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INDUSTRY CORNER

AN INSIDE LOOK AT LEED: EXPERIENCED PRACTITIONERS REVEAL THE INNER WORKINGS OF LEED

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INTRODUCTION

LEED is leading the building industry towards a greener future. A clever acronym for Leadership in Energy and Environmental Design, the LEED Rating System is a voluntary, consensus-based, national standard for developing high-performance, sustainable buildings. The U.S. Green Building Council (USGBC), a non-profit organization, developed the LEED Rating System in the late 1990s, and it has quickly grown to be the most recognized green building assessment tool in the United States. While there are over 20,000 LEED Accredited Professionals nationwide, only a small percent have worked closely on a LEED project. For this reason, the inner-workings of LEED remain somewhat mysterious.

This paper seeks to demystify the LEED process by outlining it in a systematic approach. The information herein will serve as a good tool and reference for individuals who are, or intend to, work on a project pursuing LEED in the near future.

LEED-NC was the first LEED product to be developed and is designed for new construction and major renovations. USGBC launched the pilot program in 1998, and the Rating System is currently in version 2.1. The release of version 2.2 is expected in the fall of 2005. Currently, there are two other LEED products available: Existing Buildings (EB) and Commercial Interiors (CI). Three additional products are under development including Core and Shell (CS), Homes (H), and Neighborhood Development (ND). The NC Rating System serves as the basis for all of the products, which are tailored to the specific needs of the different project types. This article focuses on the LEED-NC Rating System, but the same process generally applies to all of the LEED products.

LEED BASICS

The LEED Rating System is organized into six main categories with associated prerequisites and credits. Table 1 shows each category and the number of prerequisites and possible points for each category. A project must meet all seven prerequisites and achieve at least 26 points to qualify for any level of LEED certification. There are five levels of certification: Certified (26–32 points), Silver (33–38 points), Gold (39–51 points), Platinum (52+ points).

The LEED Rating System identifies each credit's intent, requirements for meeting the credit, documentation requirements, and potential design strategies. Industry standards from organizations such as the EPA, ASHRAE and IESNA serve as the requirements for many credits. Credits that do not relate directly to an industry standard set forth a measurable requirement.

TABLE 1. LEED Categories

Category	Prerequisites	Possible Points
Sustainable Sites	1	14
Water Efficiency	0	5
Energy & Atmosphere	3	17
Materials & Resources	1	13
Indoor Environmental Quality	2	15
Innovation & Design	0	5
Total	7	69

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It is important to note that LEED was designed for a diverse set of project types in a wide variety of locations. Not all 69 points possible under NC can be achieved by any one project. For example, some credits lend themselves to rural sites, while others can only be accomplished in urban settings. Specific climates also affect which credits are possible for a project.

Recipe for LEED Green Buildings

Ingredients:
1 C. Owner—Deeply Committed to Green Building
1 C. Design Team—Dedicated & Experienced
1 C. Contractors—Willing & Educated
1 C. LEED Expertise & Education

Add In:
1–3 Design Charrettes—Depending on Taste
Focus on goals and objectives
A positive mindset and a "can-do" attitude

Instructions:
Start early, work hard, mix it all together, and enjoy!

INTEGRATED DESIGN

The first step toward a successful LEED project is to embrace an integrated design approach. This approach brings all stakeholders to the design table early to determine goals and strategies for the project. The LEED Checklist is a great tool for guiding this process. The Checklist gives design team members, as well as owners and occupants, a common framework for targeting specific green building strategies. The team then works together to identify potential credits and brainstorm strategies to achieve them. During this process, the team should establish who is responsible for championing and signing-off for each credit. This process is often facilitated by a design charrette; otherwise known as an intensive work or brainstorming session that involves a variety of stakeholders. Additional charrettes can also be useful later in the design process to address specific design issues and developments.

While it is not necessary for all team members to be LEED Accredited Professionals, it is helpful to have at least one LEED expert and a general understanding of LEED by the rest of the team. An education component is often an important part of the initial design charrette. Other factors and dynamics that will have a significant impact on the "greenness" of the project include owner buy-in, design professional's expertise, willingness of the contractors, and general execution of the integrated design process.

In the green building industry, the mantra is "start early." By involving more stakeholders and design team members early in the design process, teams realize greater environmental and economic savings. Otherwise, green building features often become additive and awkward. The beauty of integrated design is in avoiding the pitfalls of relay-race style designs that result in over-built and under-imagined buildings.

