



Green Building Practices and LEED Green Associate Exam Preparation

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GA01 LEED Core Concepts Guide - Section 3. Sustainable Thinking at Work: New Processes for Building Green

Green Building

Green building requires a new way of thinking and approaching the design, construction, operation, and renovation of buildings and communities.

- How do teams organize as part of an **integrative process**?
- How do **systems** thinking change the way sites are developed?
- How does **life-cycle assessment** affect materials selection?

How does this new approach work in real life?

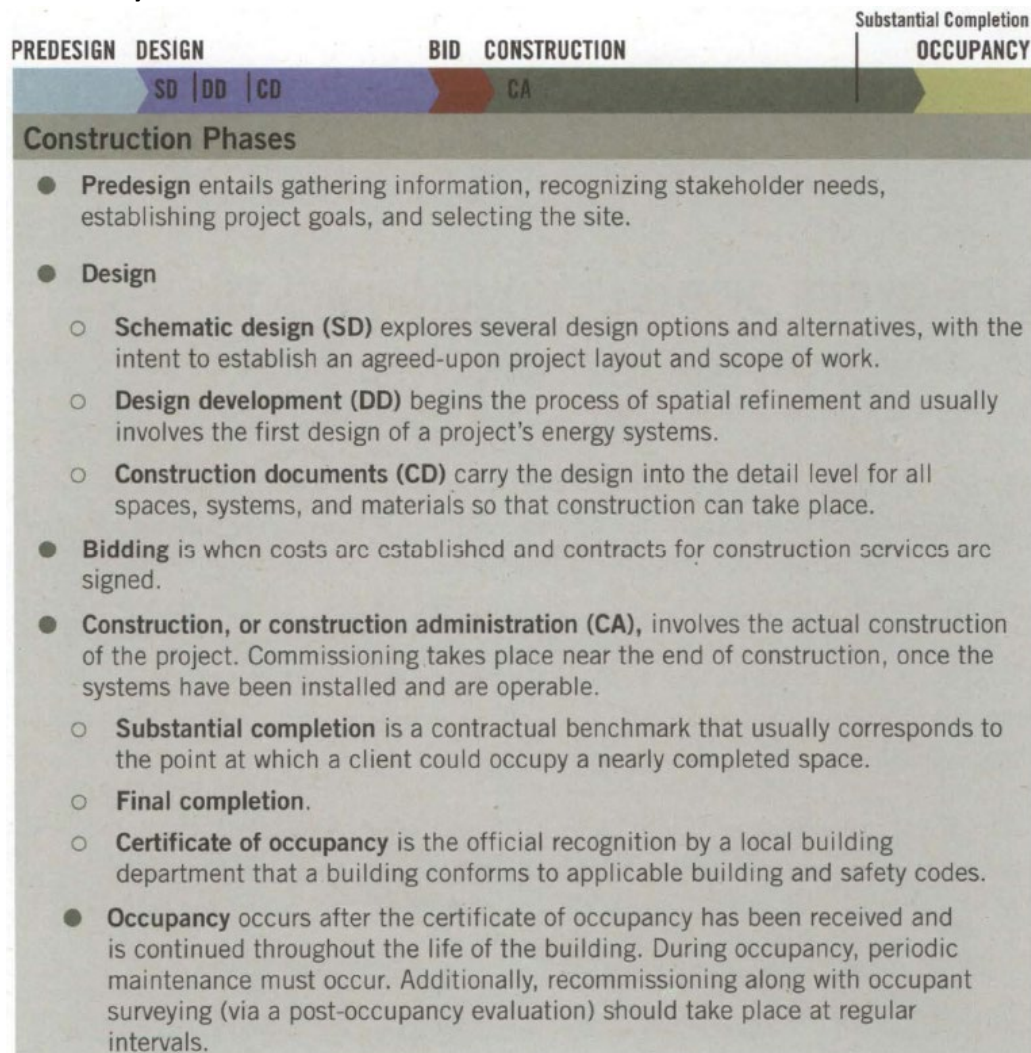
Getting Started

Principles for Successful Practice

Process Matters

A good process is essential to good outcomes.

Get in Early



Follow Through

- Ensure that the strategies and technologies are maintained or adapted as necessary to remain effective.
- Ongoing training ensures knowledgeable operation and maintenance of these strategies and technologies, as well as an opportunity to provide feedback on the challenges faced and lessons learned.

