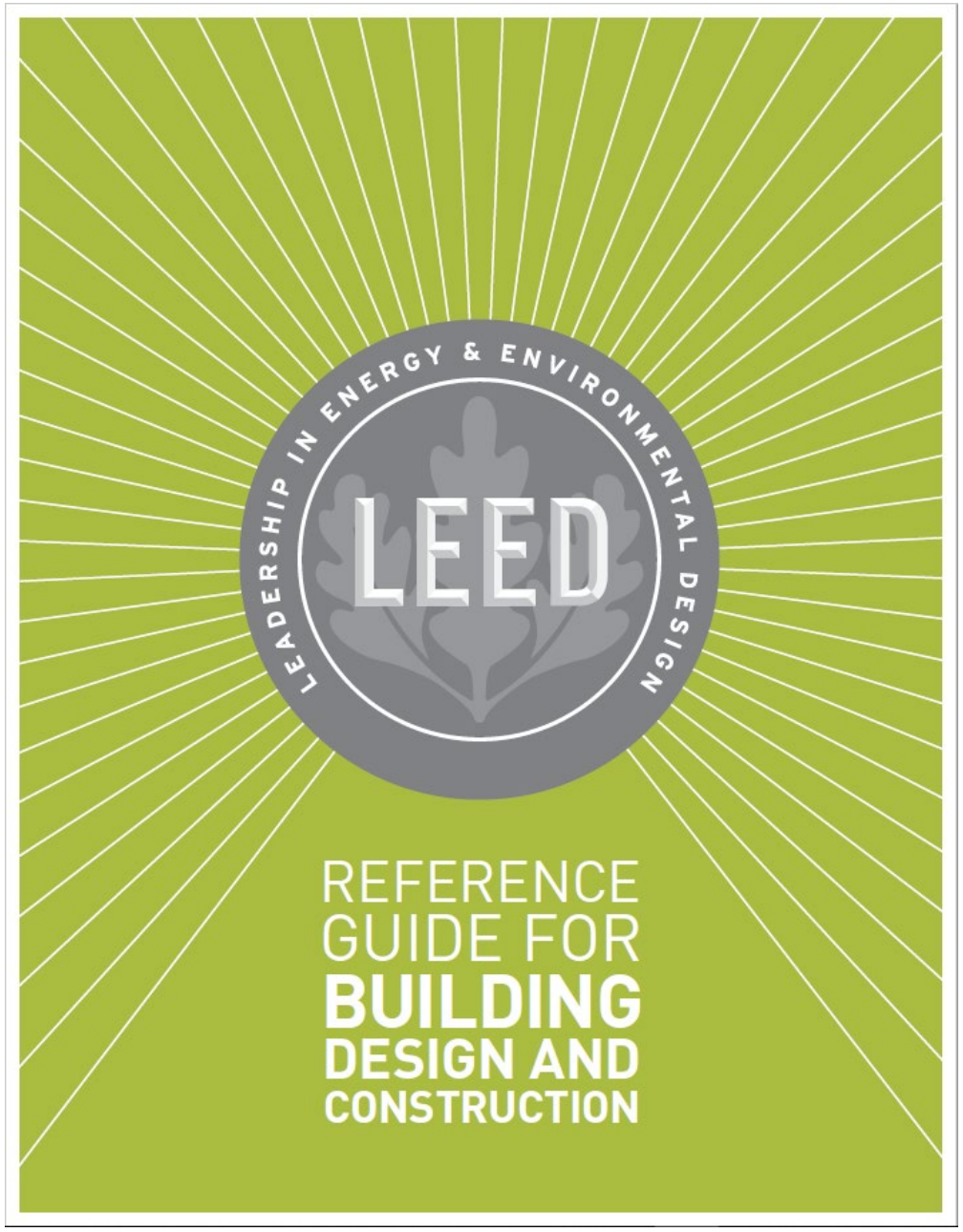
GA02 Introductory and Overview Sections: LEED BD+C Reference Guide, v4



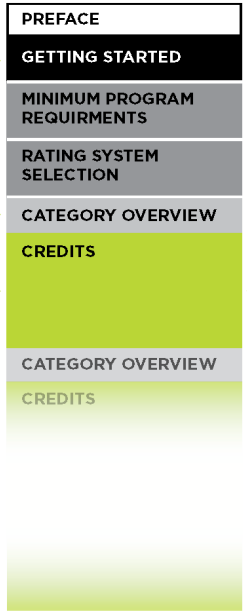
REFERENCE GUIDE OVERVIEW

GUIDE STRUCTURE

GETTING STARTED
provides a recommended process for achieving certification and addresses issues that cut across the entire rating system.

CATEGORY OVERVIEWS
emphasize sustainability topics, market factors, and credit relationships that are specific to a single credit category and information that is applicable to multiple credits within that category.

CREDITS
contain content that is specific to the achievement of that credit.