LEED REGISTRATION

Once a project has committed to pursuing LEED, it can register with the USGBC on the USGBC website, www.usgbc.org. Although there is no set requirement on when to register, registration should take place before or during schematic design. Registration establishes contact with USGBC and enables the project team to access additional LEED resources early in the design process. These resources include the current Letter Templates, the 2.0 Calculator, and access to the Credit Interpretation Requests (CIRs).

Table 2 shows the registration and certification fee summary for NC, EB and CI, which can be found on the USGBC website.

DESCRIPTION OF LEED TOOLS

As mentioned above, the following tools are available to the project team upon registration. This suite of tools is essential in successfully completing the documentation requirements for any project.

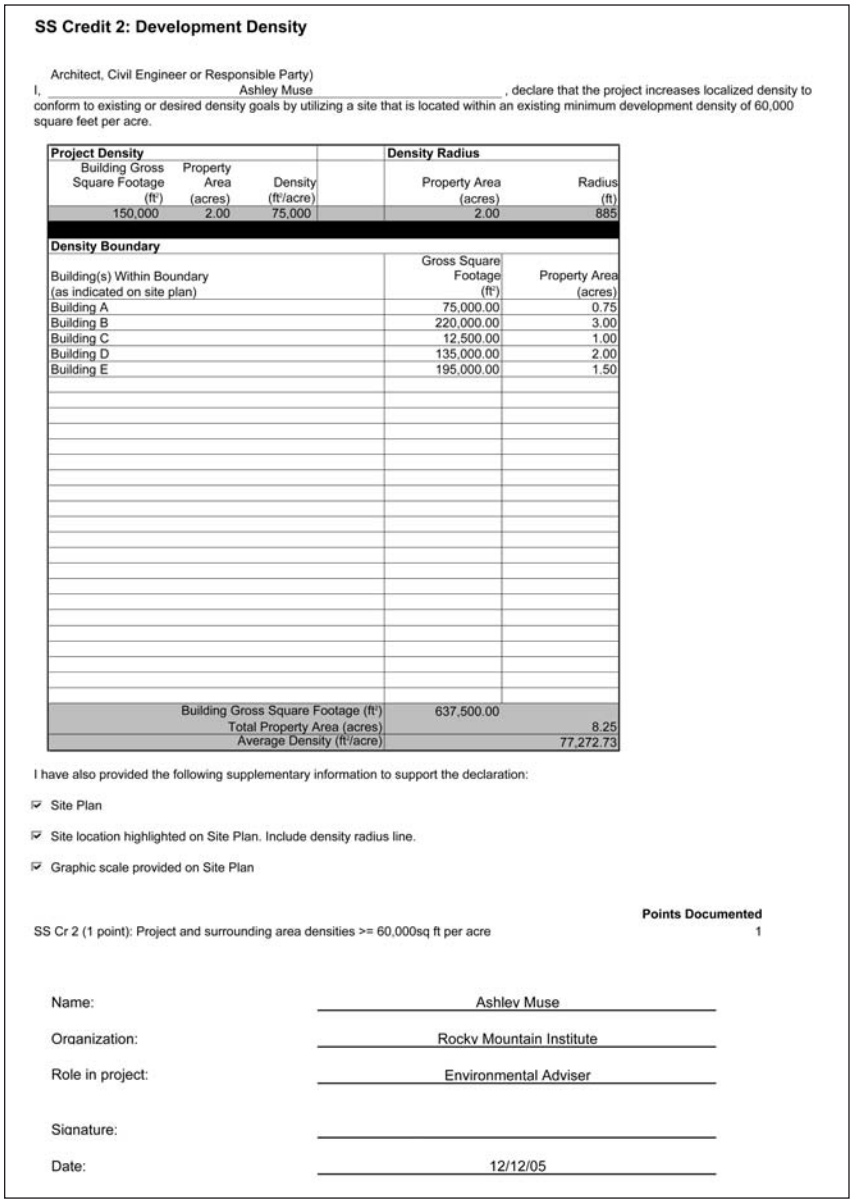
Letter Templates: Excel workbook designed to assist project team members in tracking, calculating, and signing for each credit (see Figure 1).

The 2.0 Calculator: Designed for 2.0 prior to the Letter Templates, but still has helpful guides for calculating many of the credits (see Figure 2).

