Green Associate Exam Prep



Green Associate Exam Prep

Provide information and study techniques that will assist you in passing the LEED Green Associate examination.



Green Associate Exam Prep

- Describe LEED and the procedures and requirements to sign-up for the LEED Green Associate (GA) Examination
- Describe how the GA Exam is constructed and the content it tests
- Describe the LEED application process.



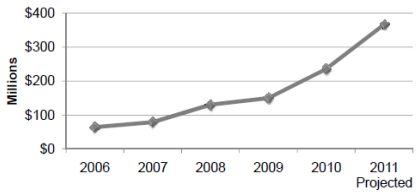
Why are we doing this?

1. To protect the environment
2. Because clients want this
3. To save money
4. More productive work environments
5. Stay ahead of competitors

Overview

KRAUS-ANDERSON®
CONSTRUCTION COMPANY

Green Construction



KRAUS-ANDERSON®
CONSTRUCTION COMPANY

Green Construction

Type	Projected 2011	2010	2009	2008	2007	2006
Office	$37,389,885	$24,845,229	$19,205,600	$34,151,577	$46,400,000	$40,700,000
Retail	$0	$0	$0	$4,417,000	$0	$0
Healthcare	$60,000,000	$71,000,000	$58,240,705	$32,978,000	$0	$0
Education	$94,310,072	$49,691,000	$29,640,000	$50,037,008	$21,502,007	$12,002,006
Government	$30,418,753	$42,791,482	$42,678,521	$8,069,000	$11,300,000	$4,000,000
Dist. & Whse.	$53,360,000	$46,640,000	$0	$0	$0	$7,300,00
TOTAL	$366,478,710	$234,978,711	$149,764,826	$129,652,585	$79,200,000	$64,000,000

Green Associate Exam Prep

- LEED means. Leadership in Energy and Environmental Design
- LEED is a system devised by the United States Green Building Council to promote the concept of building green.
- The LEED rating system established the LEED rating system for measurable performance standards and strategies for sustainable buildings.

Resources

Download and save:

•LEED Green Associate Candidate Handbook at
www.GBCI.org

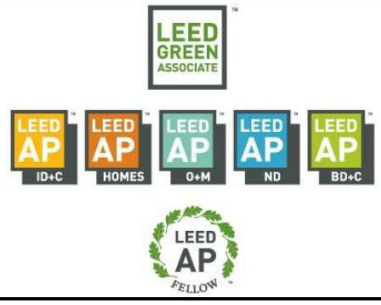
•LEED 2009 NC Guide pdf at
www.usgbc.org

Green Associate Exam Prep

- A means of recognizing buildings which incorporate strategies for sustainable operation.
- Points are awarded for green techniques employed in building construction and operation.
- Buildings are certified and ranked by the number and type of green strategies they employ:
  - Certified
  - Silver
  - Gold
  - Platinum



Green Associate Exam Prep



Green Associate Requirements

- You must agree to conform with the
  - Disciplinary policy
  - Credential maintenance program
- In addition, you must:
  - Have previous experience supporting a LEED registered project, OR
  - Be working in a sustainable field of work, OR
  - Have attended a green building principles program (such as this).
  - A certificate of completion will be provided.

Credential Maintenance Program CMP

- After passing the exam you will become a Green Associate
- To keep this credential current, you are required to
  - Participate in 15 hours of continuing education every two years
  - Three hours must be from an approved LEED program
  - There is a $50.00 fee for every two years of registration

Green Associate Exam Prep

- Go to www.gbci.org and click on:

CREDENTIALS & CERTIFICATES

Green Associate Exam Prep

http://www.greenexamprep.com/

http://www.greenexamprep.com/store/products/PTLEEDGREENASSOCIATE.html

Green123

Green Associate Exam Prep

- Enter your name
- Enter your company's Corporate Access ID to save $50.00 on the exam fee (Portal-Green-Going Green)
- Select "Green Associate" credential
- Scan your certificate of completion
- Electronically sign the GBCI's:
  - Terms and Conditions
  - Discipline Policy, and
  - Credential Maintenance Program Guidelines.

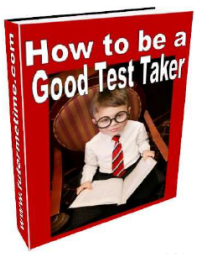
Green Associate Exam Prep

- Pay a $50.00 application fee ANOKA GRANT Refund!
- Print the confirmation
- Receive notice
- REGISTER for and complete the exam within one year PAY $150 as a member. (NOT $200!!!!!!!!!!)
- Three tries to pass the exam
- Then a 90 day wait to reapply.



Green Associate Exam Prep

- 100 multiple-choice/multiple-response questions
- Time: Two hours
- Administered on computer at a testing facility
- Random questions – different each time you take it.
- Scored immediately after completion



Examination Content

1. Synergistic Opportunities & LEED Application Process
2. Project Site Factors
3. Water management
4. Project systems and energy impacts
5. Acquisition, Installation & Management of Project Materials
6. Stakeholder involvement and innovation
7. Project surroundings and public outreach

GBCI Candidate Handbook

- View outline on pp. 13 – 14
- Note topics in outline

Sample LEED GA Score Report

- Upon completion of exam, you are given a signed, stamped report
- Keep report and pdf a copy to KAU

Kraus-Anderson Construction Company Green Associate Test Report Category Results

Category													
Synergistic Opportunities and LEED Application Process	94%	88%	94%	100%	82%	94%	76%	82%	82%	100%	94%	76%	88%
Project Site Factors	100%	69%	77%	85%	92%	92%	85%	69%	92%	100%	85%	85%	86%
Water Management	92%	85%	92%	85%	92%	100%	100%	92%	92%	92%	77%	100%	92%
Project Systems & Energy Impacts	72%	83%	100%	89%	72%	94%	78%	78%	100%	94%	83%	78%	85%
Acquisition, Installation and Management of Project Materials	82%	91%	82%	91%	73%	100%	82%	91%	100%	100%	100%	82%	90%
Stakeholder Involvement in Innovation	89%	78%	89%	89%	67%	100%	100%	78%	89%	89%	100%	100%	89%
Project Surroundings & Public Outreach	100%	75%	75%	100%	100%	75%	75%	75%	75%	100%	75%	75%	83%
Score Achieved	184	175	185	187	175	193	179	173	188	195	183	176	181

Question Format Sample

The Materials and Resources category directly addresses which of the following (Choose two)