ICONS THAT MAY APPEAR WITHIN EACH CREDIT REFER THE USER TO FOLLOWING SECTIONS:

Getting Started (beginning of book)

Further Explanation (within same credit)

CREDIT STRUCTURE

Each credit category begins with an overview that discusses sustainability and market factors specific to the category. For each prerequisite and credit, readers will then find the following sections:

INTENT & REQUIREMENTS
outlines the rating system requirements for achieving the prerequisite or credit. They were approved through the rating system development process and can also be found on the USGBC website.

BEHIND THE INTENT
connects credit achievement with larger sustainability issues and provides information on how the credit requirements meet the intent stated in the rating system.

STEP-BY-STEP GUIDANCE
suggests the implementation and documentation steps that can be used by most projects, as well as generally applicable tips and examples.

FURTHER EXPLANATION
provides guidance for lengthy calculations or for special project situations, such as tips for nonstandard project types or different credit approaches. It includes a *Campus* section and, sometimes, an *International Tips* section.

REQUIRED DOCUMENTATION
lists the items that must be submitted for certification review.

RELATED CREDIT TIPS
identifies other credits that may affect a project team's decisions and strategies for the credit in question; the relationships between credits may imply synergies or trade-offs.

CHANGES FROM LEED 2009
is a quick reference of changes from the previous version of LEED.

REFERENCED STANDARDS
lists the technical standards related to the credit and offers weblinks to find them.

EXEMPLARY PERFORMANCE
identifies the threshold that must be met to earn an exemplary performance point, if available.

DEFINITIONS
gives the meaning of terms used in the credit.

Getting Started

HOW TO USE THIS REFERENCE GUIDE

This reference guide is designed to elaborate upon and work in conjunction with the rating system. Written by expert users of LEED, it serves as a roadmap, describing the steps for meeting and documenting credit requirements and offering advice on best practices.

Within each section, information is organized to flow from general guidance to more specific tips and finally to supporting references and other information. Sections have been designed with a parallel structure to support way finding and minimize repetition.

CREDIT CATEGORIES

INTEGRATIVE PROCESS

LOCATION AND TRANSPORTATION (LT)

SUSTAINABLE SITES (SS)

WATER EFFICIENCY (WE)

ENERGY AND ATMOSPHERE (EA)

MATERIALS AND RESOURCES (MR)

INDOOR ENVIRONMENTAL QUALITY (EQ)

INNOVATION (IN)

REGIONAL PRIORITY (RP)

MORE ABOUT THE FURTHER EXPLANATION SECTION

Further Explanation contains varied subsections depending on the credit; two of the common subsections are elaborated upon here.

CAMPUS PROJECTS

Campus refers to the Campus Program for Projects on a Shared Site, which certifies multiple buildings located on one site and under the control of a single entity. Examples include buildings on a corporate or educational campus and structures in a commercial development. Only project teams using the Campus Program need to follow the guidance in the Campus section; the guidance is not applicable to projects that are in a campus setting or are part of a multitenant complex but not pursuing certification using the Campus Program.

There are two approaches to certifying multiple buildings under the Campus Program:

- **Group Approach** allows buildings that are substantially similar and are in a single location to certify as one project that shares a single certification.
- **Campus Approach** allows buildings that share a single location and site attributes to achieve separate LEED certification for each project, building space, or group on the master site.

For each approach, the reference guide gives any credit-specific information and notes two possible scenarios:

- **Group Approach**
  - "All buildings in the group may be documented as one." The buildings may meet the credit requirements as a single group by, for example, pooling resources or purchasing, and then submitting a single set of documentation.
  - "Submit separate documentation for each building." Each building in the group project must meet the credit requirements individually for the project to earn the credit.
- **Campus Approach**
  - "Eligible." This credit may be documented once at the level of the master site, and then individual projects within the master site boundary earn the credit without submitting additional documentation.
  - "Ineligible. Each LEED project may pursue the credit individually." Each project within the campus boundary may earn the credit but each project must document compliance separately.

Example Credit: LT LEED for Neighborhood Development Location

FURTHER EXPLANATION

CAMPUS

Group Approach

All buildings in the group may be documented as one. The entire group boundary must be within the LEED ND project boundary to earn credit.

Campus Approach

Eligible. The entire campus boundary must be within the LEED ND project boundary to use the campus credit approach.

Example Credits: Outdoor Water Use Reduction and Indoor Water Use Reduction

WE Credit Outdoor Water Use Reduction
Campus
Group Approach
All buildings in the group may be documented as one. Use the total landscaped area of the entire campus. The results of the Water Budget Tool apply to all buildings within the group.

Campus Approach
Eligible.

WE Credit Indoor Water Use Reduction
Campus
Group Approach
Submit separate documentation for each building.

Campus Approach
Ineligible. Each LEED project may pursue the credit individually.

Projects Outside the US

International Tips

This section offers advice on how to determine equivalency to U.S. Standards or using non-U.S. standards referenced in the rating system.

Inch-Pound (IP) - inch, pound, and gallon
Derived from the English system and commonly used in the U.S.