CIRs: Result from specific questions about the interpretation of given credits. Project teams submit their question to USGBC, it is reviewed by USGBC, and then they post the response on the website. These questions and answers are available to all registered projects for future reference. Each project gets two free CIRs with registration and additional CIRs can be purchased for $220, if need be. (See Figure 3.)

TABLE 2. LEED fee summary

	Less than 75,000 Square Feet	75,000–300,000 Square Feet	More than 300,000 Square Feet
Charges	Fixed Rate	Based on Square Ft.	Fixed Rate
Registration			
Members	$750.00	$0.01 per Square Foot	$3,000.00
Non-Members	$950.00	$0.0125 per Square Foot	$3,750.00
Certification*			
Members	$1,500.00	$0.02 per Square Foot	$6,000.00
Non-Members	$1,875.00	$0.025 per Square Foot	$7,500.00



SS Credit 2: Development Density

Architect, Civil Engineer or Responsible Party)
I, Ashley Muse, declare that the project increases localized density to conform to existing or desired density goals by utilizing a site that is located within an existing minimum development density of 60,000 square feet per acre.

Project Density				Density Radius	
Building Gross Square Footage (ft^2)	Property Area (acres)	Density (ft^2/acre)		Property Area (acres)	Radius (ft)
150,000	2.00	75,000		2.00	885

Density Boundary		
Building(s) Within Boundary (as indicated on site plan)	Gross Square Footage (ft^2)	Property Area (acres)
Building A	75,000.00	0.75
Building B	220,000.00	3.00
Building C	12,500.00	1.00
Building D	135,000.00	2.00
Building E	195,000.00	1.50
Building Gross Square Footage (ft^2)	637,500.00	
Total Property Area (acres)		8.25
Average Density (ft^2/acre)		77,272.73

I have also provided the following supplementary information to support the declaration:

- ☑ Site Plan
- ☑ Site location highlighted on Site Plan. Include density radius line.
- ☑ Graphic scale provided on Site Plan

	Points Documented
SS Cr 2 (1 point): Project and surrounding area densities >= 60,000sq ft per acre	1

Name: Ashley Muse
Organization: Rocky Mountain Institute
Role in project: Environmental Adviser
Signature:
Date: 12/12/05

FIGURE 1. Example of a LEED Letter Template for Sustainable Sites credit 2: Development Density. Documentation required to support this Letter Template includes a scaled site plan highlighting the project location and density radius line. (Reprinted with permission of the U.S. Green Building Council.)

FIGURE 2. Example of Indoor Environmental Quality credit 8: Daylight and Views calculations using the LEED v2.0 Calculator. (Reprinted with permission of the U.S. Green Building Council.)

EQ Credit 8: Daylight and Views

Daylighting and View Table

Room	Floor Area	Glazing Area	Window Geometry		Transmittance (T_{vis})		Window Height	Daylight Factor		Daylit Area	Views	Sun Control
	[SF]	[SF]	Type	Factor	Actual	Min.	Factor	Each	Room	[SF]	[SF]	
101	1,932	112	vision	0.1	0.7	0.4	0.8	0.8%	4.4%	1,932	1,932	
		288	daylight	0.1	0.4	0.7	1.4	1.2%				
		152	daylight	0.1	0.7	0.7	1.4	1.1%				
		72	vertical	0.2	0.7	0.4	1.0	1.3%				
102	1,200	130	vision	0.1	0.7	0.4	0.8	1.5%	1.5%	0	1,200	
201	900	224	vision	0.1	0.7	0.4	0.8	3.5%	4.7%	900	900	
		32	vertical	0.2	0.7	0.4	1.0	1.2%				
202	1,212	112	vision	0.1	0.7	0.4	0.8	1.3%	3.0%	1,212	1,144	
		88	daylight	0.1	0.7	0.7	1.4	1.0%				
		24	vertical	0.2	0.7	0.4	1.0	0.7%				
203	1,088	108	vision	0.1	0.7	0.4	0.8	1.4%	6.3%	1,088	1,088	
		24	vision	0.1	0.4	0.4	0.8	0.2%				
		19	daylight	0.1	0.7	0.7	1.4	0.2%				
		24	daylight	0.1	0.4	0.7	1.4	0.2%				
		60	vertical	0.2	0.7	0.4	1.0	1.9%				
		128	vertical	0.2	0.4	0.4	1.0	2.4%				
206	302	24	vision	0.1	0.7	0.4	0.8	1.1%	2.2%	302	290	
		3	horizontal	0.5	0.9	0.4	1.0	1.1%				
302	100	28	vision	0.1	0.4	0.4	0.8	2.0%	2.0%	100	50	
303	100	40	vision	0.1	0.4	0.4	0.8	3.2%	3.2%	100	50	
304	100	16	vision	0.1	0.7	0.4	0.8	2.2%	4.5%	100	100	
		28	vision	0.1	0.4	0.4	0.8	2.2%				
305	130	32	vision	0.1	0.7	0.4	0.8	3.4%	7.1%	130	130	
		40	vision	0.1	0.6	0.4	0.8	3.7%				
306	130	40	vision	0.1	0.6	0.4	0.8	3.7%	3.7%	130	70	
TOTAL	**7,194**									**5,994**	**6,954**	