(A) Habitat conservation
(B) Durable goods
(C) Energy Consumption
(D) Landscape
(E) Waste Stream

Question Format Sample

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Examination Grading

- Passing: 170 out of 200 points
- Questions scaled by difficulty
- Difficulty NOT based the number of correct responses
- Based on how hard it is to answer each question correctly

Examination Content

- Types of projects and their rating systems
- LEED project requirements and cost implications
- LEED project application process
- Credits and prerequisites



Examination Content



LEED for New Construction (NC)

- New buildings & major renovations including:
  - Significant HVAC
  - Envelope modifications
  - Major interior habilitation
- For commercial occupancies
  - Offices
  - Institutional buildings
  - Hotels
  - Residential (4+stories)
- Shared tenant space



LEED for Core & Shell (CS)



- For projects where the developer controls the design and construction of core & shell
  - Mechanical
  - Electrical
  - Plumbing
  - Fire

LEED for Schools

- For new schools & major renovations
- Projects campus can be:
  - LEED for schools or
  - LEED for schools NC
    - Administration
    - Maintenance
    - Dorms
    - Colleges
    - Pre-K



LEED for Existing Buildings O&M

- Commercial & institutional
  - Offices
  - Retail and service
  - Institutional
  - Hotels
  - Residential
- Can apply to
  - Buildings new to LEED
  - Buildings previous certified
    - New construction
    - Schools
    - Core & shell



LEED for Existing Buildings O&M

- Applicable for
  - Building operations
  - Process & systems upgrades
  - Minor space-use changes
  - Facility alterations & additions
- Individual tenant spaces do not apply for whole-building rating



LEED for Commercial Interiors (CI)



- For tenant spaces
  - Office
  - Retail
  - Institutional buildings
  - Leased tenant space
- Coordinates with Core & Shell certification

LEED for Homes

- New residences
- Major re-models of existing homes
- Single family
- Low-rise multi-family
- Affordable
- Production
- Manufactured
- Modular



LEED for Neighborhood Development ND



- Neighborhoods
  - Whole
  - Fractional
  - Multiple
- Complimenting projects
- Larger developments
- Potential "Portfolio" Program

Multiple Certifications

Previously LEED certified for New Construction, Core & Shell, and Schools, can be certified under LEED for Existing Buildings: Operation & Maintenance.



Multiple Certifications

Buildings certified for LEED Core & Shell can include tenant spaces certified under LEED for Commercial Interiors.



Multiple Certifications

LEED certified for Neighborhood Development can earn additional points for the design, construction or retrofit of a LEED certified building that are part of the project.



Practice Question

The LEED CI rating system can be applied to which of the following projects? (Choose two)

(A) Major envelope renovation of a building
(B) Renovation of part of an owner-occupied building
(C) Tenant infill of an existing building
(D) Upgrades to the operation and maintenance of an existing facility

Practice Question

The LEED CI rating system can be applied to which of the following projects? (Choose two)

(A) Major envelope renovation of a building
(B) Renovation of part of an owner-occupied building
(C) Tenant infill of an existing building
(D) Upgrades to the operation and maintenance of an existing facility

Major Project Requirements

Major project requirements for any project include its:

- **Project Site**
- **Program**
- **Project Budget**
- **Schedule**

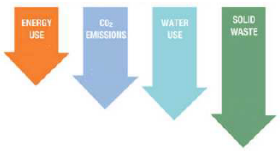


Project Requirements: Project Site

Site location and building orientation

- Environmental issues
  - Pollution
  - Stormwater
  - Habitat protection
- Transportation
  - Public transportation
  - Parking
  - Bicycle storage
- Development density and open space

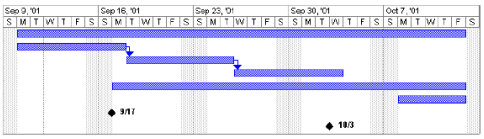
Green Associate Exam Prep



Specific elements that will be included in the project:

- Water management
- Energy consumption
- Materials and Waste Management
- Indoor Air Quality

Project Budget and Schedule



- Alignment of project goals with project budget – feasibility
- Coordination and involvement of multiple trades
- Early start to allow for a realistic schedule

Minimum Program Requirements

To achieve LEED Certification, projects must meet **minimum program requirements** because it:

- Guides customers
- Protects the integrity of LEED
- Reduces challenges during the certification process



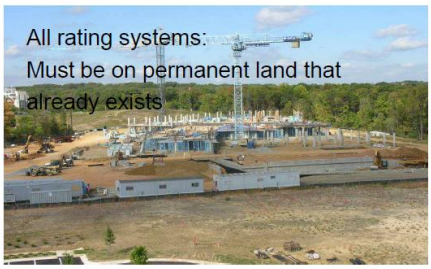
MPR Environmental Laws

LEED New Construction; Core & Shell; Commercial Interiors; and Schools:

- Must comply with federal, state and local environmental laws
- Must be satisfied from schematic design through certificate of occupancy/ ready for use



MPR Complete & Permanent Project



Green Associate Exam Prep

End of Session 1

2 hour Session

Green Associate Exam Prep

LEED Project Checklist activity

DIRECTIONS: Using the LEED project checklist as a reference, answer the questions on the worksheet.

LEED Project Checklist Sustainable Sites SS

Y	Prereq 1	Construction Activity Pollution Prevention	Required
	Credit 1	Site Selection	1
	Credit 2	Development Density and Community Connectivity	5
	Credit 3	Brownfield Redevelopment	1
	Credit 4.1	Alternative Transportation - Public Transportation Access	6
	Credit 4.2	Alternative Transportation - Bicycle Storage and Changing Rooms	1
	Credit 4.3	Alternative Transportation - Low-Emitting and Fuel-Efficient Vehicles	3
	Credit 4.4	Alternative Transportation - Parking Capacity	2
	Credit 5.1	Site Development - Protect or Restore Habitat	1
	Credit 5.2	Site Development - Maximize Open Space	1
	Credit 6.1	Stormwater Design - Quantity Control	1
	Credit 6.2	Stormwater Design - Quality Control	1
	Credit 7.1	Heat Island Effect - Nonroof	1
	Credit 7.2	Heat Island Effect - Roof	1
	Credit 8	Light Pollution Reduction	1

