

LEED Rating Systems for Historical Restorations

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The objective of this study was to identify the barriers in applying Leadership in Energy and Environmental Design (LEED) ratings toward historical restoration projects. In recent years, with the United States becoming more green conscious, preservationists are beginning to turn toward LEED to qualify their work – despite LEED being designed for new building construction. When working with a suite of standards that is in conflict with the designer’s goal of maintaining authenticity, obstacles tend to arise. These obstacles were extracted through a survey of architects and professionals involved in restoration projects of historical buildings. The intent of this study to compare obstacles that arose during restoration projects, which lead the architect to choose between scoring LEED points versus making restoration more authentic. Findings from the study revealed that coordinating the requirements to receive historic tax credits and the LEED certification process would result in a separate LEED system for historical preservation. Historic preservation and LEED both have the same basic intent: to restore projects in the most environmentally conscious manner. This study will be of interest to those involved with U.S. Green Building Council (USGBC) in the pursuit of a separate LEED system for historical preservation.

Key Words: LEED, Historical restoration, preservation, authenticity, obstacles, conflicts

Introduction

This study was aimed at benefitting the design technology and practice area of the construction industry, while also establishing new sustainable construction objectives (CERF #96-5016.T). The objective of this study was to identify the barriers in applying Leadership in Energy and Environmental Design (LEED) ratings toward historical restoration projects. Unfortunately, working with a suite of standards continues to expand, battles between sustainable advocates and designers’ attempting to maintain a buildings authenticity will be inevitable (Cherry-Farmer 2012). The designers in most cases will argue that the current version of LEED should be revised so historic buildings can be “retrofit with their original plans rather than anachronistic modern designs” that make the preservation/restoration (PR) professional lose the opportunity to acquire LEED certification inevitable (Cherry-Farmer 2012). When discussing historic preservation and LEED, Anne Kohut from Kohut Communications stated that, “One doesn’t often hear about sustainable design projects that are also historic preservation projects” (Meyers 2012). With no historical LEED rating system for historical restoration projects, the designers generally uses one of the two closest systems, LEED-NC (New Construction) or LEED-EB (United States Green Building Council 2009), neither of which covers all the aspects that arise in a historical renovation projects. Meeting USGBC goals and objectives can create obstacles that affect obtaining LEED-NC and LEED-EB credits make this an important investigation. It is past time for the USGBC to create a green rating system for historic buildings that meets sustainability, energy efficient, and environmental needs.

Based on reports from the National Trust for Historic Preservation’s Preservation Green Lab along with other testing facilities, it was concluded that historically restored buildings surpass new building in every category of energy savings (Laskow 2012). Since the restoration process starts with an existing building, it requires fewer natural resources due to the reuse of much of the historic fabric (U.S. Department of Energy 2005). When these buildings were built, the designers inherently added sustainable features based on the climatic conditions. According to the Whole Building Design Group (WBDG), “... today’s sustainable technology can supplement the buildings original features without compromising the unique historic character, [while also generating a] substantial energy savings” (Cherry-Farmer 2012). At a time when ambitious LEED standards are being used to create new buildings, PR professionals realize that new “green” buildings create more energy and impact to the environment more than

buildings that are already being used (Laskow 2012). This is why many architects and PR professionals still like to emphasize Carl Elphante's phrase, "the greenest building is the one that is already built." "As far as the project I have worked on" Helen Kessler, a board member of the Illinois chapter of the U.S. Green Building Council said, "it costs less to take an existing building and renovate that to build a new one" (Laskow 2012). Since preservationists and LEED enthusiasts' intents are both to provide stewardship to the environment, it should not be so difficult to obtain LEED certification (Young 2008). This research will benefit the construction industry by demonstrating to the U.S. Green Building Council (USGBC) the need for a green rating system that allows historical buildings to integrate the restoration process with the sustainability and energy efficiency of the LEED rating system.

