



Executive Summary

The Center for Health Research and Rural Advocacy poses many interesting aspects relevant to research analysis. Some of the more interesting features include sustainable aspects for LEED credits, an expansive aluminum curtain wall system for prefabrication, as well as difficult site logistics.

The core research proposed will be to determine the critical LEED credits which pertain to the building envelope design and construction. The newly compiled GSA LEED Cost Study will be utilized as a tool for determining LEED costs and compared to value adding sustainable credits for the exterior skin.

The technical analysis for the Center for Health Research will include determining the feasibility of prefabrication of components for the aluminum curtain wall. Cost and schedule analyses will be done to determine if the project would benefit from a prefabricated system. Quality control issues and concerns will also be raised through site visits and interviews. The prefabricated system will also be evaluated for mechanical and structural integrity.

The final area for study will include the site logistics of the CHRRA. The site is extremely condensed due to the close proximity of the Weis Research Center and Centre Street. Having only one main entrance and exit may cause additional project constraints during key construction activities such as curtain wall construction and pre-cast panel delivery. 3D and 4D CAD models will be developed to determine if the site logistics are adequately planned for these construction phases.



Critical Issues Research Method

Problem:

- New facilities for Health Care construction often employ LEED certification as an integral part of the project. With the LEED certification comes many choices that the project team must make regarding which points to pursue. Many of the credit points pursued pertain directly or in-directly to the design of the building envelope. Since the exterior of a building can impact cost, sustainability, schedule, site logistics, waste management, it is necessary to properly determine the most efficient system for design and construction.

Goals:

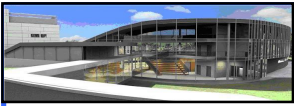
- To determine which LEED credits are directly or in-directly affected by the exterior skin design and construction.
- To develop a LEED guideline owners and project team members can utilize outlining value adding credits for building envelope selection

Audience:

- Architect, Contractors, Owners, and Subcontractors can all benefit from a guideline to outlining the points which may be most critical to a projects success and sustainability.
- United States Green Building Council (USGBC).
- United States General Services Administration (GSA)
- Leadership for Energy and Efficient Design (LEED)
- The Green Guide for Health Care (GGHC)

Objectives:

- Develop a guideline which can be used as a tool by industry members to clearly see the differences sustainable aspects can offer a facility. Establish a clear idea of what determines the LEED point aspirations on the project.
- Identify credits which are affected heavily by decisions for the envelope design

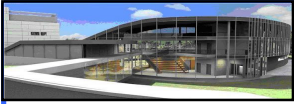


Research Methods:

- Prepare matrix of LEED credits for building construction and whether the credit is directly, in-directly, or not affected at all by the building skin.
- Evaluate the accuracy of this matrix by getting thoughts from industry professionals in sustainable aspects and building envelope.
- Use resources such as GGHC and GSA: LEED Cost Study to compare costs, sustainable aspects, and other miscellaneous items.

Outside Information Sources:

- Dr. David R. Riley, Penn State University
- Andreas Phelps, Penn State University (Health Care Research)
- Dr. Michael J. Horman, Penn State University
- Mitch Leiby, Project Manager; Geisinger Facilities
- Bill Gladish, Director of Construction (Owners Rep); Geisinger Facilities
- Steve Gastright, Lead Architect; Ewing Cole
- Other Professionals to be determined



Technical Analysis Methods

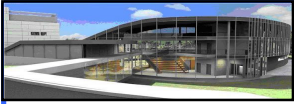
Technical Analysis #1: Prefabrication of Aluminum Curtain Wall System

The first analysis to be conducted on the Center for Health Research and Rural Advocacy will take an in depth look at the expansive aluminum curtain wall system. The possibility for prefabrication of this system would allow for schedule and cost reduction, decrease site congestion, and utilize existing conditions.

In determining the feasibility of this study I will need to remain in close contact with the project manager for the curtain wall subcontractor. The general contractor has already expressed that prefabrication for this system would be beneficial from their perspective.

The following resources will be utilized or created in order to determine if prefabrication of this system is feasible:

1. Cost breakdown of labor and material for assembly and erection of curtain wall on the project site to be compared with one created for offsite assembly and on site erection.
 - a. Crane requirements
 - b. Different wage rates between on-site and factory employees
 - c. Delivery expenses
 - d. Factory leasing costs and expenses
2. Time breakdown for on site activities to be compared with estimated durations for off site production.
 - a. Factory component erection
 - b. On-site component erection
3. Site logistics of on site work for stick built system vs. prefabricated system.
 - a. Fabricated panel storage
 - b. Shake out areas
 - c. Stick built component storage
 - d. On-site erection workspace
 - e. Delivery space
4. List of quality control issues which can be avoided utilizing a prefabricated system.
 - a. Water and moisture control



- b. Erection tolerances
 - c. Consistency of quality
5. List of prefabrication concerns raised by project participants.

Once the construction aspects of the prefabrication system have been explored, I will also propose the addition of triple pane glass for the curtain wall system to allow for the deletion of the radiant heaters. This will require mechanical calculations for the glass system to ensure the required mechanical properties. The addition of triple pane glass will also require a structural check for the stability of the entire structure. Triple pane glass is much heavier than the proposed glass system and the mullions may need to be resized and the concrete footings changed.

In addition to the resources explored above, a visit to a Harmon Incorporated (<http://www.harmoninc.com>) prefabrication facility will be planned. Information and comments gathered during this tour will be used to as part of the determination if prefabrication for the curtain wall system should be explored.

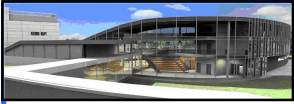
Technical Analysis #2: Site Congestion Analysis

The second analysis on the project will involve site congestion issues and project planning. Only one main entrance and exit is utilized on the site off of the main thoroughfare. In the future, this may cause added frustration for doctors and patients in the existing facilities which may reflect a negative image for the project.

Part of the construction process is the relocation of Centre Street so that excavation could occur. Would it have beneficial to incorporate site logistics into this relocation and utilize this opportunity to create multiple entrances and exists to the site? Would this initial cost benefit the project in terms of flow and logistics?

The following research tools will be utilized to determine the feasibility of the analysis:

1. Cost analysis of additional infrastructure.
2. 3D/4D site plan of building envelope construction and safety (i.e. aluminum mullion system and pre-cast architectural panel deliveries).



3. Alternative site plans with new entrance and exists to accommodate these construction issues.

After looking at these issues and resources an educated determination of site logistics can be made to determine if additional infrastructure should be utilized.

Weight Matrix

Description	Research	Value Eng.	Const. Rev.	Sched. Red.	Total
Prefabrication	x	20%	10%	15%	45%
Site Logistics	x	10%	x	15%	25%
LEED Research	30%	x	x	x	30%
Total	30%	30%	10%	30%	100%