LEED Project Checklist Water Efficiency WE

Y	Prereq 1	Water Use Reduction	Required
	Credit 1	Water Efficient Landscaping	2 to 4
		Reduce by 50%	2
		No Potable Water Use or Irrigation	4
	Credit 2	Innovative Wastewater Technologies	2
	Credit 3	Water Use Reduction	2 to 4
		Reduce by 30%	2
		Reduce by 35%	3
		Reduce by 40%	4

LEED Project Checklist Energy and Atmosphere EA

Y	Prereq 1	Fundamental Commissioning of Building Energy Systems	Required
Y	Prereq 2	Minimum Energy Performance	Required
Y	Prereq 3	Fundamental Refrigerant Management	Required
	Credit 1	Optimize Energy Performance	1 to 19
		Improve by 12% for New Buildings or 8% for Existing Building Renovations	1
		Improve by 14% for New Buildings or 10% for Existing Building Renovations	2
		Improve by 16% for New Buildings or 12% for Existing Building Renovations	3
		Improve by 18% for New Buildings or 14% for Existing Building Renovations	4
		Improve by 20% for New Buildings or 16% for Existing Building Renovations	5
		Improve by 22% for New Buildings or 18% for Existing Building Renovations	6
		Improve by 24% for New Buildings or 20% for Existing Building Renovations	7
		Improve by 26% for New Buildings or 22% for Existing Building Renovations	8
		Improve by 28% for New Buildings or 24% for Existing Building Renovations	9
		Improve by 30% for New Buildings or 26% for Existing Building Renovations	10
		Improve by 32% for New Buildings or 28% for Existing Building Renovations	11
		Improve by 34% for New Buildings or 30% for Existing Building Renovations	12
		Improve by 36% for New Buildings or 32% for Existing Building Renovations	13

LEED Project Checklist Energy and Atmosphere EA

		Improve by 36% for New Buildings or 32% for Existing Building Renovations	13
		Improve by 38% for New Buildings or 34% for Existing Building Renovations	14
		Improve by 40% for New Buildings or 36% for Existing Building Renovations	15
		Improve by 42% for New Buildings or 38% for Existing Building Renovations	16
		Improve by 44% for New Buildings or 40% for Existing Building Renovations	17
		Improve by 46% for New Buildings or 42% for Existing Building Renovations	18
		Improve by 48%+ for New Buildings or 44%+ for Existing Building Renovations	19
	Credit 2	On-Site Renewable Energy	1 to 7
		1% Renewable Energy	1
		3% Renewable Energy	2
		5% Renewable Energy	3
		7% Renewable Energy	4
		9% Renewable Energy	5
		11% Renewable Energy	6
		13% Renewable Energy	7
	Credit 3	Enhanced Commissioning	2
	Credit 4	Enhanced Refrigerant Management	2
	Credit 5	Measurement and Verification	3
	Credit 6	Green Power	2

LEED Project Checklist Materials and Resources MR

Y	Prereq 1	Storage and Collection of Recyclables	Required
	Credit 1.1	Building Reuse - Maintain Existing Walls, Floors and Roof	1 to 3
		Reuse 55%	1
		Reuse 75%	2
		Reuse 95%	3
	Credit 1.2	Building Reuse - Maintain Interior Nonstructural Elements	1
2	Credit 2	Construction Waste Management	1 to 2
		50% Recycled or Salvaged	1
		75% Recycled or Salvaged	2
	Credit 3	Materials Reuse	1 to 2
		Reuse 5%	1
		Reuse 10%	2
	Credit 4	Recycled Content	1 to 2
		10% of Content	1
		20% of Content	2
	Credit 5	Regional Materials	1 to 2
		10% of Materials	1
		20% of Materials	2
	Credit 6	Rapidly Renewable Materials	1
	Credit 7	Certified Wood	1

LEED Project Checklist Indoor Environmental Quality IEQ

Y	Prereq 1	Minimum Indoor Air Quality Performance	Required
Y	Prereq 2	Environmental Tobacco Smoke (ETS) Control	Required
	Credit 1	Outdoor Air Delivery Monitoring	1
	Credit 2	Increased Ventilation	1
	Credit 3.1	Construction Indoor Air Quality Management Plan - During Construction	1
	Credit 3.2	Construction Indoor Air Quality Management Plan - Before Occupancy	1
	Credit 4.1	Low-Emitting Materials - Adhesives and Sealants	1
	Credit 4.2	Low-Emitting Materials - Paints and Coatings	1
	Credit 4.3	Low-Emitting Materials - Flooring Systems	1
	Credit 4.4	Low-Emitting Materials - Composite Wood and Agrifiber Products	1
	Credit 5	Indoor Chemical and Pollutant Source Control	1
	Credit 6.1	Controllability of Systems - Lighting	1
	Credit 6.2	Controllability of Systems - Thermal Comfort	1
	Credit 7.1	Thermal Comfort - Design	1
	Credit 7.2	Thermal Comfort - Verification	1
	Credit 8.1	Daylight and Views - Daylight	1
	Credit 8.2	Daylight and Views - Views	1

LEED Project Checklist
Innovation in Design ID

Credit 1	Innovation in Design	1 to 5
	Innovation or Exemplary Performance	1
	Innovation or Exemplary Performance	1
	Innovation or Exemplary Performance	1
	Innovation	1
	Innovation	1
Credit 2	LEED® Accredited Professional	1

LEED Project Checklist
Regional Priority RP

Credit 1	Regional Priority	1 to 4
	Regionally Defined Credit Achieved	1
	Regionally Defined Credit Achieved	1
	Regionally Defined Credit Achieved	1
	Regionally Defined Credit Achieved	1

Green Associate Exam Prep

Triple Bottom Line

Social Responsibility

Economic Prosperity

Environmental Stewardship

Green Associate Exam Prep

Minimum Program Requirement and Prerequisite Worksheet

*Complete worksheet using checklist and LEED NC guide.