In recent years, with the United States becoming more green conscious, preservationists are beginning to turn to LEED to qualify their work – despite LEED being designed for new building construction (Young 2008). LEED is a green building rating system organized by the USGBC to provide the industry with a suite of standards for the environmentally sustainable design, construction, neighborhoods, and building operations. The building's design committee uses a checklist to measure ensure that the new building maximizes energy use (Cherry-Farmer 2012). In the beginning, USGBC started with just LEED for New Construction; as that was perfected, they began to add new rating systems currently; they have nine systems (LEED 2009). With so many systems, USGBC still does not have a rating system that can be applied to historical preservation. This is where the problem arises for preservationist professionals, because they are having to force fit their project into one of the nine existing systems while still attempting to maintain the authenticity of the structure. If the designer wishes to create a LEED recognized green building, they must work with a suite of standards that at times is in conflict with their goal of maintaining authenticity. The "obstacles that tend to arise" is the basis for this research.

Methodology

Is there a possibility that designers' efforts toward a sustainable future can embrace and respect historic preservation? Despite the continual improvements in LEED standards, designers still feel threatened by the sustainable building codes inspired by LEED when retrofitting historic buildings with green solutions that are unsympathetic to historic preservation standards. The reason for researching this paper is the concern for sustainable maintenance in buildings 60 years old and older in the hope that in the process the USGBC will realize the need for a LEED historical restoration certificate. This certificate is important because in this day and age these buildings need to be sustainable but unfortunately historical buildings and sustainability are not able to merge at this time. During this study, a group of architects and PR professionals throughout the United States were surveyed, via email with questionnaires attached except for the ones in the Atlanta area, which were interviewed personally. Responses were returned by email generally with a letter attached with a more detailed explanation of their answers. The results of the questionnaire were meant to be reviewed to determine how many professional designers had been involved in historical restoration projects, where they might have attempted LEED certification. If they had not attempted to achieve LEED certification, they were asked why and if they had then which certification system had they used. The most relevant questions were the ones dealing with credit barriers and authenticity, these questions dealt with the type of obstacles, how they were dealt with, their effect on authenticity, and whether LEED points were affected. Once the surveys were completed, obstacles were compared to the LEED certification system to determine if the obstacles really affect historical buildings. This paper has the potential to enable the federal government to realize the necessity of a sustainable rating system allowing historic buildings to meet sustainability and energy efficiency standards.

Discussion of Results

Since several of the professionals surveyed had never worked on historical structures, they felt unqualified to reply to the survey, while many of the others had not worked on LEED projects, this affected the response rate but the people who responded were very detailed with their information. Of the thirty responses, (17%) of them use LEED on historical restoration projects, while the rest of them are more concerned with cost to the client, addition of insulation, air quality, waste management and acquiring regional materials, and maintaining authenticity credits, which is why they tend to opt against using LEED. These responses included multiple votes because some of the respondents felt there was more than one issue that caused them problems. The LEED designers felt affected the authenticity of the building are shown in *table 1*. When asked which LEED certification they opted to use on historical buildings 77% did not use LEED, 17% used LEED NC, 3% LEED EB, and 3% LEED Neighborhood Development (ND).

<i>Table 1 – LEED Credits With Potential Conflicts</i>	
Energy & Atmosphere	14% of people who answered survey
EAp2	Minimum Energy Performance
EAc1	Optimize Energy Performance
Materials & Resources	16% of people who answered survey
MRc2 1-2.2	Construction Waste Management
MRc5 1-5.2	Regional Materials
Indoor Environmental Quality	12% of people who answered survey
IEQp1	Minimum Indoor Air Quality
IEQc7.1	Thermal Comfort - Design
LEED Credits With Potential Conflicts Found During Research	
Sustainable Sites	
SSc2	Development Density and Community Connectivity
SSc7.1	Heat Island Effect-Non-roof
SSc7.2	Heat Island Effect-Roof
Water Efficiency (non-landscape)	
WEp1	Water Use Reduction
WEc2	Innovative Wastewater Technologies
WEc3	Water Use Reduction
WEc4	Process Water Use Reduction