International System of Units (SI) – meter, kilogram, and liter
Metric system used in most other parts of the world and defined by the General Conference on Weights and Measures.

“local equivalent”

- Means an alternative to a LEED referenced standard that is specific to a project’s locality. “Whichever is more stringent”

“USGBC-approved local equivalent”

- Means a local standard deemed equivalent to the listed standard by the U.S. Green Building Council through its process for establishing non-U.S. equivalencies in LEED.

Example Credits: SS Prerequisite Construction Activity Pollution Prevention

REQUIREMENTS

Create and implement an erosion and sedimentation control plan for all construction activities associated with the project. The plan must conform to the erosion and sedimentation requirements of the 2012 U.S. Environmental Protection Agency (EPA) Construction General Permit (CGP) or local equivalent, whichever is more stringent. Projects must apply the CGP regardless of size. The plan must describe the measures implemented.

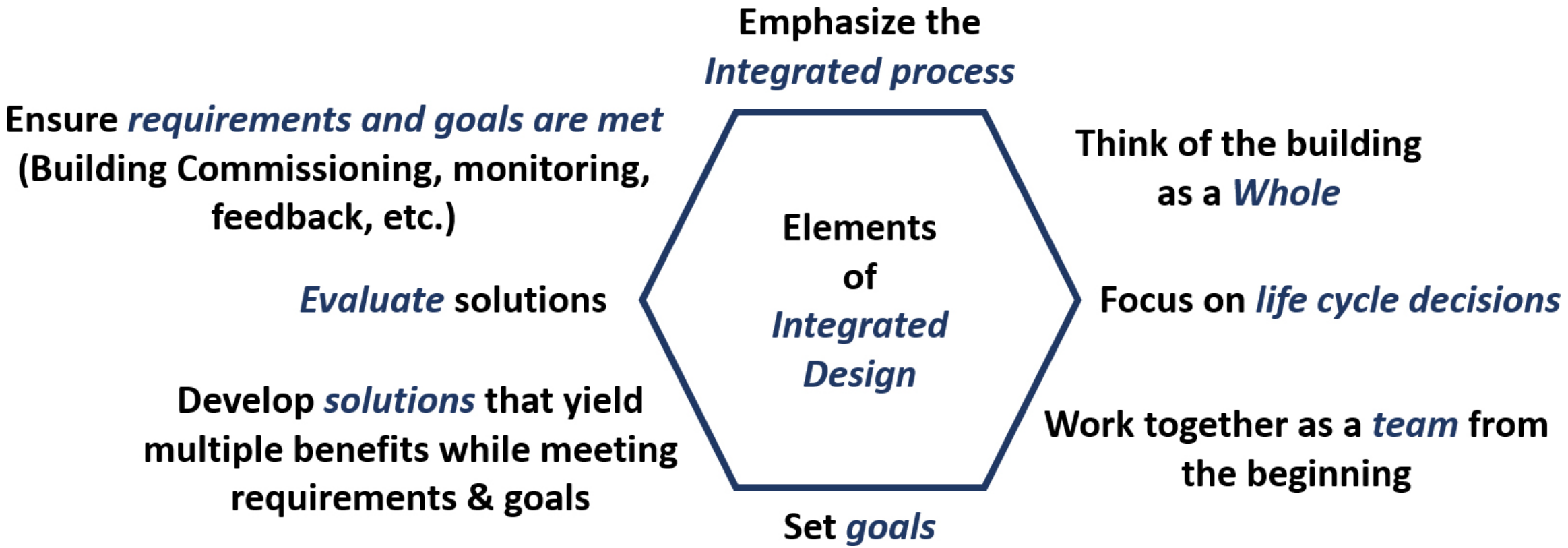
FURTHER EXPLANATION

ABOUT NPDES AND THE CGP

The National Pollutant Discharge Elimination System (NPDES) is a U.S. program that regulates stormwater discharges from construction activities that disturb 1 acre (0.4 hectare) or more; it also applies to smaller sites that are part of a larger development or sale. This LEED prerequisite applies to all sites, even those smaller than 1 acre (0.4 hectare). In the U.S., the EPA or a local authority, depending on the project's location, administers the permitting process associated with the NPDES program using the CGP.[1] Projects outside the U.S. may use a local equivalent to NPDES.

Based on the project's location and conditions, some U.S. projects may be required to acquire an NPDES permit. Refer to EPA's CGP website to determine whether a permit is required. A permit is not required to meet this LEED prerequisite, but all projects (regardless of size or NPDES status) must conform to the applicable erosion and sedimentation control requirements of the CGP or a local equivalent.

