Leadership in Energy and Environmental Design

LEED® Prep

What You Really Need to Know to Pass the LEED NC v2.2 and CI v2.0 Exams

Contributing Editors

Holly Williams Leppo, AIA, LEED AP, and
Brad Saeger, LEED AP

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LEED Project and Team Coordination

The process of designing and constructing a high-performance, "green" building is quite different than either the traditional design-bid-build model or design-build method of project delivery. Correctly answering many LEED AP exam questions requires an understanding of this green building design process, and of how to coordinate projects and their teams. Such coordination may involve setting project goals, coordinating multiple job functions, reviewing codes and standards, understanding the interdependencies of building components, understanding a cost/benefit analysis, identifying opportunities for LEED credit synergies, and scheduling critical decisions and activities to meet project goals. This section, adapted from the U.S. Department of Energy (DOE) Building Technologies Program online Building Toolbox, will help you grasp the fundamentals of green building project and team coordination and apply it to LEED projects and the LEED AP exam. For more detailed information, go to the DOE website, www.energy.gov.

The topics presented in this section are designed to prepare you for exam questions related to coordinating LEED projects and teams. These topics are directly related to the LEED credits listed in the table "LEED Prerequisites and Credits Covered in This Section."

Whole-Building Design Approach

Whole-building design considers all building components and systems during the design phase and integrates them to work together. Because all building systems are interrelated, it is essential that the design team be fully integrated from the project's inception. The project team can include architects, engineers, building occupants and owners, construction professionals, and specialists in areas such as indoor air quality, materials, and energy use. This holistic and interdisciplinary approach to design considers site, energy, materials, indoor air quality, acoustics, natural resources, and their interrelationships.

Whole-building design considers the building structure and systems simultaneously and examines how these systems can best work together to save energy and reduce environmental impact. For example, a strategy that extensively employs daylighting techniques will reduce the amount of heat given off by lighting fixtures, thus allowing for a smaller air conditioning system. In this scenario, the civil engineer should be involved in selecting an appropriate

LEED Credit Synergies and Trade-Offs *(continued)*

LEED CI		
	synergies	**trade-offs**
MRc1: Building Reuse	EQc4: Low-Emitting Materials	
EQc2: Increased Ventilation		EAc1: Optimize Energy Performance
EQc6: Controllability of Systems EQc7: Thermal Comfort EQc8: Daylighting and Views	EAc1: Optimize Energy Performance	

Finding the right building design recipe through an integrated design process can be challenging. Often, design teams first make incremental changes that result in high-performance buildings at affordable costs. But exploring further the opportunities for design integration can sometimes result in extraordinary cost savings.

Design: Building Siting

Both site selection and site planning have a major impact on the relative "greenness" of any facility being planned. Site selection includes issues such as transportation and travel distances for building occupants, impacts on wildlife corridors, and impacts on the hydrology (storm water flows, wetlands, etc.). Decisions made during site planning will impact the immediate natural community as well as the building's energy consumption and occupant comfort. Good site planning minimizes site clearing, which can save money by requiring less site demolition, and helps preserve existing vegetation to provide a low-maintenance landscape that avoids supplemental irrigation and fertilizer. Mature stands of native vegetation often provide the desired energy-conserving shade and wind control that would otherwise require years to develop from expensive new plantings. Thoughtful placement of a building on a site promotes energy conservation by taking advantage of natural site features such as topography, sunlight, shade, and breezes.

Carefully planned building placement should:

- minimize stormwater runoff
- reduce the risk of erosion
- minimize habitat disturbance
- protect open space
- conserve energy by providing for passive solar heating and cooling, natural ventilation, and daylighting

Opportunities to maximize sustainability should be acted on as early as possible in the site selection and site planning process—even before pre-design—so that site issues and features are integrated into the design process. Some opportunities continue through design and, to a more limited extent, through site construction and landscaping.

The natural and existing characteristics of a site influence elements of both site design and building design, including shape, massing, materials, surface-to-volume ratio, structural systems, mechanical systems, access and service, solar orientation, and provisions for security

Construction: Purchasing Materials

Sustainable building materials should be selected whenever possible. Sustainable, low-impact materials are durable and long lasting. They should also be

- nontoxic
- recycled and/or recyclable
- renewable
- obtained from local sources
- certified wood

In addition, it is helpful to design for standard sizes, modular units, and precut materials when possible, as this reduces waste during construction.

Nontoxic

Select materials within prescribed volatile organic compound (VOC) limits.