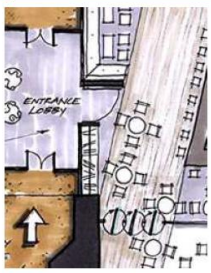
MPR Complete & Permanent Project

New Construction; Core and Shell; & Schools:

- Must include at least one building in its entirety
- Construction prerequisites and credits cannot be submitted for review until substantial completion of construction



MPR Complete & Permanent Project



Commercial Interiors:
Must include a complete interior space from other spaces with respect to:

- Ownership
- Management
- Lease
- Party walls

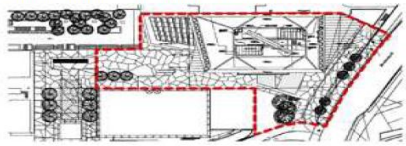
MPR Complete & Permanent Project

Existing Buildings Operations and Maintenance:
Must include one existing building in its entirety



MPR Reasonable Site Boundary

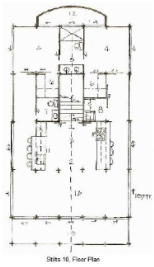
All rating systems require:
- LEED Project Boundary includes all land that was or will be disturbed for the LEED project that is owned by the LEED project party
- Manipulation of boundaries is not allowed



MPR Environmental Minimum Floor Area

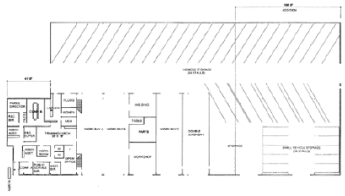
New Construction; Core and Shell; Schools & Existing Buildings Operations and Maintenance:

Minimum gross floor area is 1,000 square feet



MPR Environmental Minimum Floor Area

Commercial Interiors:
Minimum gross floor area is 250 square feet



MPR Minimum Occupancy Rates

All rating systems require:
One or more full time equivalent occupants



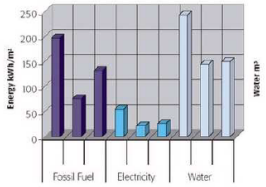
MPR Minimum Occupancy Rates



Existing Buildings Operations and Maintenance
Must be operating for a period of at least 12 months prior to submission for review

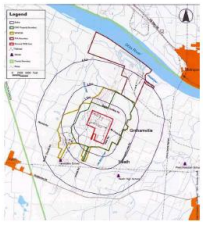
MPR Sharing Energy & Water Usage Data

All rating systems require:
Project must grant the USGBC and GBCI access to whole building energy & water usage data for at least 5 years.



MPR Minimum Building Area in Site Ratio

All rating systems require:
LEED project's total gross floor area must be at least 2% of the gross land area within the LEED project boundary.



Boundary Definitions

Project boundary: The outer limits of a project. LEED will allow you to use a "reasonable" project boundary since there may be no clear boundary. The boundary must be consistent through all LEED credits.

LEED boundary: Must include all land that was or will be disturbed by the LEED project party.

Property boundary: The site area. The outer limit of the site that encompasses all legal property including constructed and non-constructed areas.

Cost Definitions

Hard costs:
Physical construction costs including building and landscaping materials

Soft costs:
Architectural, engineering and legal fees as well as pre- and post-construction expenses

Life-cycle costs:
The sum of all costs over the full life span of a project

Used in LEED to evaluate the economic performance and practicality of systems.

Cost Implications

- Many projects achieve LEED certification within their budgets and in the same cost range as non-LEED projects.
- Even though construction costs are rising, projects are still achieving LEED status.
- The idea that green is an added feature of design and construction continues to be a problem.

"Cost of Green Revisited: Reexamining the Feasibility and Cost Impact of Sustainable Design in the Light of Increased Market Adoption"

David Langdon

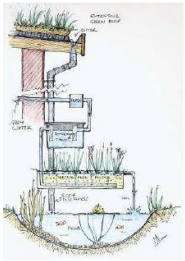
Examples of Justified Upfront Costs

Solar panels are a large upfront cost, but pay for themselves over the lifetime of the building.



Examples of Justified Upfront Costs

Equipment installed for capturing rainwater, recycling graywater and treating wastewater has a large upfront cost but will save money on operation/utility cost for potable water usage.



Examples of Justified Upfront Costs

Vegetated roofs add design and construction cost, but they lessen energy costs as they prevent heat loss in winter and reduce cooling loads in summer.



Green Associate Exam Prep

Which of the following describes the property area?

(A) The area of the project site impacted by the building and hardscapes
(B) The area of the project site impacted by hardscapes only
(C) The area of the project site impacted by the building only
(D) The total area of the site including constructed and non-constructed areas.

Green Associate Exam Prep

Which of the following describes the property area?

(A) The area of the project site impacted by the building and hardscapes
(B) The area of the project site impacted by hardscapes only
(C) The area of the project site impacted by the building only
(D) The total area of the site including constructed and non-constructed areas.

Green Associate Exam Prep

Which of the following do all LEED rating systems contain? (Choose three)

(A) Core credits
(B) Educational credits
(C) Innovation credits
(D) Operational credits
(E) Prerequisites

Green Associate Exam Prep

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(C) Innovation credits
(D) Operational credits
(E) Prerequisites

Green Associate Exam Prep

A building that will be partially occupied by the owner may pursue LEED CS certification if the building owner occupies no more than what percent of the building's leasable space?

(A) 25%
(B) 50%
(C) 75%
(D) 80%

Green Associate Exam Prep

A building that will be partially occupied by the owner may pursue LEED CS certification if the building owner occupies no more than what percent of the building's leasable space?

(A) 25%
(B) 50%
(C) 75%
(D) 80%

LEED Application Roles

LEED Accredited Professional (AP)
- Coordinates all disciplines on the project team
- Manages documentation templates
- Holds team members responsible for each credit
- Coordinates trades regarding codes and standards

Green Associate Exam Prep

Project Administrator
- Responsible for access to LEED-Online
- Validates project information
- Assigns credit responsibility
- Submits complete submittal for design or construction review via LEED-Online

Project Registration

- Registered online via the GBCI website for access to:
  - Credit templates (Letter Templates)
  - Point of contact with GBCI
  - Rating system errata and information
  - Maximum potential for achieving certification
- Flat fee for registration:
  - USGBC Members - **$900**
  - Non-members - **$1200**

Project Registration

- Project type
- General project information
- Project administrator contact information
- Project owner information
- Project details to include:
  - Scope
  - Conditions
  - Square footage
  - Budget



LEED Online

My Project Page

Project Registration – Download LEED checklist

Project Dashboard (Project Homepage)

- Access to all LEED-Online items
- Team Administration
- Credit Interpretation Rulings (CIRs)
- Scorecard tab – assigns credits to team members
- LEED Templates
- Timeline
- Post Certification Tab – Brand store certificates, etc

•to see an overview of LEED Online v3

Green Associate Exam Prep

The LEED Online workspace allows the LEED project administrator to do which of the following? (Choose three)

