
- Ballasted single ply roof membrane on rigid insulation
- (275) single bed rooms with private bathrooms
- (53) emergency treatment rooms
- (2) truma and 2 cardiac rooms

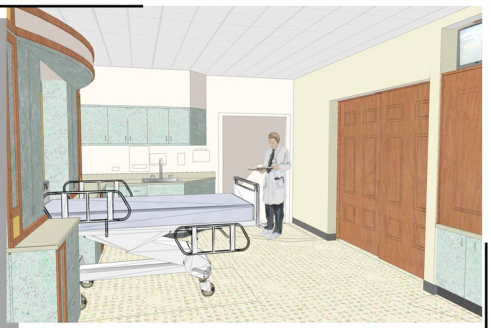


MEP Systems

- (5) AHU's totaling a maximum of 450,000 cfm.
- Central Utility Plant - (2) chillers & (2) cooling towers
- Electrical service feeds (3) substations each at 4,000 amps, 480Y/277, 13.2kV, 3 phase 4 wires.
- (2) emergency generators at 2,000 amps, 480Y/277
- Flourescent ceiling mounted light fixtyres typical

Structural System

- (150) deep foundation caissons under bed towers
- Spread footing foundation and grade beams under the other portions of building footprint
- Structural steel frame with 3-1/4" LWT concrete slab on 20 guage composite deck for the floors



http://www.engr.psu.edu/ae/thesis/portfolios/2009/sse112

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Executive Summary

This report contains a proposal for the following semester's thesis work. It reviews critical industry issues and identifies problems related to the Washington County Regional Medical Center. These issues will serve as a basis for future research under each topic. The topics were selected from numerous sources, but contain information that can be analyzed from a cost and schedule viewpoint as well as value engineering and constructability. The proposal also contains two breadth concepts that will allow a more in depth look at each effected topic from another option area. The following are the topics of which I intend to study in the spring semester:

Analysis 1: Risks of Site Selection, Financing, and Sources of Funding
Critical Industry Issue
MAE Requirement
This analysis will focus on the changing economy and how it affects construction projects. It will also look into risks associated with project funding and financing. The topic will also address alternate sources of funding. The goal is to educate owners and developers of the fragile economic impacts of their decisions and how to continue to proceed with healthcare construction projects. The MAE requirement will be fulfilled through further development of this topic in relation to Project Development & Delivery Planning.

Analysis 2: Deep Foundation System
Structural Breadth
This analysis will focus on the deep foundation system located beneath the three bed towers on the project. Currently there are 150 caissons spread out over the three towers. The current system has many constructability issues related to the existing site conditions. The subsurface rock, which each caisson must adequately bear on, does not facilitate use of this drilled pier foundation system. An alternative system will be researched and designed to provide a more efficient construction process while maintaining a similar budget

Analysis 3: Precast Panel Units and Glazing
Mechanical Breadth
This analysis will focus replacing the existing masonry cavity wall unit and glazing, in the respective areas, with one single precast element. It will look at initial system costs and address schedule impacts. The thermal properties of the precast wall system will be researched to provide greater economic advantages. Also, with a more efficient precast wall unit in place, a mechanical load analysis will be conducted to see if the air handling units can be reduced in size and allow for reduced upfront unit costs and lower lifecycle costs.

A. Introduction

The Washington County Regional Medical Center is a project located in Hagerstown, MD and owned by Washington County Health Systems. It is designed to be a state of the art medical center with the newest and most specialized equipment in the region. The medical center will also become a regional trauma unit with the expansion of their emergency services section of the building. The medical center will be serving a larger and more diverse base of patients than it has ever done before and will continue its mission of delivering quality healthcare in a safe manor to all their patients through the new facility. The project's construction costs are just under $150 million and the project is expected to be substantially complete in December 2010.

The new medical center faces many challenges throughout design and construction. This proposal will analyze certain features of the building and offer alternative analyses and solutions for future research. The proposal includes ideas generated from educational knowledge, healthcare market research, and industry contacts.

B. Analysis #1 – Risks in Site Selection, Financing, and Sources of Funding

Critical Industry Issue
MAE Requirement

B.1 Problem Statement

As the economy worsens, evaluating projects, securing available financing, and finding alternate sources of funding becomes much more challenging. Information is needed to help owners and developers find or maintain project finances in order to sustain the industry as an economic provider. The Washington County Regional Medical Center has had an issue with the location of the new hospital relating to project finances. Hospitals are vital to the nation's healthcare needs and will continue to be built. The concern is how they will be financed and continually funded.

B.2 Goal

The goal of the research is to help owners and developers establish appropriate credible sources of financing and funding and show ways that healthcare projects can continually be constructed in an economic crisis. To satisfy the MAE requirement, I will expand on this information through knowledge I will gain in the Project Development & Delivery Planning class.

B.3 Research Steps

The following steps will be taken to adequately research this topic:

1. In order to establish a sound base for research, the first step is to analyze the different markets and identify sources and amounts of funding.
2. Determine how much comes from banks or institutions that will need to be repaid and at what rates of repayment.
3. Investigate options for alternate sources of funding incase loans can no longer be received.
4. Research case studies relating to project financial situations both positive and negative.
5. Ask creditors and market researches their opinion on sustained project funding and other sources of funding.
6. Interview owners and developers and investigate their financial problems and potential solutions.
7. Compile results and form conclusions to identify quality solutions, directions, or information for owners to make educated financial and project decisions.