Based on the survey results shown in *table 1* historical restoration professionals felt there were two LEED prerequisites and four credits that have the potential for conflict in a historic restoration project where authenticity is a priority and research uncovered one more prerequisite and six more credits that were issues in the same area. The prerequisites are very significant to the LEED certification process because the project must acquire all prerequisite in a category in order to receive any credits in that category. LEED certification is difficult to earn without acquiring points in every category. The information in *table 1* and *figure 1* will be juxtaposed to demonstrate the credits that are considered obstacles, professionals that felt it was an issue, and why they felt they might have to lose the LEED credit in order to protect the character of the building.

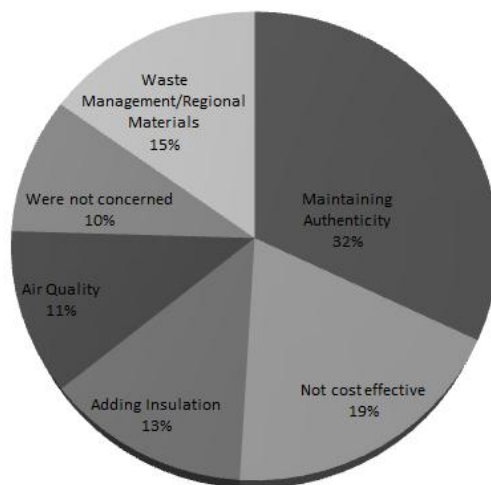


Figure 1 – Responses Concerning the Usage of LEED on Historical Preservation Projects

Of the 30 answered surveys, 14% were concerned about applying insulation to the interior of the building. This concern is covered in Energy and Atmosphere (EA) prerequisite 2 - Minimum Energy Performance, EA1 – Optimize Energy Performance, and Indoor Environmental Quality credit 7.1 – Thermal Comfort – Design. The LEED intent of each of these credits helps define what LEED is expecting from the credit. For example, EA2 the intent is “to establish the minimum level of energy efficiency for the proposed building and systems to reduce environmental and economic impacts associated with excessive energy use.” EA1 is “to achieve increasing levels of energy performance beyond the prerequisite standard to reduce environmental and economic impacts associated with excessive energy use.” Finally, Indoor Environmental Quality (IEQ) 7.1 states, “to provide a comfortable thermal environment that promotes occupant productivity and well-being, (LEED 2009).”

Part of each of the EA credits pertains to the building envelope, which needs to meet the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) Standard 90.1-2007, Section 5. The EA category pertains relates to the building envelope, which includes the standards for insulation, which states that walls and floor cavities be insulated to the full depth with insulation of a minimum nominal value of R-3.0/in. This was a big problem for two of the respondents because in their opinion “all historical buildings were meant to breathe.” They felt the addition of any type of insulation to the walls of a historical building might trap moisture within the wall and lead to accelerated and often hidden deterioration of the structure. The problem is in order to install the insulation properly it would require the removal of the historic finish, which can be damaged in the process. One of those two architects also felt that attempting to prevent air loss was an obstacle that was too large to overcome because there is just about only one way to achieve the points for this credit and that is to upgrade the windows, which defiantly ruins the authenticity of the historical structure.

Materials and Resources (MR) Credit 2 1-2.2: Construction Waste Management a potential loss of one to two points when attempting to achieve LEED credits is intended to “divert construction and demolition debris from disposal in landfills and incineration facilities. Redirect recyclable recovered resources back to the manufacturing process and reusable materials to appropriate sites,” (LEED 2009). In order to receive the points for this credit a minimum of 50% of the construction and demolition debris needs to be recycled or salvaged (*seen in table 2*). This causes problems on historical sites since much of the waste is unable to be recycled due to its high content of asbestos and lead meaning it must be disposed of via a hazardous waste program. With such high percentages of hazardous waste, it would be difficult to meet the required rate for receiving a LEED point.