Taking an Integrative Approach to Design and Construction



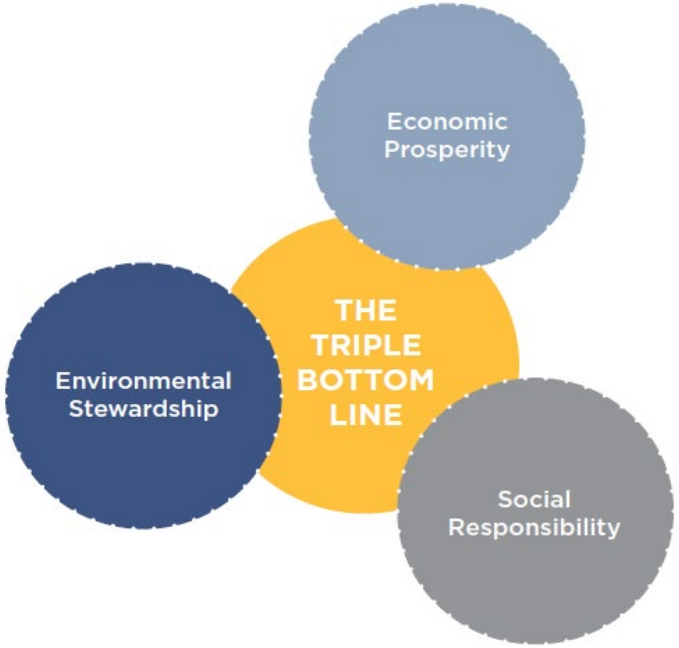
Integrative Design Process

- ❑ Engage all project team members.
- ❑ Work in collaboration not isolation.
- ❑ Look for interrelationships and synergies between systems and components.

The coordination of building and site systems should be addressed early, preferably **before schematic design**.

The **Integrative Process credit** formally introduces this way of working into LEED so that the team members' expertise in building and site systems can inform the performance, efficiency, and effectiveness of every system.

"When areas of practice are integrated, it becomes possible to significantly improve building performance and achieve synergies that yield economic, environmental, and human health benefits."



Integrative Process Includes Three Phases:

Discovery. The most important phase of the integrative process, discovery can be thought of as an extensive expansion of what is conventionally called predesign. A project is unlikely to meets its environmental goals cost-effectively without this discrete phase. Discovery work should take place before schematic design begins.

Design and construction (implementation). This phase begins with what is conventionally called schematic design. It resembles conventional practice but integrates all the work and collective understanding of system interactions reached during the discovery phase.

Occupancy, operations, and performance feedback. This third stage focuses on preparing to measure performance and creating feedback mechanisms. Assessing performance against targets is critical for informing building operations and identifying the need for any corrective action.

The structure to manage this flow of people, information, and analysis is as follows:

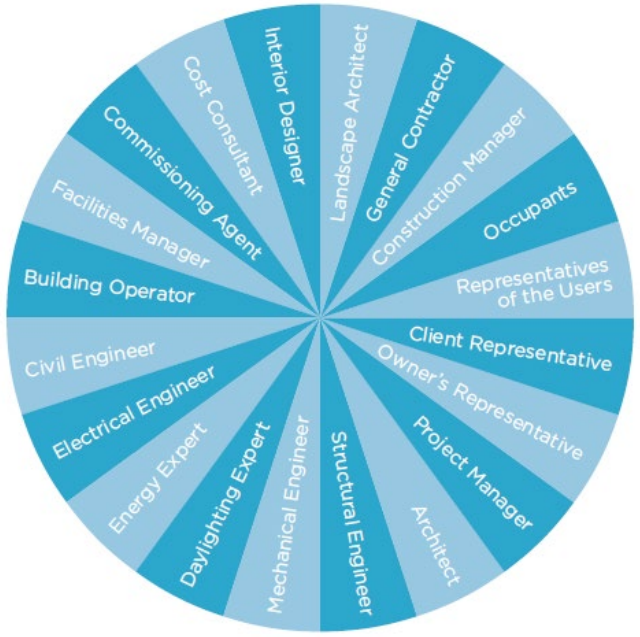
- ❑ All project team members, representing all design and construction disciplines, gather information and data relevant to the project.
- ❑ Team members analyze their information.
- ❑ Team members participate in **workshops** to compare notes and identify opportunities for synergy.

This process of research, analysis, and workshops is done in an iterative cycle that refines the design solutions.

Devising a LEED Work Plan

It is recommended that LEED applicants follow a series of steps to certification.

Step 1. Initiate discovery phase
Step 2. Select LEED rating system
Step 3. Check minimum program requirements
Step 4. Establish project goals
Step 5. Define LEED project scope
Step 6. Develop LEED scorecard
Step 7. Continue discovery phase
Step 8. Continue iterative process
Step 9. Assign roles and responsibilities
Step 10. Develop consistent documentation
Step 11. Perform quality assurance review and submit for certification



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Charrette

When sufficient information has been gathered, hold a goal-setting workshop.

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deliverables
- LEED Project Checklist
- Level of certification

Maintaining Consistency in the LEED Application

Certain issues recur across multiple credits and credit categories and must be treated consistently throughout the submission.

Special Project Situations

Projects with a combination of space types or unusual space types should pay particular attention to how these characteristics influence credit achievement.

