



## *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 waste management 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 selection criteria for health care sustainability. The newly compiled GSA LEED Cost Study will be utilized as a tool for determining LEED costs and compared to value adding sustainable credits as determined by health care professionals.

When analyzing recycling costs, effort must be put forth to garner information from industry professionals. This information will be gathered using interviews and surveys from fifteen professionals including architects, construction managers, LEED experts, and even owners representatives. The surveys will be used to compile industry trends in terms of who is determining that recycling should be pursued on a project. LEED cost breakdowns will be created to quantitatively assess pursuing recycling credits on construction projects.

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 industry surveys and interviews.

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 superstructure delivery and erection as well as precast 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. If the basis for decision is initial cost, the facility may not take full advantage of the sustainable aspects that a LEED certification can employ.

### *Goals:*

- To accurately portray the decision process owners and project teams go through when determining LEED credits for a facility.
- To develop a LEED guideline owners and project team members can utilize outlining value adding credits versus purely cost driven credits

### *Audience:*

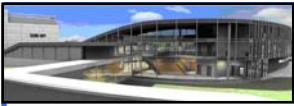
- Architect, Contractors, Owners, and Subcontractors can all benefit from a guideline to determine if recycling is cost-effective credit on a specific project.
- United States Green Building Council (USGBC).
- United States General Services Administration (GSA)
- Leadership for Energy and Efficient Design (LEED)

### *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 points for certain projects i.e. cost, health, paperwork, etc.
- Identify credits which add more value to a health care facility project.

### *Research Methods:*

- Interview/survey five owners who are involved in the decision process for LEED certified projects.



- Compare results from the interviews/surveys according to each discipline area as well as the overall industry.
- Read and evaluate GSA: LEED Cost Study. Compare purely low cost points with the value adding sustainable points.

*Outside Information Sources:*

- Dr. David R. Riley, 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

*Interview/Survey Questions:*

1. What level of LEED certification are you exploring on your project?
2. What are your motivations for exploring a LEED certified facility?
3. Is cost the determining factor? If so, would you consider exploring fewer credits at the same base cost?
4. What sustainable credits would you consider as adding value to your facility?



## ***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.

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 possible critical construction zones (i.e. steel column and precast 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.



*Technical Analysis #3: Waste Management*

The final analysis involves recycling, which is a large part of the initial LEED certification credit breakdown for the Center for Health Research and Rural Advocacy. These credits sound easy to garner, but require numerous hours of project management, adequate space for recycling bins, as well as additional cost for the recycling itself. Recycling costs in Danville, Pennsylvania are not competitive when compared with larger building markets such as Washington, D.C. Since the CHRRA is pursuing a basic LEED sustainability credit, can these premium dollars be spent elsewhere?

Cost estimates and analyses will be performed utilizing industry tools such as:

1. Advanced Construction and Demolition Waste Management
2. Contractors Guide to Job-site Recycling and Waste Prevention
3. Sellen Construction Company Recycling Case Study

These tools will be used to determine alternative LEED points for the Center for Health Research and Rural Advocacy and provide insight into the different possibilities waste management provides.

***Weight Matrix***

Description	Research	Value Eng.	Const. Rev.	Sched. Red.	Total
Prefabrication	x	10%	10%	10%	30%
Site Logistics	x	5%	x	10%	15%
LEED Research	30%	5%	x	x	35%
Recycling	x	10%	x	10%	20%
<b>Total</b>	30%	30%	10%	30%	100%