(A) Apply for LEED EBO&M pre-certification
(B) Assign credits to project team members
(C) Build a project team
(D) Review credit appeals submitted by other project teams
(E) Submit projects for review

Green Associate Exam Prep

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LEED Credit Forms

- The project administrator assigns each credit form to a team member; each credit's requirements and data are completed via LEED-Online.
- LEED credit form elements include:
  - Template status
  - Manage Template
  - Credit Resources
  - Required Documents
  - Project Calculations

Submittal and Appeals

- Design Application Phase
  - GBCI marks credits as anticipated or denied within 25 days
  - Project team has 25 days to request clarification
  - GBCI issues Final Design Review within 15 days
  - Project team can either accept or appeal credit
- Construction Application Phase
  - Submitted after attempting pre-requisites and credits
  - GBCI marks credits as anticipated or denied within 25 days
  - GBCI issues Final Design Review within 15 days
  - Project team can either accept or appeal credit
- Certified / Denial Phase
  - LEED certified by level or closed with no further review

Credit Interpretation Request (CIR)

- A way to get technical and administrative guidance
- Submitted anytime after project registration
- Accomplished via LEED-Online
- Only one LEED requirement per submission
  - 600 words maximum
  - **Do not include confidential project information**
  - **Do not state credit name or contact information**
    - **(because it already is in heading)**
  - **Do not include attachments**
- CIR rulings are not guarantees; only information
- Only requested by project teams of registered project
- **Fee is $220**

Green Associate Exam Prep



Level	Points
Certified	40 – 49
Silver	50 – 59
Gold	60 – 79
Platinum	80 +

Fees are based on the rating system chosen and the size of the project.

Green Associate Exam Prep

Which is true about a CIR submittal?

(A) CIRs must be submitted as text-based inquiries
(B) Drawings an specification sheets must be submitted as attachments
(C) It must be a complete project narrative
(D) Text is limited to 1000 words

Green Associate Exam Prep

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Green Associate Exam Questions

- **Three Levels of Questions:**
  - **Recall questions** – test direct knowledge of concepts
  - **Application questions** – evaluate your knowledge fo procedures and performance
  - **Analysis questions** – test your reasoning and problem-solving abilities

Examination Preparation Tips

- Work on a LEED Project
- Interview someone who has worked on a LEED project
- Study the ***LEED Prep GA*** text
- Form a Study Group – participate in this class
- Take notes in the form of questions with answers on flash cards
- Take sample tests on paper and on-line

One Month Before the Exam

- Ensure that your identification matches the first name and surname in the My Credentials.
- Request reasonable accommodations if you have a documented disability
- Ensure that your address in My Credentials is current.

One Week Before the Exam

- Confirm that the exam is scheduled with Prometric for the correct date, time and location.
- Prepare to test without any aids. You cannot use:
  - Papers
  - Books
  - Food & beverages
  - Bags (purses)
  - Electronic devices

On the Day of the Exam

- Provide ID with a signature and photograph
- Prepare to take the exam via computer based testing
- The final scaled score will be provided at the conclusion of the exam
- Accept (sign) a non-disclosure statement that you will not reveal the contents of the exam to others.

Green Associate Exam Prep

End of 3 hour Session One

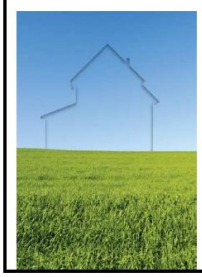
Rochester Dorm Project

- https://www.leedonline.com/irj/servlet/prt/portal/prtroot/com.sap.portal.navigation.portallauncher.anonymous
- **LEED Online Demo**

Objectives

- **Describe the LEED prerequisites and credits**
- **Identify specific LEED strategies for each of these topic areas:**
  - Sustainable Sites (SS)
  - Water Efficiency (WE)
  - Energy and Atmosphere (EA)
  - Materials and Resources (MR)
  - Indoor Environmental Quality (IEQ)
  - Innovation in Design (ID)
  - Innovation in Operations (IO)
  - Regional Priorities (RP)

Prerequisites



Mandatory requirements that a project must fulfill. If a project fails to meet even just one prerequisite, it does not qualify for LEED certification. This is the same as Minimum Project Requirements. No points are earned for fulfilling the requirements of a prerequisite.

Green Associate Exam Prep

Credits are points earned. Each credit contains a different strategy and specific requirements. The points are awarded to projects that fulfill those credit requirements.



Structure of Prerequisites and Credits

- Intent
- Requirements
- Environmental/ Economic Issues
- Related Credits
- Reference Standards
- Implementation
- Timeline and Team



Structure of Prerequisites and Credits



- Calculations
- Documentation Guidance
- Examples
- Exemplary Performance
- Regional Variations
- Resources
- Definitions

Phases of Building Design & Construction

- Predesign
- Schematic Design (SD)
- Design Development (DD)
- Construction Documents (CDs)
- Construction
- Substantial Completion
- Final Completion
- Certificate of Occupancy



Green Associate Exam Prep

- *Activity*
  - Construction Phase Definitions Sheet

Credit Achievement Strategies

- Identify LEED objectives and approaches early
- Identify LEED related credits
- Maintain consistency in project data and information
- Plan project operations and maintenance for sustainability

Exemplary Performance

- Also known as **innovation in design** points
- Doing more than is required to meet a credit
- Achieving a level of performance that exceeds or expands on the scope required by an existing LEED credit.
- Going beyond normal requirements
- Options are defined for each credit
- Not applicable for prerequisites
- Can be earned by achieving more than one compliance path within a requirement

Regional Priority Credits

- **The importance of some projects depends on the region in which they are located**
- **Within specific zip codes (regions), 6 existing credits are considered more important**
- **Each RPC is worth 1 bonus point**
- **When an RPC is earned, it also earns a bonus**
- **Up to 4 RPCs can be earned per project**



Green Associate Exam Prep

In each LEED rating system, how many points can a project team earn from Regional Priority credits?

(A) 2 points
(B) 4 points
(C) 6 points
(D) 8 points

Green Associate Exam Prep

In each LEED rating system, how many points can a project team earn from Regional Priority credits?