B.4 Expected Outcome

I expect to be able to analyze risks associated with financing a major construction project and alternate solutions for funding on projects. I also expect to inform owners and developers of the risky financial situations and inform them about the availability of funding to their project. Since this is a very big national crisis, I do not expect this research to provide an economic revitalization or to show that lending institutions are not the source of project financial situations; rather, I can only expect to show the risks as it relates to the construction industry processes.

C. Analysis #2 – Deep Foundation System

Structural Breadth

C.1 Problem Statement

The current deep foundation system, 150 caissons under the three bed towers, has created multiple issues in construction because of the subsurface site conditions and lack of the entire diameter of the caisson reaching adequate bearing rock where intended.

C.2 Goal

The goal is to determine a more appropriate system that meets all the contract document specifications, greatly improves work flow and schedule requirements, and maintains a suitable cost.

C.3 Research Steps

The following steps will be taken to adequately research this topic:

1. Consult industry professionals and identify alternative deep foundation systems that would be constructible with the subsurface site conditions.
2. Design a separate system based on the building loads and calculations.
3. Evaluate the alternative system's costs and schedule impacts.
4. Recommend alternative solution as a viable deep foundation system.

C.4 Expected Outcome

I expect to be able to show that an alternative deep foundation system under the three bed towers provides a better solution to the problems and issues of the site than the current system. I also expect to be able to lessen schedule impacts and overall project costs.

D. Analysis #3 – Precast Panel Units and Glazing

Mechanical Breadth

D.1 Problem Statement

The masonry work currently on the project is mainly located on the lower two levels of the medical center, the administration wing, and on the vertical elements. The masonry work starts in the winter months and can be a long, labor intensive activity. The exterior studs and insulation are completed by a separate contractor and as separate activities that include more time and labor. Exterior glazing is located throughout the project; however, I will focus the glazing research in the same areas of the precast units. Glazing can also dramatically effect the cooling and heating loads on a building.

D.2 Goal

The goal of the research is to combine the exterior façade, exterior studs, and the insulation and sheathing into one precast wall unit and determine how effective, from a cost and schedule standpoint, the use of this precast panel wall unit would be over the masonry work. I will also address alternate glazing in these areas of the precast units and research including the window into the precast panel unit. Another goal is to determine if the thermal properties of the precast wall panels could reduce the mechanical load and allow for a resizing of the air handling units.

D.3 Research Steps

The following steps will be taken to adequately research this topic:

1. Identify a proper precast wall system that would work for this application
2. Identify alternate glazing systems.
3. Determine the initial and life cycle costs associated with engineering, producing, and installing the precast wall system.
4. Address the schedule impacts the alternate system would have.

5. Obtain thermal properties of the wall system and glazing then compare with the current system to form a more energy efficient wall.
6. Calculate new loads in the areas of the building with the precast wall system and compare them to the original design loads.
7. Recommend precast wall system to replace the current system and resized air handling units to accommodate the new system.

D.4 Expected Outcome

I expect that the initial cost of the precast wall system to be higher than the traditional masonry wall cavity unit. Also, to achieve a more energy efficient window, I expect the glazing to have a higher initial cost. However, I expect the lifecycle costs to be reduced because of the thermal efficiency of the wall and glazing and a lower air handling unit cost because of downsizing. I also expect the onsite time of the precast erector to much shorter than that of the masonry contractor. Furthermore, I expect the glazing to take the same amount of time to install unless the glazing can be integrated into the precast unit. Then, I can expect to eliminate the glazing contractor for these areas of the building.

E. Weight Matrix

The following weight matrix illustrates how I will distribute my time among each analysis next semester.

Table 1: Weight Matrix

Description	Research	Value Eng.	Const. Review	Schedule Red.	Total
Risks in Site Selection, Financing, and Sources of Funding	25%				25%
Deep Foundation System	5%	5%	15%	15%	40%
Precast Panel Units	5%	15%	5%	10%	35%
Total	35%	20%	20%	25%	100%

Appendix A: Breadth Areas

Deep Foundation System
Structural Breadth

The current deep foundation system, 150 caissons under the three bed towers, has multiple constructability issues. I will demonstrate breadth in the structural option by the following:

- Analyze alternate systems based on constructability directly related to the site conditions.
- Design a new foundation system under the bed towers to accommodate the complexities of the site while maintaining the specifications and designing to the building loads.

Precast Panel Units
Mechanical Breadth

This topic includes an analysis of a precast wall unit in lieu of the traditional masonry cavity wall unit that exists on portions of the building. I will demonstrate breadth in the mechanical option by the following:

- Analyze the wall system to achieve the best thermal properties with a slight cost restraint and a consideration of the cavity wall system.
- Determine the thermal efficiency of the wall system.
- Calculate new loads in the areas with the precast wall units and determine if the air handling units can be resized accordingly.