Common project programs that require additional consideration include the following:

- ❑ Mixed Use
- ❑ Multitenant Complex
- ❑ Incomplete Spaces
- ❑ Projects with Several Physically Distinct Structures

Mixed Use

Examples

Residential and Commercial

A multi-family residential building with 8 occupiable stories above grade certifying under BD+C: New Construction includes a retail grocery store on the ground level, the team could benefit from guidance for BD+C: Retail projects.

Commercial and Data Center

An office building certifying under BD+C: New Construction includes a small data center, the team should follow the data center guidelines for certain credits; these guidelines are not limited to BD+C: Data Centers projects.

Hospitality and Retail

A hotel project certifying under BD+C: Hospitality; in designing the retail spaces on the hotel's ground floor, the team could benefit from guidance for BD+C: Retail projects.

Multitenant Complex

- ❑ Some projects may be part of a large complex of buildings or a master planned development.
- ❑ Any project can follow the multitenant complex approach if it is part of a master plan development, regardless of whether the project is using the LEED Campus approach.

Incomplete Spaces

- ❑ No more than 40% of the certifying gross floor area of a LEED project may consist of incomplete space unless the project is using the LEED BD+C: Core and Shell rating system.
- ❑ Projects that include incomplete spaces must use Appendix 2 Default Occupancy Counts to establish occupant counts for incomplete spaces.
- ❑ For incomplete spaces in projects using a rating system other than LEED BD+C: Core and Shell, the project team must provide supplemental documentation.
  - Submit a letter of commitment, signed by the owner.
  - Incomplete spaces intended to be finished by tenants (i.e., parties other than the owner), submit a set of nonbinding tenant design and construction guidelines.

Projects with Several Physically Distinct Structures

Primary and secondary school projects, hospitals (general medical and surgical), hotels, resorts, and resort properties, as defined for ENERGY STAR building rating purposes, are eligible to include more than one physically distinct structure in a single LEED project certification application without having to use the Campus Program, subject to the following conditions.

- ❑ The buildings to be certified must be a part of the same identity. For example, the buildings are all part of the same elementary school, not a mix of elementary school and high school buildings.
- ❑ The project must be analyzed as a whole (i.e., in aggregate) for all minimum program requirements (MPRs), prerequisites, and credits in the LEED rating system.
- ❑ All the land area and all building floor areas within the LEED project boundary must be included in every prerequisite and credit submitted for certification.
- ❑ There is no specific limit on the number of structures, but the aggregate gross floor area included in a single project must not exceed 1 million square feet (92,905 square meters).
- ❑ **Any single structure that is larger than 25,000 square feet (2,320 square meters) must be registered as a separate project or treated as a separate building in a group certification approach**.

Renovations and Additions

Refer to the **minimum program requirements** for information on how boundaries should be drawn for renovation and addition projects.

Additionally, use the following guidance for treating energy systems in any project with mechanical systems.

Separate systems. Mechanical systems are completely separate from those in the existing building (emergency generators excepted) and can be modeled separately.

Shared central systems located outside the project building or space. Each prerequisite and credit section related to energy modeling offers specific guidance on how to handle this situation; in particular, see the guidance for EA Prerequisite Minimum Energy Performance.

Tenant Sales and Lease Agreement

Credits or thresholds beyond the construction scope of the LEED project, a binding tenant sales and lease agreement must be provided as documentation.

This must be signed by the future tenant and include terms related to how the technical credit requirements will be carried out by the tenant.

Previous Development

previously developed altered by paving, construction, and/or land use that would typically have required regulatory permitting to have been initiated (alterations may exist now or in the past). Land that is not previously developed and landscapes altered by current or historical clearing or filling, agricultural or forestry use, or preserved natural area use are considered undeveloped land. The date of previous development permit issuance constitutes the date of previous development, but permit issuance in itself does not constitute previous development.

previously developed site a site that, prior to the project, consisted of at least 75% previously developed land.

previously disturbed areas that have been graded, compacted, cleared, previously developed, or disturbed in any way. These are areas that do not qualify as 'greenfield.'

LEED Sites

Greenfield - area that has not been graded, compacted, cleared, or disturbed and that supports (or could support) open space, habitat, or natural hydrology.

Brownfield - real property or the expansion, redevelopment, or reuse of which may be complicated by the presence or possible presence of a hazardous substance, pollutant, or contaminant.

Hardscape - the inanimate elements of the building landscaping. It includes pavement, roadways, stonewalls, wood and synthetic decking, concrete paths and sidewalks, and concrete, brick, and tile patios.

Buildable Land - the portion of the site where construction can occur, including land voluntarily set aside and not constructed on. When used in density calculations, buildable land excludes public rights-of-way and land excluded from development by codified law.

LEED ND: the portion of the site where construction can occur, including land voluntarily set aside and not constructed on. When used in density calculations, buildable land excludes public rights-of-way and land excluded from development by codified law or LEED for Neighborhood Development prerequisites.