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(D) 8 points

Green Associate Exam Prep

- Green Associates must **know each referenced standard** for all LEED rating systems
- Referenced standards are codes or standards required to achieve a prerequisite or credit
- Examples:
  - **ASHRAE**
  - **SMACNA**
  - **Green Seal**

Credit Interactions

- Some credits interact positively with each other; these are **synergistic**
- Some credits inhibit each other and are **trade-offs**



Green Associate Exam Prep

- . **Projects earn a point if the accredited professional is a principle team project member**
- **The person in this position can**
  - **Streamline the LEED certification process**
  - **Coordinate documentation**
- **Must be documented with their name, company, role description and copy of LEED AP certificate**

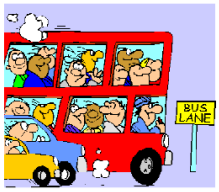
LEED GA Knowledge of Strategies

- You DO NOT have to know the names of
  - Specific Prerequisites, or
  - Credits

In the LEED rating system!
However,
- **You MUST memorize the basic strategies** that follow in this class to achieve LEED credits and certification.

Green Associate Exam Prep

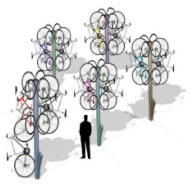
Develop in urban areas with existing infrastructure and plan with regard to transportation
Benefits include:
- **Connection to community resources**
- **Makes new infrastructure less necessary**
- **Reduces pollution and land development**



Carpool



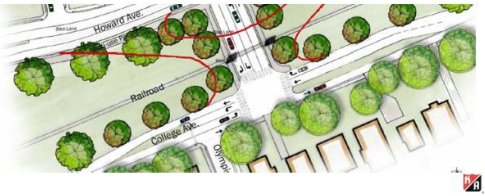
Project Site Factors – Community Connectivity



- **Projects should be located near busses and rail systems**
- **Provide bike storage**
- **Provide preferred parking for fuel efficient vehicles and carpooling**
- **Provide fueling stations for efficient vehicles**
- **Restrict parking lot size to promote carpooling**
- **Provide crosswalks, trails and ramps for walkers**
- **Alternative fuel vehicle support**

Community Connectivity Credit Interactions

Community connectivity and transportation credits complement each other. Building in areas with existing infrastructure coincides with site selection credits.



Green Associate Exam Prep

Examine the site area as it is affected by development and the site activity.
Benefits include:
• Maximizing open space for wildlife
• Maximizing open space for vegetation
For example:
Determine construction limits
Perform density calculations



Green Associate Exam Prep

Site area:
The outer limit of the site that encompasses legal property – both construction and non -constructed areas

Floor area ratio:
Floor area :Site Area

Building footprint:
Area of building structure

Development footprint:
Area affected by development & project site activity



Zoning Requirement Credit Interactions



Providing and/or keeping open vegetated space within a project will help project teams earn credits related to storm water and the heat island effect.

Green Associate Exam Prep

Which of the following strategies could lead to a project team's earning a Sustainable Site's credit?

(A)Minimizing storm water runoff
(B)Monitoring outdoor air delivery
(C)Using graywater for irrigation
(D)Using on-site renewable energy

Green Associate Exam Prep

Which of the following strategies could lead to a project team's earning a Sustainable Site's credit?

(A) Minimizing storm water runoff
(B) Monitoring outdoor air delivery
(C) Using graywater for irrigation
(D) Using on-site renewable energy

Project Site Factors – Development

Careful consideration of surface materials used throughout the project with regard to heat islands. This will decrease cooling loads, electricity consumption and it help wildlife and their habitat.



Heat Island Effect



Project Site Factors – Development Examples

Using hardscape materials and paving with high SRI and albedo
- Shading hardscapes with vegetation
- **Locating parking underground**
- Using roofing materials with higher SRI and albedo
- Vegetated roof
- **Maximize** use of parking space



Installation: Grass Porous Pavement



Fill rings with clean sharp sand



Lay sod or seed with mulch



Roll sod with heavy roller



Ready for use after two mowing cycles



Use regular mower—do not aerate

Case Study #2 - Reliant Stadium & Astrodome

The seven acres of grass porous pavement installed is, presently, the largest engineered grass porous paving system in the world, and an integral part of the thirty-acre green park setting. The cooler site provides the area with nearly three more months of use for public and private festivals and conventions, events formerly avoided because of the extremely high surface temperatures of Texas asphalt.

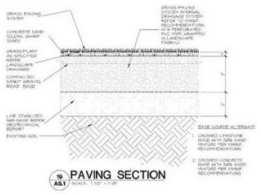




Case Study #2 - Reliant Stadium & Astrodome

As part of the "Greening of Reliant Park," 800 square meters of terra cotta gravel pavement was installed close to the Astrodome to be used as an emergency and truck access route. The cross section for this plan varied slightly from the normal grass porous pavement system technical specifications, since the system would be dealing with a tremendous amount of water. The grass pavement system is also a bioswale for much of the hard surface pavement.





PAVING SECTION

Maximize parking



Shared parking space



Green Associate Exam Prep

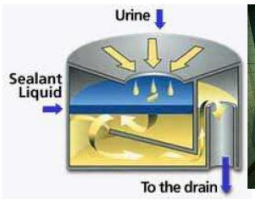


Heat Island Effect:
Urban areas have warmer temperatures because of solar energy retention on constructed surfaces
Solar Reflective Index (SRI):
Material's rejection of solar heat; black = 0, white = 100
Emissivity:
Ratio of radiation emitted by a surface compared to black
Albedo:
Fraction of light reflected by a surface
Green Roof:
Vegetated roof

Water Management – Reduce Water Use

Benefit: It conserves local and regional potable water resources
Examples:
- Using low-flow and low-flush fixtures
- Using non-potable water
- Mulching and adaptation of plants to site
- Using non-potable water from rainwater, graywater, and treated water
- Using high-efficiency micro-irrigation systems

Waterless Urinals



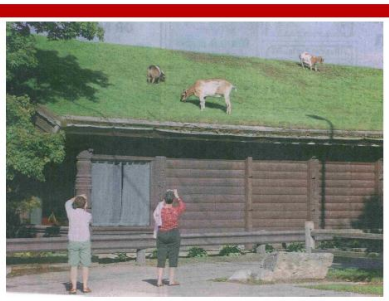


Water Management Credit Interactions

Rainwater capturing and treatment helps with storm water management; specific adaptive plant strategies help with habitat protection, open space requirements and energy performance, as well as the heat island effect.



