



Office Building

Washington, D.C

Katey Andaloro
Construction Management

Final Report

Dr. John Messner

April 7, 2009

Analysis #3: Implementing the Whole Building Design Guide (Critical Industry Research Issue)

Problem Statement

During the bidding phase, the Office Building was non-LEED rated. However, with LEED certified buildings becoming the future in construction, the owner wished to achieve an LEED Silver certification for the project. Thus a LEED design was noted as a bulletin to the drawings and priced as a change order to the contract.

Goals

Identify why the owner chose to pursue a LEED design after the initial planning process and what techniques or methods that could have been or can be implemented to the overall project to produce a more sustainable office building.

Research Steps

1. Contact the construction manager and owner of the Office Building project to determine why LEED designs were added to the project.
2. Depending on answer to the previous step;
 - a. Owner Driven:
 - i. Research further into what motives the owner had in achieving a LEED Silver certification
 - ii. Through the internet, investigate if there are any techniques or methods that could have been or can be implemented to the project to produce a more sustainable office building
 - iii. Develop conclusion, and determine if the techniques or methods were effective
 - b. Energy Consumption Driven:
 - i. Pursue research in the connection between the owner and International Facility Management Association (IFMA)
 - ii. Contact a member of IFMA to verify if any connections exist currently between informing owner of IFMA in LEED design implementations
 - iii. If the connection already exists evaluate it effectiveness
 - iv. If the connection does not exist create, a way IFMA can contact owner about LEED design implementations and their impacts on projects

Expected Outcome

The reason as to why the owner chose to pursue a LEED design for the Office Building will determine which outcome to expect.

If the owner desired to implement green design himself, no matter the motive, what techniques and methods could have been or can be utilized to improve the current sustainable design to create an all-around "more aware" project. One that will not only surpass the purpose for sustainability, but a project that meets the design challenges of creating an office building that arises to the needs of today's people, surroundings, economy, and environment, and at the same time taking a step toward the future.



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If the owner was driven to LEED design due to the desire to control energy consumption in today's world, then an evaluation on how to notify owners earlier in the design process will be established. Therefore, establishing direct contact between the owner and International Facility Management Association (IFMA) to inform the owner of on how he or she can improve their project with any new or current green design opportunities.

Introduction

This study sprouted from one of the three topics discussed at the 17th Annual PACE Roundtable Meeting. The topic in question, discussed how effective is the current LEED rating system, do owners actually want green buildings or is it just another attraction? There was also talk about what changes could be made or expected of the new LEED rating system that would provide a more sustainable building and design. This led me to question how sustainable was the Office Building, truly, and what was the purpose behind choosing sustainable design?

Originally, this analysis was planned to identify why the owner chose to pursue a LEED Silver certification after the initial design process, whether it be a general desire to implement green design into the project or to control energy consumption by using facility management, considering today's economy. However, early in my research I found that the owner's intentions were not in line with either of the ideas I had assumed. The owner's true intention for adding the LEED change order was to pursue a specific client, GSA to be exact, thus I began to research what specifications and goals GSA expected in their office buildings.

As stated from GSA website, "GSA is committed to incorporating principles of sustainable design and energy efficiency into all of its building projects. The result is an optimal balance of cost, environmental, societal and human benefits while meeting the mission and function of the intended facility. It is GSA's intent that sustainable design will be integrated as seamlessly as possible into the existing design and construction process. As a means of evaluating and measuring our green building achievements, all GSA new construction projects and substantial renovations must be certified through the Leadership in Energy and Environmental Design (LEED®) Green Building Rating System of the U.S. Green Building Council. Projects are encouraged to exceed basic LEED® green building certification and achieve the LEED® Silver level." (2) Upon reviewing this information I had a better understanding as to why the owner pushed to achieve a LEED Silver certification instead of the just being LEED certified.

While I was researching more information about GSA and the criteria the Office Building met, I came across an article discussing how GSA is currently implementing a technique called "Whole Building Design" on most of their current and future projects to exceed their criteria. As I began reading through the objectives that needed to be satisfied in order to successfully accomplish the idea behind the Whole Building Design, I realized that the Office Building already achieved most of the objectives. After a discussing the topic with the Project Manager constructing the Office Building, she confirmed that they did not implement the Whole Building Design technique on this project.



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Thus my research has led me to analyze how the Office Building has obtained and expand upon all the objectives presented in the Whole Building Design approach, therefore exceeding GSA's criteria for truly sustainable design.

About Whole Building Design (WBD)

WBD consists of two components: an integrated design approach and an integrated team process. The integrated design approach asks all the members of the building stakeholder community and the technical planning, design, and construction team to look at the project objectives, and building materials, systems, and assemblies from many different perspectives. This approach is a deviation from the typical planning and design process of relying on the expertise of specialists who work in their respective specialties somewhat isolated from each other.