Table 2 – MRc2: Construction Waste Management Point Table

Recycled or Salvaged	Points
50%	1
75%	2

Another Material and Resource credit that is an issue to architects and preservationists is MRc5.2 Regional Materials; the intent being, “to increase demand for building materials and products that are extracted and manufactured within the region, thereby supporting the use of indigenous resources and reducing the environmental impacts resulting from transportation,” (LEED 2009). The idea behind this credit is to purchase materials and products that are extracted, harvested, recovered, and manufactured within a 500-mile radius of the site for material value to count toward a regional purchase. It is quite understandable why this credit can be difficult to obtain when the object of the project is to maintain authenticity. In this type of project materials cannot be chosen based on regional priority, they need to be acquired to match the preexisting structure, which means it is possible there might be only one place in the world to obtain the components desired.

The IEQp7.1 was written, “to establish minimum indoor air quality (IAQ) performance to enhance indoor air quality in buildings, thus contributing to the comfort and well-being of the occupants, (LEED 2009).” When surveyed 12% of the respondents were concerned with the air quality within the building one of the areas of concern for achieving this credit relates back to EA2 and EA1, these were the credits that related to insulation. The issue for obtaining this credit is that the insulation traps moisture within the walls where it creates mold, which will affect the air quality within the building causing employees to get sick or miss work affecting the production of the company.

Other responses in the survey showed some of the professionals felt there were some LEED credits that were easy to obtain when attempting to promote historical preservation. These credits included Sustainable Site (SS) credit 5.1 Site Development – Protect and Restore Habitat, MRc1.1 Building Reuse – Maintain Existing Walls, Floors and Roof, MRc1 Building Reuse – Maintain Existing Walls, Floors, and Roof, MRc1.2 Building Reuse – Maintain Interior Nonstructural Elements, and MRc3 Recycled Content. A partner at a landscape and small development firm felt there was nothing that prevented their firm from obtaining LEED certification for a historic landscape and small historic building renovation project. Another owner of a firm that works on many historical projects commented in his survey that when working with historical structures LEED does not have to be a hindrance. When and if conflicts arise there is always a way to work around the problems. He felt so strongly about this that he wrote a detailed report on one of his projects explaining the process his firm went through to achieve LEED on that project.

Conclusion

After reviewing the surveys and talking to many of the respondents, even though five of the professionals stated they were not concerned about obstacles when attempting the LEED certification process on historical buildings. During a follow up phone interview with one of the people surveyed, they stated that, “conflicts tend to occur when the focus is on one set of standards without considering the impacts it might have on other disciplines with in the project.” Another person who declared that they were not concerned with obstacles preventing LEED certification also commented that they did feel they had lost the opportunity to achieve LEED certification because they were concerned with meeting the meeting the historical tax credit specifications to maintain authenticity. Of the rest of the 28 professionals surveyed, 25 of them agreed that it was too difficult to pigeonhole a historical building into one LEED rating system. When attempting to choose which rating system to use it is very difficult because none of the system completely fit even when picking and choosing between the system it can still be hard to achieve enough credits to achieve certification. There is one of the respondents that is so concerned with the preservation of our cultural heritage, that they generally do not attempt to acquire LEED certification; instead, they work closely with a preservation officer. Preservation officers’ first priority is authenticity requirements, which helps the project receive historic tax credits. This does not prevent them from the desire for the project to earn LEED certification too. Many of the respondents agreed that working closely with the preservation officer, who desires to maintain authenticity and achieve LEED certification, has the potential to enable them to work through conflicting issues. That way the problems might be avoided is the advanced due to the resources and contacts of the preservation officer. When attempting to maintain authenticity in a historical structure, historic tax credits were a process that was brought up as another important program to use. Focusing on the preservation tax incentive standards that are needed to apply for a historical tax credit might be able to be accommodated it to use toward a LEED credit. All survey appeared to agree that if future LEED rating systems were to coordinate their requirements with those of the historic preservation office and the historic preservation standards the results of the venture would be a LEED system for historical renovation. The consensus was that, “If the greenest building is the one already built, this should be emphasized in the LEED rating system.”

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