Look Beyond First Costs to Long-Term Savings

- Green Building often shifts cost earlier. Increased efficiency and savings come later.
- Up-front goal setting, analysis, and evaluation of alternatives will assist in making decisions that result in savings over the long term through synergies and integration.
- Synergies are actions that complement each other, creating a whole greater than the sum of its parts.
- The savings are often reflected in life-cycle costing.

Include and Collaborate

- Multidisciplinary team of professionals
- Members of the community involved or affected by the project
- Look at the big picture, not just individual elements

Establishing an Iterative Process

Integrated Project Delivery (IPD)

an approach that involves people, systems, and business structures (contractual and legal agreements) and practices. The process harnesses the talents and insights of all participants to improve results, increase value to the owner, reduce waste, and maximize efficiency through all phases of design, fabrication, and construction. (Adapted from American Institute of Architects)

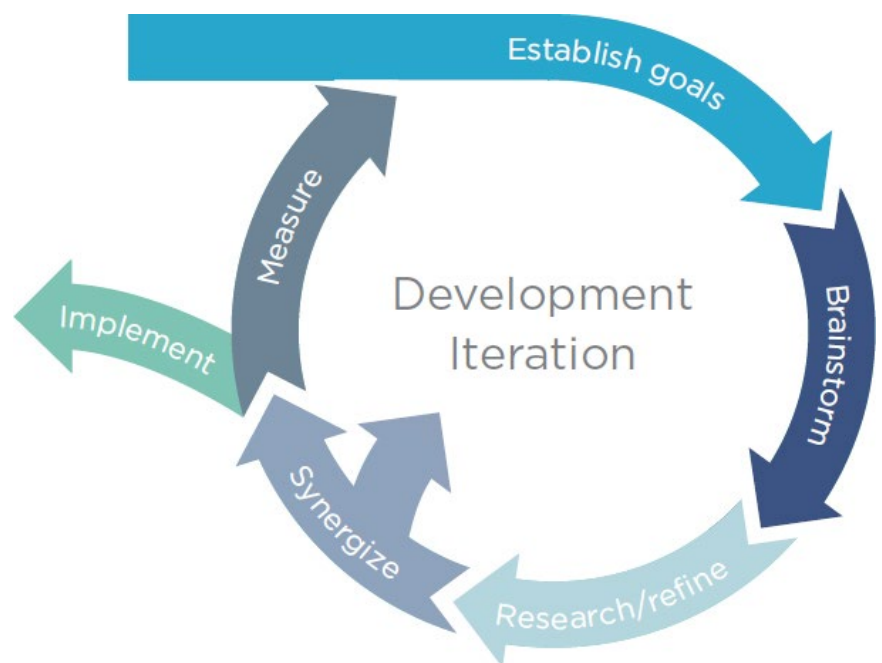
Design-build and IPD enable team members to participate from the early project stages, including goal setting and initial brainstorming.

Iterative Process

- An iterative process is circular and repetitive. It provides opportunities for setting goals and checking each idea against those goals.
- Defining critical milestones, assigning champions, and clarifying goals up front will enable projects of all sizes and types to incorporate sustainability more effectively.

Types of Meetings

- Charrette
- Team Meeting
- Small Task Group
- Stakeholder Meeting



Charrette

an intensive, multiparty workshop that brings people from different disciplines and backgrounds together to explore, generate, and collaboratively produce design options.

At least one initial strategy meeting or LEED “charrette” generally held at the beginning of the project
Charrettes assist in establishing green goals

Goal – to develop possible design and strategies for greening a space

Deliverables

The typical deliverables from the initial strategy meeting are:

- LEED certification goal (certification level)
- LEED scorecard that shows the targeted credits for pursuit (LEED checklist)

Team Meeting

Allow the group to work together creatively on new synergies.

Small Task Group

Opportunity to explore particular topics, conduct research, and refine the ideas for presentation at a later team meeting.