WBD in practice also requires an integrated team process, in which the design team and all affected stakeholders work together throughout the project phases and to evaluate the design for cost, quality-of-life, future flexibility, efficiency; overall environmental impact; productivity, creativity; and how the occupants will be enlivened. The 'Whole Buildings' process draws from the knowledge pool of all the stakeholders across the life cycle of the project, from defining the need for a building, through planning, design, construction, building occupancy, and operations.

Integrated Design Approach

The integrated design approach entails eight design objectives and each one is significantly important in any project. Yet a truly successful one is where project goals are identified early on and held in proper balance during the design process; and where their interrelationships and interdependencies with all building systems are understood, evaluated, appropriately applied, and coordinated concurrently from the planning and programming phase. A high-performance building cannot be achieved unless the integrated design approach is employed.

Figure 14: The Eight Design Objectives





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As displayed in the figure above, the eight design objectives are; accessible, aesthetics, cost-effective, functional/operational, historic preservation, productive, secure/safe, and sustainable. A brief description of each objective is provided in the table below:

Table 17: Description of the Integrated Design Objectives

Integrated Design Approach Objectives	
Design Objectives	Descriptions
Accessible	Refers to building elements, heights and clearances implemented to address the specific needs of disabled people.
Aesthetics	Refers to the physical appearance and image of building elements and spaces as well as the integrated design process.
Cost-Effective	Refers to selecting building elements on the basis of life-cycle costs as well as basic cost estimating and budget control.
Functional/Operational	Refers to functional programming—spatial needs and requirements, system performance as well as durability and efficient maintenance of building elements.
Historic Preservation	Refers to specific actions within a historic district or affecting a historic building whereby building elements and strategies are classifiable into one of the four approaches: preservation, rehabilitation, restoration, or reconstruction.
Productive	Refers to occupants' well-being, physical and psychological comfort, including building elements such as air distribution, lighting, workspaces, systems, and technology.
Secure/Safe	Refers to the physical protection of occupants and assets from man-made and natural hazards.
Sustainable	Refers to environmental performance of building elements and strategies.



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Integrated Team Process

To create a successful high-performance building, an interactive approach to the design process is required. It means all the stakeholders, everyone involved in the planning, design, use, construction, operation, and maintenance of the facility, must fully understand the issues and concerns of all the other parties and interact closely throughout all phases of the project.

A design charrette, a focused and collaborative brainstorming session held at the beginning of a project, encourages an exchange of ideas and information and allows truly integrated design solutions to take form. Team members, all the stakeholders, are encouraged to cross fertilize and address problems beyond their field of expertise. The charrette is particularly helpful in complex situations where many people represent the interests of the client and conflicting needs and constituencies. Participants are educated about the issues and resolution enables them to "buy into" the schematic solutions. A final solution isn't necessarily produced, but important and often interdependent, issues are explored.

WBD Approved

Implementing WBD correctly would require the utilization of both the integrated design approach and the integrated team process during the design phase of the Office Building project. However, the initial design of the Office Building, the third building of the project, began in 1997 when they started to develop the plans for all three office buildings. This being said, a breakdown of the design objectives and how the Office Building has accomplished them in its current design are shown below.

Tables 18: Integrated Design Objectives Accomplished

Accessible
Meets Americans with Disabilities Act (ADA) codes
Entrance levels from Office Building Two, J Street, and M Street
One block away from public transportation; MACR Train Service, Virginia Railway Express trains, Amtrak, Washington's Metrorail, and Metrobus System
Total of sixteen elevators in the building
Private Parking Garage



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Aesthetics

Follows the "themed architecture" of the two previous buildings; including coloring and textures of materials

Exterior - LEED rated glass curtain wall system with granite stone panels on three elevations

Garden roof terraces located between Building Three and Building Two on the second, third, and fourth levels

Design concepts that provide the user with a clear sense of the facility's functional purpose

Cost-Effective

Employed Value Engineering Ideas to control budget

Employed Earned Value Analysis - tracking the cost of each project component against the initial budget and adjustments made to ensure the overall budget is on track

Employed a Life-Cycle Analysis Cost - for evaluating the economic performance of federal investment in the building or the building's system

Functional/Operational

"One size fits all" design approach - flexible office layout designs - meeting the needs of small, medium, and large space users

Three lobbies - one main lobby and two secondary lobbies

Physical Fitness Area and Locker Rooms

State-of-the-art technology

Access to nearby public restaurants, shopping, food court, and convince stores

Provides maximum access to natural daylight and views to the outdoors

Historic Preservation

Designed to aid in the revitalization plan of Capital Hill

Accepts environmental conditions as a primary influents of the buildings form - streetscape between commercial and residential

Designed to push the economic boom back into the historic business district

Productive

Allows for user controls to meet comfort levels

Provides maximum access to natural daylight and views to the outdoors

Encourages adaptability, improving comfort, supporting sense of community, and provides connections to the natural environment

User-friendly work environment



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Secure/Safe

Designed to be a secure building for tenant with the use of engineered controls - Safe against unauthorized entry

Meets fire, safety, and health codes and regulations - NFPA, UL, NECA, OSHA....etc.