Green Roof

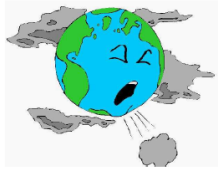


Green Associate Exam Prep

Potable water
Drinking quality water
Graywater
Untreated waste water without contact with toilet water
Blackwater
Toilet or urinal water and water from kitchen sinks
Stormwater Runoff
Precipitation that flows into sewers or other bodies of water
Baseline water demand
Normal water use inside and outside irrigation prior to application of LEED water management strategies



Green Associate Exam Prep



Benefit: Greenhouse gases deplete Earth's ozone and cause climate change
Examples:
• Use refrigerants with low ozone depletion potential and global warming potential
• Use CO2, Ammonia, Propane
• Avoid refrigerants
• Do not use halons, CFCs and HCFCs
• Phase out CFC-based refrigerants

Refrigerant Management Credit Interactions

Helps with energy performance as well as with thermal comfort for occupants of the building.

Green Associate Exam Prep

Which of the following are considered natural Refrigerants?

(A)Hydrofluorocarbons
(B)Carbon dioxide
(C)Hydrocarbons
(D)Chlorofluorocarbons
(E)Freon

Green Associate Exam Prep

Which of the following are considered natural Refrigerants?

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Flash Card Exercise



Green Associate Exam Prep



ODP:
Ozone Depletion Potential
GWP:
Global Warming Potential
CFCs:
Chlorofluorocarbons

HCFCs:
Hydrochlorfluocarbons
HFCs:
Hydroflurocarbons
Halons:
Fire extinguishing chemical

- **CxA** Commissioning Authority *Must have commissioned 2 previous buildings
- **Glazing Factor**
  - Window Area
  - Window Geometry
  - Visable Transmittance

Material Reuse (salvaged or reclaimed)
*material used for Other than Original use
Door made into a table

- **Building Reuse** *Material must be Part of Original building and used like original purpose
- **SCAQMD**
  - **South coast Air Quality Mgmt. District**
    - Adhesives
    - Sealants
    - Primers
    - Wood finishes
    - Floor coatings

ASHRAE 90
Energy code, modeling and lighting
ASHRAE 62 Ventilation
ASHRAE 55 Thermal
ASHRAE 52.1 Filters -MERV rating

Green Seal Aerosol adhesives, Architectural paints/coatings, anti-rust/corrosive paints
Green Label Carpet Pad
Green Label Plus Carpets

Green Associate Exam Prep

Which of the following chemical compounds are Commonly found in fire suppression systems
and
Increase ozone depletion (Choose two)

(A) Chlorofluorocarbons
(B) Halons
(C) Hydroflurocarbons
(D) VOCs
(E) water

Green Associate Exam Prep

Which of the following chemical compounds are Commonly found in fire suppression systems and Increase ozone depletion (Choose two)

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(B) Halons
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(D) VOCs
(E) water

Green Associate Exam Prep



Benefit: Reduces energy production from traditional sources that pollute and have other adverse effects

Examples:

- Utilize solar, water, wind, biomass & geothermal energy
- Purchase renewable energy certificates

Green Associate Exam Prep

Which of the following are renewable energy resources (Choose two)

(A) Ethanol
(B) Hydropower
(C) Natural gas
(D) Propane
(E) Uranium

Green Associate Exam Prep

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(A) Ethanol
(B) Hydropower
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(E) Uranium

Green Associate Exam Prep

Works directly with optimizing the energy performance of the building.



Green Associate Exam Prep

Which of the following can help reduce a building's energy load? (Choose two)

(A) Reducing the building's heat island effect
(B) Increasing the ventilation rate
(C) Installing heat recovery systems
(D) Flushing out prior to occupancy
(E) Zoning mechanical systems

Green Associate Exam Prep

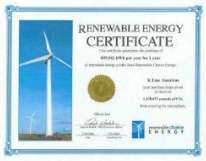
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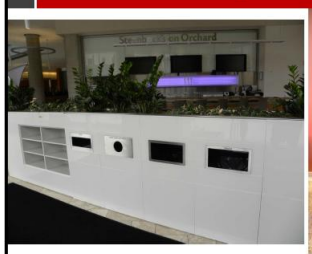
Green Associate Exam Prep

Green Power (Green-e Certified Power):
Power collected off site from green-e providers

Renewable Energy Certificates:
A commodity traded to prove that power being used is generated from a renewable resource



MR Prereq 1 Storage and Collection of Recyclables



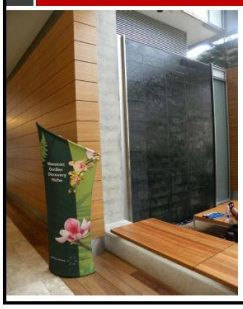


Construction Waste Management

Redirect recovered materials back to the manufacturing process or appropriate sites.

The primary benefit is this diverts construction and demolition waste from landfills and incineration.

Project Materials – Recycled



Using building materials that are from recycled materials and encourage recycling within the project.

Benefits include the reduction of virgin materials and waste volumes.

Project Materials – Recycle Examples

- Using materials with recycled content for building such as steel, gypsum board, and acoustical tile.
- Collecting and storing recyclables by using a dedicated area within the building to collect paper, cardboard, glass, plastics and metals.



Recycled Materials Credit Interactions

Using recycled waste assists with construction waste management and material reuse credits. It may also help locate locally manufactured materials.
Some recycled content may have unwanted air emissions such as plastic, rubber or polyester. This may work against credits for dealing with low emitting materials.



Atomic and Shamrock Examples

Veit Disposal Member of the USGBC team: **Russ Reger**
LEED Accredited Professionals: **Greg Norris - Ryan Johnson**
14098 Yeti Place Rogers MN 55374 Phone: 763-428-3867 Fax: 763-428-6779
Architect: Architectural Resources
Contractor: Kraus Anderson
Project: East High School
Contact: Pat Mufcahey, Krystal Blesener

September 2010 Construction Waste and Recycling Report

Total Loads for the Month: 7 — Total Loads for the Project: 50

Off-Site Separation Materials	Tons	Recycle % of Total Tons	Final Destination(s)	Tons to Date	Recycle % of Total Tons to Date
Metals: Iron, Aluminum, Steel, etc.	0.00	0.00%	Appropriate Facility	0.00	0.00%
Aggregate: Concrete, Asphalt, etc.	0.00	0.00%	Appropriate Facility	0.00	0.00%
Fiber: Cardboard, Paper, etc.	0.00	0.00%	Appropriate Facility	0.00	0.00%
Wood: Various Types Mixed	0.00	0.00%	Appropriate Facility	3.26	1.45%
Sub-Total Off-Site Recycle	0.00	0.00%		3.26	1.45%
Construction Debris - DLS	20.13	100.00%	DLS	137.91	61.40%
Sub-Total Off-Site Landfill:	20.13	100.00%		137.91	61.40%
Total Waste Off-Site	20.13	100.00%		141.17	62.85%
Off-Site Loads Total for the Month: 7					