Percentage of Daylit Area	83%
Percentage of Area with Sufficient Views	97%

An additional tool that is *not included with project registration* is the LEED Reference Guide. The Reference Guide is an expansion of the LEED Rating System and gives in-depth discussion on the concerns, strategies, guidelines, and calculations for each credit and summarizes the referenced standards. You do not need to register a project to purchase these materials.

FIGURE 3. Example of a CIR for Materials and Resources credit 4: Recycled Content

7/1/2004 **Credit Interpretation Request**

For Materials and Resources Credits 3 through 6, the calculation is based on the cost of all construction materials and products as a percentage of the total cost of all materials for the project. Material cost excludes installation (e.g. equipment and labor). Our question is regarding the cost of formwork used during construction. Should this be included as part of the material costs of the project even though it is not permanently installed in the building? Or would it be acceptable to consider it an equipment cost and therefore excluded from the total material cost of the project? What are the implications for resource reuse and local/regional materials points?

7/19/2004 **Ruling**

As formwork (rented or purchased for the project) is not a permanently installed material, it is considered as "equipment" for all MR credits except MR c7 and thus not included in the material costs of the project. For MRc7, all non-rented temporary wood formwork must be included in the denominator of the credit calculations and the FSC-certified non-rented temporary wood formwork should be included in the numerator.

The LEED-NC v2.1 Reference Package includes:

- One printed copy of the LEED-NC v2.1 Reference Guide
- 1 year online access of the v2.0 and v2.1 Reference Guides
- 2.1 Letter Templates
- Printed copy of the LEED-NC Rating System and Project Checklist

The price for USGBC members is $250 and $400 for non-members. LEED-NC workshop participants may purchase a package for $200.

In addition to assisting with project design and compliance with LEED, the Reference Guide serves as an essential tool for studying for the LEED Accreditation exam.

MORE ABOUT CIRS

While the Reference Guide and other LEED tools provide guidance and support for the LEED Rating System, issues and questions often arise when the system is applied to real projects and circumstances. Each project presents a unique set of circumstances, challenges, and questions about the Rating System. CIRs serve two functions: First, they give project teams the opportunity to ask questions that they have about specific design strategies or approaches to a given credit. Second, they encourage the ongoing development and refinement of the LEED Rating System.

Project teams submit questions online at any time during the design and construction process. USGBC works with independent reviewing consultants and their own Technical Advisory Groups (TAGs) to answer questions. Rulings are posted online about two weeks after they are submitted and are available for review by all registered project teams. Before submitting a CIR, project teams should remember to research thoroughly the Reference Guide and previously posted CIRs to avoid wasting their CIR.

The USGBC's response to CIRs represents an official ruling and can often change the nuisances of credit requirements and documentation. In effect, CIRs become the new law of LEED until updated versions of the Rating System are developed. Project teams charged with complying with the LEED documentation requirements should be intimately familiar with the CIRs for each credit; otherwise, credits may be misinterpreted or missed altogether.

DOCUMENTATION

Preparing the correct documentation for a LEED submittal is an ongoing process that should begin early in the project's design. Each prerequisite and credit is submitted in the form of a LEED Letter Template. USGBC created the Letter Templates in an effort to simplify the 2.0 documentation process. In many cases, the Letter Templates reduce or eliminate the need for large amounts of back-up documentation that were necessary in the 2.0 version. Letter Templates vary in their scope from mere statements of compliance to others that include calculations and/or ask for some supporting documentation. It is important to look carefully at each Letter Template to be sure that all tables, calculators, and check boxes are complete and that all supplementary documentation is provided.