Guardrails and barriers to prevent falls from heights in both interior and exterior spaces

Designed to protect against moderate terroristic threats, such as explosive and ballistic threats and CBR - UFC & ISC

Provide Safety training for operator personnel

All maintenance and operation documentation is submitted to the building owner/operator prior to the buildings turnover

Sustainable

Silver LEED Certification

Meets Energy Star specifications

Designed to rebuild the economy and promote more sustainable development

Storm water management by the installation of storm water management tanks

Heat island reduction (roof) by the installation of a gray TPO roof and a white colored roof

Installation of efficient plumbing fixtures to reduce water consumption by as much as 40%

Installation of CO2 sensors for outside air monitoring

These are just a few of the many examples of how the office building has satisfied each of the design objects. But there is always room for improvement, since the Office Building is a tenant fit out project, below are suggested techniques and methods on how GSA can enhance upon several of the design objectives when creating their interior spaces.

Tables 19: Suggested Integrated Design Objectives to Accomplish

Cost-Effective

Drawings and specifications should continuously go through a constructability review

The specifications should also be reviewed to ensure that the General Requirements included in division 1 are not overly restrictive and that the use of proprietary materials is minimized - working hours, noise restrictions...etc

During construction the focus can shift from predictive cost estimating to reactive cost management of any changes in the work. Changes arise from a number of different sources - unforeseen conditions, owner-generated changes, drawing errors and omissions, code issues or contractual claims

Employing the analytical hierarchy process (AHP) to help consider non-monetary attributes in addition to the common economic evaluations measured when evaluating project alternatives



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Productive

Incorporate new interior design strategies to increase user satisfaction

Designed to improve individual and group work effectiveness

The acoustical environment - noise control in open office settings, with absorptive finish materials, masking white noise, and sufficient separation of individual occupants

Use wireless technology and mobile phones to enable workers to move effortlessly among spaces as their needs change

Provide a layout that promotes a multiplicity of spaces for individual and group work

Open spaces, such as pods or bull pens are used, to provide attractive acoustically sound rooms for individual concentration as needed

Secure/Safe

Conduct preliminary hazard analyses and design reviews to eliminate or mitigate hazards in the work place

Provide interior and exterior floor surfaces that do not pose slip or trip hazards

Specify materials and furnishings that are low emitters of indoor air contaminants such as volatile organic compounds - VOCs

Require building maintenance personnel to maintain the HVAC air infiltration devices and condensate water biocides appropriately

Implement personnel reliability programs and background checks

Limit and control access to sensitive areas of the facility

Sustainable

Utilize LEED for Commercial Interiors

Purchase cleaning products and supplies that are resource-efficient and non-toxic

Minimize travel by supporting telecommuting programs and enabling teleconferencing

Train building occupants, facilities managers, and maintenance staff in sustainable design principles and methods

The second component of the WBD is implementing an integrated team process. As stated previously, the project has already gone through the design phase of the project, because of this, it is difficult to show the utilization of this technique. But it can be assumed that there was an active, consistent, and organized collaboration among the stakeholders in order to design the Office Building. This assumption can be proven true by how the project has successfully met the objectives, shown above, in the integrated design approach.



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There are three standard operations in utilizing the integrated team process; clear and continuous communication, rigorous attention to detail, and an active collaboration among all team members. Working on the job site this past summer allowed me to see firsthand how the team interacted, met challenges head on, and a feel for the working atmosphere. I, the author, can attest that communication flowed between every person involved with the project was continuous and precise. All team members were kept up to date on the project's progress, what to expect in the next month, week, or day of construction, and met quite regular to discuss any specific item of the project. There was also a great deal of focus on detail; ranging from the documentation, how information was presented, how things were installed, types of material used and much more.

Conclusion & Recommendations

It can be said that buildings are deceptively complex. At their best, they connect us with the past and represent the greatest legacy for the future. They provide shelter, encourage productivity, embody our culture, and certainly play an important part in life on the planet. Through this analysis I have discovered just that, the Office Building implemented a technique commonly used on today's projects and upcoming future projects, without them even noticing. By utilizing the components of the Whole Building Design (WBD) technique, the team was able to fashion an office building into something more than simple materials bound together, hence forth making a structure. In my view, the office building has exceed the criteria of GSA and has become more than just a LEED Silver certified core and shell building, it has achieved both design component of WBD by having a integrated design and team. Bearing in mind that only a LEED change order was required to update the original 1997 plan of the building and accomplish the design challenges set forth by this technique. Also, the team members involved with this project were able produce a high-performance office building that could not only met the needs of the community around it and GSA's standards, but it helped to strengthen the building's surrounding and environment, creating an integrated society for all the people within it.