Stakeholder Meeting

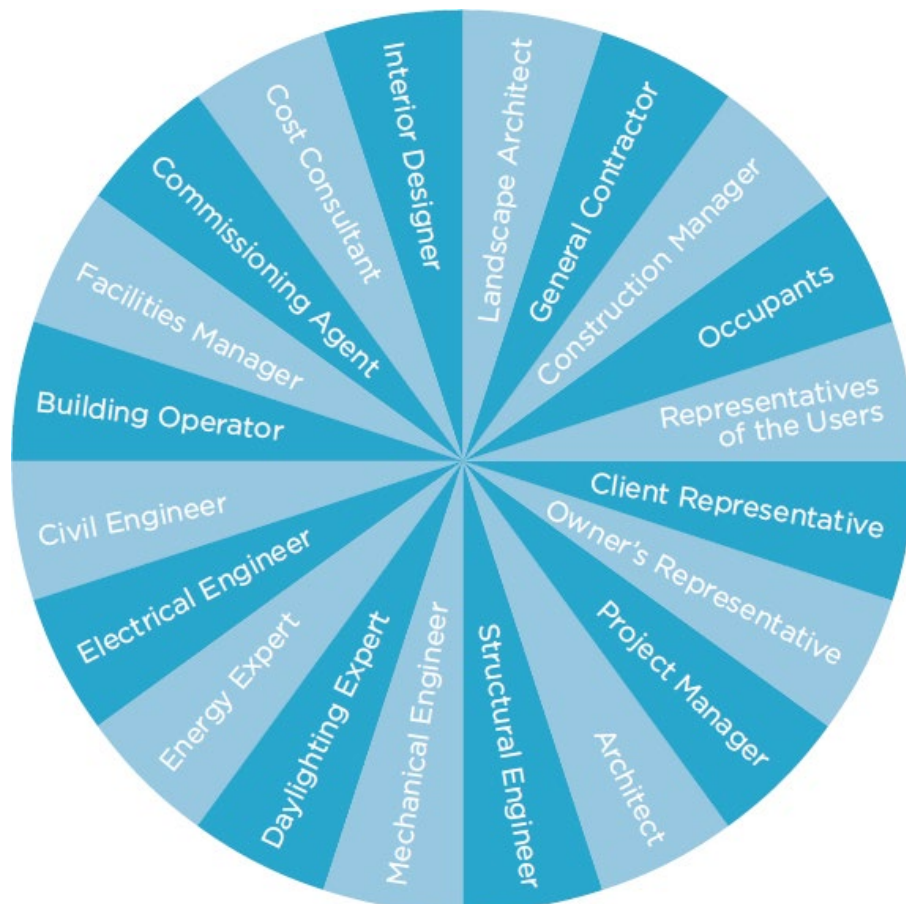
Held with neighbors, community members, and others with a vested interest in the project.

They enhance a project team’s interaction with and understanding of community issues, concerns, and ideas.

Team Selection

Project Team

Broad
Inclusive
Collaborative
Provide Training



Goal Setting

Green Building Projects

Must be grounded in strong goals and set a pathway to ensure they are achieved.

Clear goals articulate what the project will be designed to accomplish, by:

- Making sure that the vision is clear
- Providing a frame of reference for the whole project
- Defining the sustainability targets and keeping the project on track to meet them

Metrics and Targets

Goals

S = Specific
M = Measurable
A = Attainable
R = Realistic
T = Timely

Assessments and Measurements

Metrics
→ Qualitative
→ Quantitative

Example

Goal - neighborhood project be walkable

Quantitative

Percentage of homes that are within a quarter-mile of destinations such as parks, restaurants, and stores.

Qualitative

Does the project have functional sidewalks?

Observation of the System

Data Gathering and Interpretation

Often requires expertise of technical specialists:

Hydrologists
Ecologists
Engineers
Economists
Anthropologists

Tools

Systematic data collection and analysis
Mapping
Occupant surveys
Building walkthroughs
Audits

Geographical information systems (GIS) can help illustrate how different elements intersect and overlap.

Map layers might show soils, infrastructure, shade, wind patterns, species distribution, land uses, demographics, roads and transit routes, traffic patterns, walkways and barriers, material flows, and solid waste pathways.

Maps can also display growth projections, targeted development areas, and other indicators of how the site is likely to change over time.

OBSERVING A SYSTEM

To observe and understand the site, team members must ask many questions:

- What are the general climatic patterns of the site? What are the microclimates, and how and why do they occur? How does water fall on and run off the site? How does the sun affect these conditions?
- What are the soils like on the site? Are they rich loam or hard clay? Has the site ever been used for agriculture? Can it be used to grow food now?
- What plants and animals exist on the site? How did they get there? Are they healthy or stressed?
- How does energy get to the site? Is the site remote or connected to a utility grid?
- Are there roads? What type? Where do they go? Do they have sidewalks? How do the current occupants use this infrastructure?
- What kind of buildings are on the site? How tall are they? How do they connect to the street? Are they new or old? Occupied or vacant? What are they used for?

Exploration and Selection of Technologies and Strategies Sustainable Design

Requires thinking methodically through the types of strategies for each aspect of the system and evaluating alternatives against project goals through an iterative process.