Development Footprint

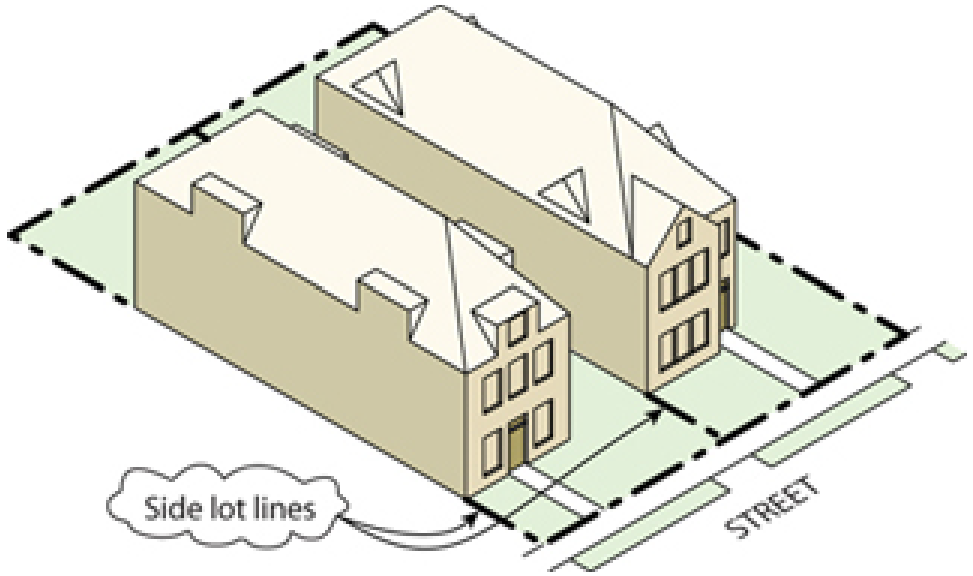
A project's development footprint is all of its impervious surfaces.

development footprint the total land area of a project site covered by buildings, streets, parking areas, and other typically impermeable surfaces constructed as part of the project.

Surfaces paved with permeable pavement (at least 50% permeable) are excluded from the development footprint.

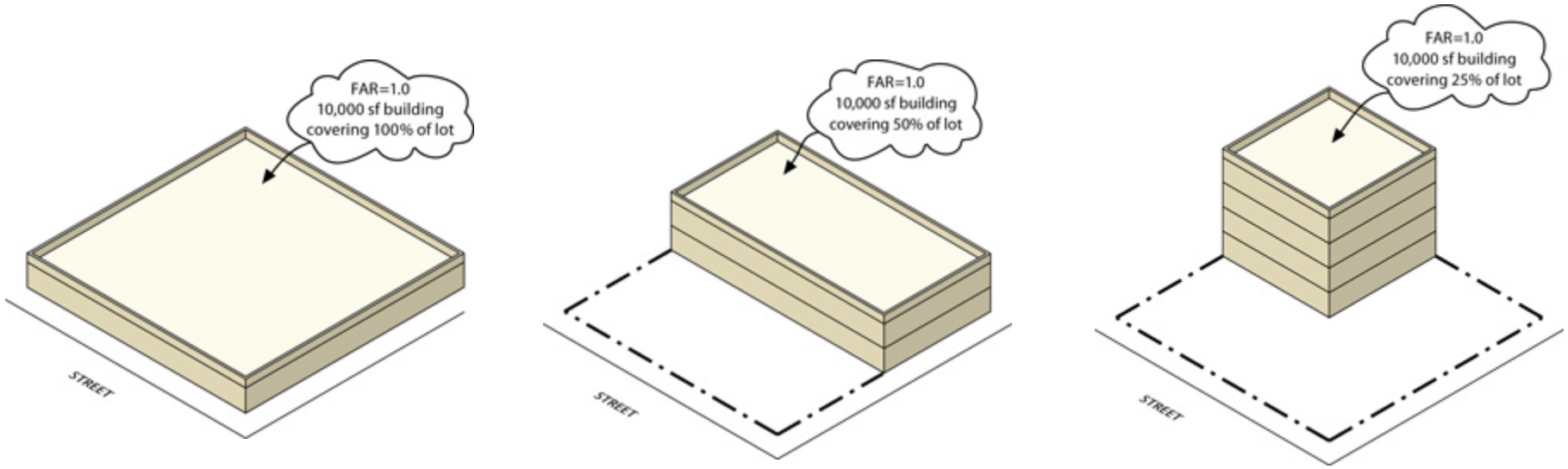
Density

A measure of the total building floor area or dwelling units on a parcel of land relative to the buildable land of that parcel. Units for measuring density may differ according to credit requirements. Does not include structured parking.



Floor-Area Ratio (FAR)

The density of nonresidential land use, exclusive of parking, measured as the total nonresidential building floor area divided by the total buildable land area available for nonresidential structures.



Determine the FAR

A LEED for Retail project has a total floor area of 12,400 square feet and the total buildable land is 0.4 hectacre. What is the Floor-Area Ratio for the project?