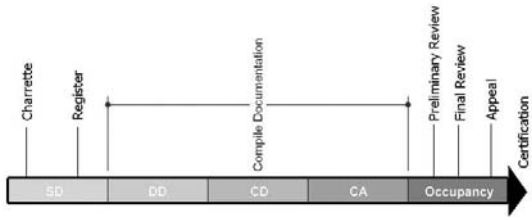
While the Letter Templates reduce the amount of documentation that must be submitted, during the review process, the USGBC randomly audits 1–6 credits for each project, with the average at about three. Audits require more extensive documentation and help USGBC ensure that project teams have actually done the work as claimed by the Letter Templates. For this reason, it is important to compile additional documentation, such as specs, cut sheets and drawings, in one three-ring binder and/or on a compact disc.

To prepare for audited credits, project teams should collect all documentation required by an audit for each credit that they are pursuing. Audit requirements are available on the USGBC website. When a team is ready to submit its project for review, the team should compile a separate three-ring binder and compact disc that contains only the Letter Templates and documentation required by the v2.1 Rating System. Two hard copies and two CDs of the submittal are sent to the USGBC for administrative and technical review. Because all credit requirements must be complete and documented prior to submitting, projects usually submit only after all or most of construction is finished.

CERTIFICATION

The certification process includes a preliminary and final technical review, and an opportunity for appeals. Independent consultants for USGBC conduct these reviews. Upon receiving a project submittal, the

FIGURE 4. LEED process timeline



USGBC will conduct an administrative review, which makes sure that the submittal is complete. Once it has been determined that the submittal is complete, it is sent to one of the independent consultants for a technical review. The project team will receive the preliminary review comments within 30 days. Each credit may be marked Anticipated, Pending, Audited, or Denied. Anticipated credits require no additional action. A credit is marked pending if there were inconsistencies, errors, or omissions in the Letter Template or supporting documentation. The review comments for pending credits include Technical Advice describing what further documentation is necessary to demonstrate credit achievement. Audited credits list what documentation is required for the final submittal. Credits can be denied during the preliminary review when the documentation provided clearly indicates that the intent of the credit has not been met and the reviewer feels that there is no additional information that would demonstrate achievement. If the project team wishes to supply additional information, denied credits can be resubmitted for consideration during the final review.

Upon receiving the technical review comments, the project team has 30 days to gather additional information and send it back to USGBC for final review. All additional documentation should be compiled in a new three-ring binder and information saved to a compact disc. It is not necessary to include the preliminary documentation, as the reviewer will have a copy of your preliminary submittal. Upon receiving the final submittal, the USGBC will complete and return a final review within three weeks. During the final review, credits are given a rating of either Awarded or Denied. The final review report gives comments and/or explanations for each credit decision. The final review also determines the projects certification level: Certified, Silver, Gold, or Platinum. Upon receiving the final review, the project team has 30 days to accept or appeal the awarded certification.

If a project team is unsatisfied with the ruling of a credit during the final review, they may apply for an appeal at the price of $500 per credit. An independent consultant who was not involved in the preliminary or final review will assess the appeal. Appeals must be submitted either with new documentation or with a narrative describing the case for credit achievement. Appeals are most common when one point will make the difference between certification levels.

When all credit appeals, if any, have been resolved and the certification level is determined, the USGBC presents the project team with an award letter, 10 certificates for project team members, and a metal LEED award plaque indicating the certification level.

Finally, everyone gets to have a big party and celebrate the team's success!

CONCLUSION

While the documentation and certification process is long, there are many benefits to going through the LEED process. Among the most recognized benefits are publicity and recognition, third party verification of achievements, brand recognition, and healthier, more sustainable, cost-effective and energy efficient buildings. The USGBC is working hard to improve upon the review process. With the release of LEED NC version 2.2, expected at the Atlanta Greenbuild Conference, documentation will be submitted online, and web-based tools will allow for more communication between the review team and the applicant. Many project teams fail to look beyond the certification process to recognize the service LEED can provide by keeping the project's goals and mission from being compromised. When push comes to shove, green building technologies often get brushed aside in the name of "value engineering." Unless a project has considerable expertise, commitment, and vision, green building practices and technologies are often seen as add-ons. This fatal approach results in marginally successful green buildings and breeds cynicism for those involved. LEED is a tool that can help lead a project through the integrated design process, but it does not replace the need for deep commitment to sustainability, education, or the needed mindset to build truly green buildings, all of which emanate from dedicated individuals.