Example - Designing a new waste management plan

Waste Hauler #1

Cost less

Accepts only sorted recyclables

Waster Hauler #2

Higher recycling diversion rate

Accepts commingled recyclables

Team values both recycling and cost savings. Now what?

What if another project goal is to reduce GHG emissions associated with solid waste?

The team would then have to consider additional information, such as the distance of each waste management facility from the project site, the types and sizes of trucks used for hauling, and their associated emissions factors.

That example illustrates four important points.

- When systems thinking is applied to sustainable design, it is often necessary to consider information beyond cost. A wide range of tools can help teams evaluate components of a system, including modeling, life-cycle analysis, and life-cycle cost analysis, as well as inventorying. These tools and technologies will be discussed in Section 4.
- Even if the system is evaluated using a complex computer model, the best solution may depend on the team's goals, metrics, and targets, as well as their resources. The alternatives must be analyzed and evaluated against the goals.
- Although alternatives are often viewed as an either-or choice, there may be more than two options. In the waste hauler example, the question is about more than which hauler to select. When deciding between two alternatives, the project team must ask whether there is a third option (or a fourth or a fifth ...). The question can spark the creativity needed to find new solutions that lead to sustainability.
- Sometimes other variables, besides goals, targets, and costs, may make certain solutions inappropriate for the site. Sustainable design means finding not only the measures that perform best in a model but also the solutions that will perform best over the life of the project.

EVALUATING STRATEGIES

For existing building projects, the evaluation process should take the following steps:

- Set goals
- Benchmark performance
- Identify improvement opportunities
- Prioritize and align improvement opportunities with the project goals
- Implement the program
- Measure performance and undergo third-party verification
- Set revised or new goals

Value Engineering

a formal review based on the project's intended function and conducted to identify alternatives that reduce costs and improve performance, is a critical part of the sustainable design process.

Implementation

Planning and Design Phase

Up-front Planning

- Helps keep a project on schedule and on budget
- Protects achieving the projects goals

FROM PLANNING TO PRACTICE

Management plans for design-build construction projects are critically important; they must be developed, implemented, and documented.

A **construction activity pollution prevention plan** addresses measures to prevent erosion, sedimentation, and discharges of potential pollutants to water bodies and wetlands.

An **indoor environmental quality management plan** spells out strategies to protect the quality of indoor air for workers and occupants; it includes isolating work areas to prevent contamination of occupied spaces, timing construction activities to minimize exposure to off-gassing, protecting the HVAC system from dust, selecting materials with minimal levels of toxicity, and thoroughly ventilating the building before occupancy.

A **waste management plan** addresses the sorting, collection, and disposal of waste generated during construction or renovation. It must address management of landfill waste as well as recyclable materials.

THE FOLLOWING STRATEGIES CAN HELP PROJECTS MEET SUSTAINABILITY GOALS DURING CONSTRUCTION:

- Reducing the amount of fossil fuels used in construction equipment by minimizing grading and earth moving, as well as using biodiesel or other alternative fuels.
 - Preventing air and water pollution by addressing dust and implementing a construction activity pollution prevention plan.
 - Ensuring indoor air quality by following an indoor environmental quality management plan for protecting ductwork and pervious materials, preventing dust, and protecting any occupied spaces from pollutants.
 - Minimizing landfill waste by reducing construction debris and following a waste management plan that addresses waste separation and hauling, also saving costs.
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Documentation

Essential for verifying achievement of sustainability goals

Maintain clear and organized documentation throughout implementation will help to ensure success.

Examples:

Change orders

Chain-of-custody letters

Waste hauling tickets

Updated/revised construction management plans

Commissioning or retrocommissioning reports

LEED documents

On-Going Performance

Green Buildings and Neighborhoods

The construction and operations of green building and neighborhood projects are never really complete.

- Requires on-going delivery or production of resources
- Routine maintenance and upkeep
- Data collection and feedback
- Training – occupants and personnel

Building System Performance

Regular inspections and maintenance to reveal problems or opportunities for improvement:

- Retro-commissioning
- Energy and water audits
- Solid waste audits
- Occupant surveys, including thermal comfort and transportation analysis
- Green purchasing and green housekeeping program assessments

Measurement and Verification

- Essential to identifying opportunities for improvement.
- The right information needs to flow to the right place.
- The flow of information can be used as a feedback loop within the built environment to promote continuous improvements and support the commitment to sustainability.

SUCCESS DEPENDS ON THESE ESSENTIALS:

- Start early
- Find the right team and process
- Understand the systems across space and time
- Develop clear and measurable goals
- Follow an iterative process to ensure achievement of goals
- Commit to continuous improvement