- Select adhesives that meet or exceed the VOC limits of South Coast Air Quality Management District Rule #1168.
- Select sealants that meet or exceed the Bay Area Air Quality Management District Regulation 8, Rule 51.
- Select paints and coatings that meet or exceed the VOC and chemical component limits of Green Seal requirements.
- Select carpet systems that meet or exceed the Carpet and Rug Institute Green Label Indoor Air Quality Test Program.
- Select composite wood and agrifiber products that do not contain added ureaformaldehyde resin.

Local

Specifying materials mined, harvested, salvaged, or constructed within a 500-mile radius from the project can reduce the costs and the associated environmental impacts of that transportation. This can have the added benefit of helping the local economy. Regional material opportunities should be researched early in the design process to maximize the potential benefits.

Recycled

The recycled content of a material is classified as either post-consumer or postindustrial. Specifying materials made with recycled content is another method of saving processing or manufacturing energy. Building materials that can contain a high percentage of recycled material include reinforcing and framing steel, concrete masonry units, gypsum wallboard and facing paper, and acoustic ceiling panels and their suspension systems.

Use recycled materials to reduce the use of raw materials and divert material from landfills. Use at least 5% to 10% salvaged or refurbished materials, and specify that a minimum of 25% to 50% of the building materials contain at least 20% post-consumer recycled content material, or a minimum of 40% postindustrial recycled content material.

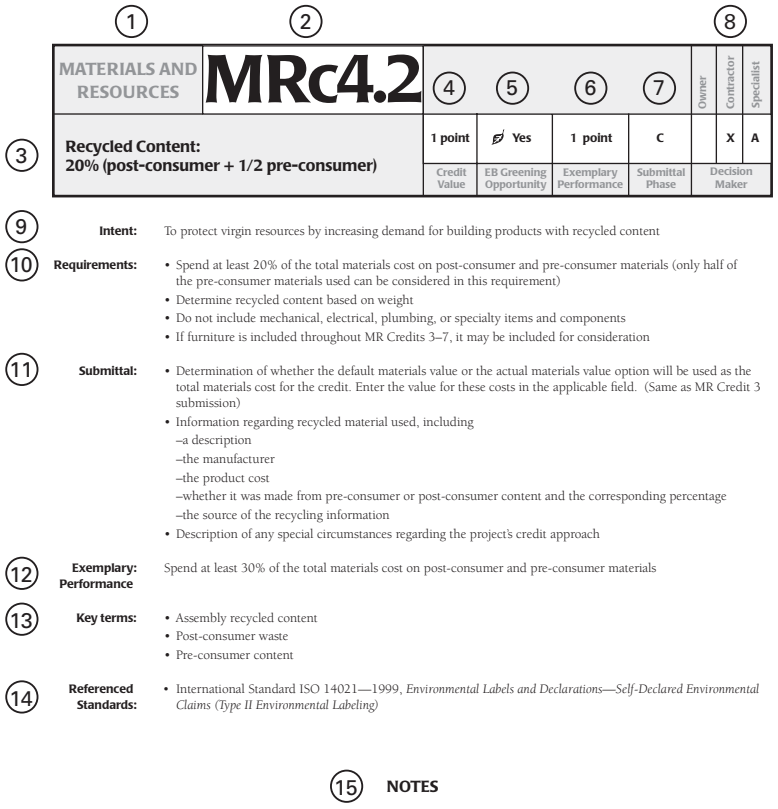
Recyclable

During the design phase, identify the potential waste streams that the facility will produce. At a minimum, facilities should be provided to handle the separation, collection, and storage of common recyclable materials such as paper, glass, plastics, and metals. The collection points

LEED NC Knowledge Summaries

For success on the LEED NC exam, it is valuable to commit to memory the key components of each prerequisite and credit. The LEED NC Knowledge Summaries condense information from the LEED NC Reference Guide and present it in a format that makes it easier to memorize. The following illustration shows where on each LEED NC summary page you'll find the information you need to know.

1. rating system category
2. credit abbreviations
   - SS = sustainable sites
   - WE = water efficiency
   - EA = energy and atmosphere
   - MR = materials and resources
   - EQ = indoor environmental quality
   - ID = innovation and design
   - p = prerequisite
   - c = credit
3. credit name
4. number of points possible
5. if credit helps achieve LEED EB certification
6. if ID points can be earned by exceeding credit requirements
7. if credit can be submitted during the design phase (D), or only during the construction phase (C)
8. specialist responsible for submitting letter template
   - E = engineer
   - AP = LEED AP
   - A = architect
   - LD = lighting designer
   - CxA = commissioning authority
9. primary benefit of meeting the credit requirements
10. what the project team must do
11. what must be included in the letter template submittal
12. what must be done to earn an ID point for the credit
13. terms used in the reference guide to describe the credit, requirements, and strategies
14. documents that the credit refers to
15. space to include personal notes