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$$\text{FAR} = \frac{12{,}400 \text{ sf}}{0.4 \text{ ha} \times 2.5 \frac{\text{ac}}{\text{ha}} \times 43{,}560 \frac{\text{sf}}{\text{ac}}}$$

$$\text{FAR} = \frac{12{,}400 \text{ sf}}{43{,}560 \text{ sf}}$$

$$= 0.285$$

Occupancy

Regular Building Occupants

Part-time and full-time employees
Staff
Volunteers – regularly use a bldg.
Residents
Primary and secondary school students
Hotel guests
Inpatients

Visitors

Retail customers
Outpatients
Volunteers – periodically use a bldg.
Higher-education students

EQUATION 1.

$$\text{FTE employees} = \text{Full-time employees} + (\Sigma \text{ daily part-time employee hours} / 8)$$

EQUATION 2.

$$\text{FTE employees} = (\Sigma \text{ all employee hours} / 8)$$

In calculations, occupant types are typically counted in two ways:

Daily averages take into account all the occupants of a given type for a typical 24-hour day of operation.

Peak totals are measured at the moment in a typical 24-hour period when the highest number of a given occupant type is present.

Whenever possible, use actual or predicted occupancies.

A LEED project has 8 employees that work 4 hrs per day; 12 employees that work 6 hours per day; and 20 employees work 8 hrs per day. What is the total Full Time Equivalent (FTE) for the project?

37
33
35
38

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37
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Total Employee Hours = (8 x 4) + (12 x 6) + (20 x 8) = 264

FTE = Total Employee Hours / 8 = 33

If occupancy cannot be accurately predicted, use one of the following resources to estimate occupancy:

- ❑ Default occupant density from ASHRAE 62.1-2010, Table 6-1
- ❑ Default occupant density from CEN Standard EN 15251, Table B.2
- ❑ Appendix 2 Default Occupancy Counts
- ❑ Results from applicable studies.

If numbers vary seasonally, use occupancy numbers that are a representative daily average over the entire operating season of the building.

If occupancy patterns are atypical (shift overlap, significant seasonal variation), explain such patterns when submitting documentation for certification.

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Minimum Program Requirements (MPRs)

The Minimum Program Requirements (MPRs) are the minimum characteristics or conditions that make a project appropriate to pursue LEED certification. These requirements are foundational to all LEED projects and define the types of buildings, spaces, and neighborhoods that the LEED rating system is designed to evaluate.

Purpose:

1. Give clear guidance to customers
2. Protect the integrity of the LEED program
3. Reduce challenges that occur during the LEED certification process

1. **Must be in a permanent location on existing land**

Requirements

- ❑ All LEED projects must be constructed and operated on a permanent location on existing land.
- ❑ No project that is designed to move at any point in its lifetime may pursue LEED certification.
- ❑ This requirement applies to all land within the LEED project.

2. **Must use reasonable LEED boundaries**

Requirements

- ❑ The LEED project boundary must include all contiguous land that is associated with the project and supports its typical operations.
- ❑ The LEED boundary may not unreasonably exclude portions of the building, space, or site to give the project an advantage in complying with credit requirements.
- ❑ The LEED project must accurately communicate the scope of the certifying project in all promotional and descriptive materials and distinguish it from any non-certifying space.

3. **Must comply with project size requirements**

Requirements

- ❑ LEED BD+C: minimum 1,000 square feet of gross floor area
- ❑ LEED O+M: minimum 1,000 square feet of gross floor area
- ❑ LEED ID+C: minimum 250 square feet of gross floor area
- ❑ LEED for Homes: defined as a “dwelling unit” by all applicable codes
- ❑ LEED for ND: at least 2 habitable buildings, no larger than 1500 acres

Rating System Selection Guidance

Before Registering a project:

1. Identify an appropriate rating system
2. Determine the best adaptation

If a project team selects a rating system that doesn't apply, USGBC may request that they change the project's rating system.

Rating System Selection Guidance

Minimum Program Requirements (MPRs)

The first step should be to make sure that LEED will work for your project no matter what rating system is selected.

Verify project can satisfy all of the LEED v4 Minimum Program Requirements.

Contact USGBC if it is not clear which rating system should be used.

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The following project types and scopes are addressed by LEED rating systems:

LEED FOR Building Design and Construction	LEED BD+C: New Construction LEED BD+C: Core and Shell LEED BD+C: Schools LEED BD+C: Retail LEED BD+C: Healthcare LEED BD+C: Data Centers LEED BD+C: Hospitality LEED BD+C: Warehouses and Distribution Centers LEED BD+C: Homes LEED BD+C: Multifamily Midrise
LEED FOR Interior Design and Construction	LEED ID+C: Commercial Interiors LEED ID+C: Retail LEED ID+C: Hospitality
LEED FOR Building Operations and Maintenance	LEED O+M: Existing Buildings LEED O+M: Data Centers LEED O+M: Warehouses and Distribution Centers LEED O+M: Hospitality LEED O+M: Schools LEED O+M: Retail
LEED FOR Neighborhood Development	LEED ND: Plan LEED ND: Built Project

Rating System Selection Guidance

An owner wants to LEED certify an existing office building and commit to on-going sustainability goals. Which rating system would you recommend?