SUSTAINABLE SITES	SSc2				Owner	Contractor	Specialist
Development Density and Community Connectivity	**1 point**	**Yes**	**0 points**	**D**	**X**		**LA**
	Credit Value	EB Greening Opportunity	Exemplary Performance	Submittal Phase	Decision Maker		

Intent: To preserve natural resources by developing urban areas and protecting greenfields

Requirements:

Option 1

Construct/renovate on previously developed land in a community with a development density, $D_{development}$, of at least 60,000 sq ft. To confirm this density, find the area of each building within the density radius and add the areas together. This total, $A_{gross\ building}$, is divided by the area of the density radius, $A_{density\ radius}$, resulting in the total development density within the radius, which must be at least 60,000 sq ft/acre.

$$D_{development} = \frac{A_{gross\ building,\ ft^2}}{A_{density\ radius,\ acres}}$$

Option 2

- Construct/renovate on previously developed land which
  - –is within a half mile of a residential area or neighborhood with an average density of 10 units per acre
  - –is within a half mile of at least 10 basic services and with pedestrian access between the building and the services
  - –has pedestrian access between the building and the services

Submittal:

- Project site and building area (square feet)
- Description of special circumstances or options not defined by the USGBC

Option 1

- Drawing of project site vicinity including buildings within the density radius, R

$$R = 3\sqrt{A_{property,\ acres}\left(43{,}560\ \frac{ft^2}{ac}\right)}$$

- List of site and building areas within the density radius

Option 2

- Drawing or aerial photograph of a half-mile radius from the building's main entrance including buildings providing basic community services.
- List of site and building areas within the half-mile radius

Key Terms:

- Basic services
- Building density
- Building footprint
- Community connectivity
- Density radius
- Development density
- Greenfield
- Pedestrian access
- Property area
- Site area
- Site map
- Square footage
- Urban infill development
- Urban sprawl

ENERGY AND ATMOSPHERE	EAc1.3				Tenant	Owner	Contractor	Specialist
Optimize Energy Performance: HVAC	**1–2 points**	**1 point**	**D**					**A E**
	Credit Value	Exemplary Performance	Submittal Phase	Decision Maker				

Intent: To conserve energy beyond the prerequisite standard to reduce environmental impacts associated with excessive energy use

Requirements:

Option A—equipment efficiency and appropriate zoning

- Install HVAC systems that comply with the prescriptive criteria for mechanical equipment efficiency requirements in the New Buildings Institute, Inc.'s *Advanced Buildings: Energy Benchmark for High Performance buildings (E-Benchmark)*, Secs. 2.4 (excluding ASHRAE Standard 55), 2.5, and 2.6 (1 point)
- Incorporate separate zone and control measures, as appropriate, for private offices, specialty occupancies, solar exposure, and/or interior spaces (1 point)

Option B—HVAC energy performance 15%–30% savings

- Perform 15% better than HVAC system energy performance criteria in tenant space and comply with ANSI/ASHRAE/IESNA standard 90.1-2004 (1 point)
- Perform 30% better than HVAC system energy performance criteria in tenant space (1 point)

Submittal:

Option A—equipment efficiency and appropriate zoning

- Confirmation of option compliance
- Descriptions of
  - –HVAC system serving the tenant space
  - –building level system
  - –how the zones were determined (if applicable)
  - –control logic (if applicable)
  - –potential energy savings (if applicable)

Option B—HVAC energy performance 15%–30% savings

- Confirmation of option compliance
- Descriptions of the HVAC system serving the tenant space the building level system
- Completion of the ECB Compliance Form, including:
  - –HVAC energy uses
  - –energy type
  - –electric in kilowatt-hours
  - –gas in units of 100 cubic feet
  - –energy use in 10^3 British thermal units
  - –annual cost in dollars
  - –project area in square feet
  - –total segment area in square feet

Exemplary Performance: For project team choosing option B, demonstrate that the HVAC system component performance criteria used for tenant spaces are 45% better than a system in minimum compliance with ANSI/ASHRAE/IESNA Standard 90.1-2004

Key Terms:

- Daylighting
- Daylight-responsive lighting controls
- Design energy cost (DEC)
- Default energy consumption
- Interior lighting power allowance
- Lighting power density (LPD)
- Luminaire
- Plug load
- Rated power
- Tradable renewable certificate (REC)

Referenced Standards:

- New Buildings Institute, Inc., *Advanced Buildings: Energy Benchmark for High Performance Buildings (E-benchmark)*
- ANSI/ASHRAE/IESNA Standard 90.1-2004, *Energy Standard for Buildings Except Low-Rise Residential Buildings*

NOTES