A. LEED for Interior Design and Construction
B. LEED for Building Design and Construction
C. LEED for Building Operations and Maintenance
D. LEED for Neighborhood Development

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B. LEED for Building Design and Construction
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A new tenant in a commercial office building wants to pursue LEED certification. Which rating system would you recommend they use?

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B. LEED for Building Design and Construction
C. LEED for Building Operations and Maintenance
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C. LEED for Building Operations and Maintenance
D. LEED for Neighborhood Development

Rating System Selection Guidance

What LEED rating system focuses on the where, what, and how to build green at a community scale?

A. LEED BD+C: Retail
B. LEED BD+C: Schools
C. LEED BD+C: New Construction
D. LEED for Neighborhood Development

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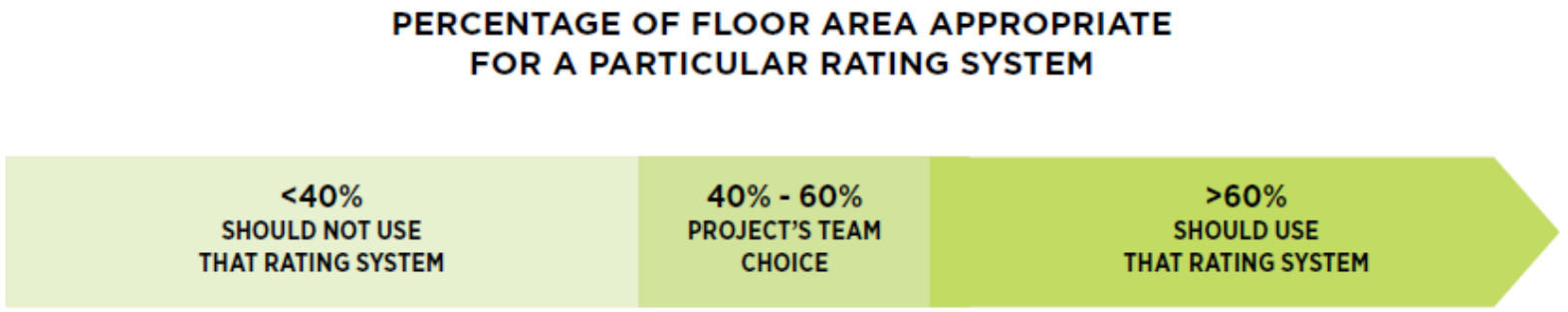
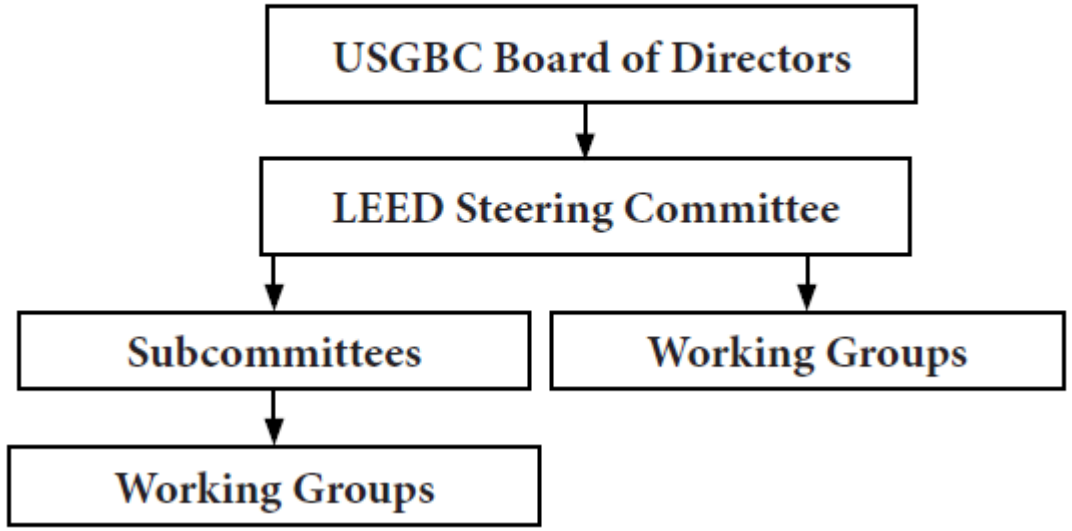
B. LEED BD+C: Schools
C. LEED BD+C: New Construction
D. LEED for Neighborhood Development

Choosing Between Rating Systems

- 40/60 rule provides guidance for making a decision when several rating systems appear to be appropriate for a project.
- To use this rule, first assign a rating system to each square foot or square meter of the building. Then, choose the most appropriate rating system based on the resulting percentages.
- The entire gross floor area of a LEED project must be certified under a single rating system and is subject to all prerequisites and attempted credits in that rating system, regardless of mixed construction or space usage type.



USGBC Organizational Structure



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