On-Site Separation Materials	Tons	Recycle % of Total Tons	Final Destination	Tons to Date	Recycle % of Total Tons to Date
Metals: Iron, Aluminum, Steel, etc.	0.00	0.00%		25.45	10.44%
Aggregate: Concrete, Asphalt, etc.	0.00	0.00%		60.99	26.71%
Fiber: Cardboard, Paper, etc.	0.00	0.00%		0.00	0.00%
Wood: Various Types Mixed	0.00	0.00%		0.00	0.00%
Total Waste On-Site Recycle	0.00	0.00%		83.45	37.15%
On-Site Loads Total for the Month: 0					

Summary of Total Material	Tons	Recycle % of Total Tons	N/A	Tons to Date	Recycle % of Total Tons to Date
Total Waste Removed	20.13	100.00%		224.62	100.00%
Total Waste Landfilled	20.13	100.00%		137.91	61.40%
Total Waste Recycled	0.00	0.00%		86.71	38.60%

Veit Specialty Contracting & Waste Management
Recycling Since 1992
"Bring It On"

Recycled Materials

Post Consumer Recycled Material:
Material already used that will be reused in a different application such as plastic, paper, glass and metal.

Pre-Consumer Recycled Material:
Material from the manufacturer that has NOT been used for its original intent and will NOT be reused. For example, wheat, straw, sawdust and fly ash.



Project Materials – Local & Regional

Using building materials that are harvested and manufactured regionally, within 500 miles of the construction site.
Benefits include a reduction in:
- Transportation
- Pollution



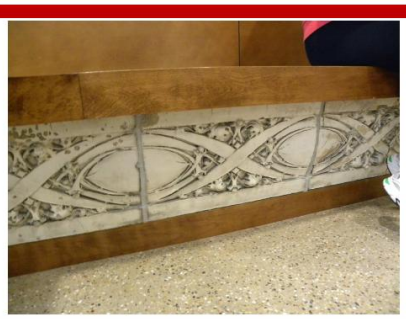
Local & Regional Materials Credit Interactions

Using local materials can combine with other credits dealing with materials reuse, recycled content, as well as rapidly renewable materials.

Construction & Waste Management

A Construction & Waste Management Plan should:
- Identify goals & materials to be diverted
- Either weight or volume can be used but it must be used consistently
- Keep a log of waste types and quantities
- LEED for Existing Buildings & Operations Maintenance includes:
  - Polychlorinated Biphenyl (PCB) removal
  - Asbestos-containing materials (ACM) management

Building Reuse



Green Associate Exam Prep



Projects that reuse existing building materials but don't meet the required thresholds for "building reuse" credits may use that material for construction waste calculations. Also, asbestos and PCB removal may coincide with Brownfield redevelopment.

Green Associate Exam Prep

Rapidly renewable materials are materials that grow And mature within how many years?

(A) 5 years
(B) 10 years
(C) 12 years
(D) 15 years

Green Associate Exam Prep

Rapidly renewable materials are materials that grow And mature within how many years?

(A) 5 years
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Green Associate Exam Prep

Mass transit options are generally more accessible to Occupants of a building in an urban setting, and green Roofs mitigate storm water and reduce the heat island Effect of buildings. Which LEED rating system Category addresses mass transit, storm water Mitigation, and heat islands?

(A) Energy and Atmosphere
(B) Materials and Resources
(C) Sustainable Sites
(D) Water Efficiency

Green Associate Exam Prep

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Stakeholder Involvement & Innovation

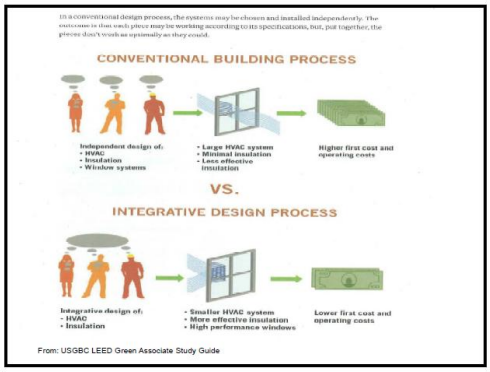


Stakeholders are individuals or groups of people who are involved in the success of the project.

Integrated Project Team

All project team members should be in collaboration early in the design process to learn responsibilities and specific credits for which each is responsible.

- Architect
- HVAC Engineer
- Landscape Architect
- Civil Engineer
- Energy sustainability consultant
- Contractor
- Facility Manager
- Commissioning Authority (CA)



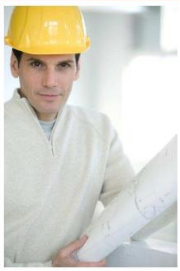
Project Team Roles - Architect

Plans and designs with green building strategies for sites, building construction and interior spaces.



Green Associate Exam Prep

Designs systems to manage energy and water through the selection and proper installation of all equipment as required in LEED credits.



Project Team Roles – Landscape Architect

Designs site and selects trees and plants with careful consideration for water efficiency and shading.



Project Team Roles – Civil Engineer

Leads the site design process to include site protection, open space requirements and storm water design.



Project Team Roles – Facility Manager

Coordinates and oversees safe, secure and environmentally sound operations and maintenance of building systems.



Project Team Roles – Commissioning Authority

Verifies that building energy-related systems are installed, calibrated and operate according to documents. Must have commissioned 2 buildings of similar size.



Green Associate Exam Prep

An integrated project team should include which of the Following professionals (Choose two)

(A)Code official
(B)Energy sustainability consultant
(C)Landscape architect
(D)Product manufacturer
(E)Utility manager

Green Associate Exam Prep

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Green Associate Exam Prep

Which of the following steps are part of creating an integrated project team (Choose two)

(A)Include members from varying industry sectors
(B)Include project vendors in the design phase
(C)Involve a commissioning authority in the team
(D)Involve the LEED AP in design integration
(E)Involve the team in different project phases

Green Associate Exam Prep

Which of the following steps are part of creating an integrated project team (Choose two)

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(D) Involve the LEED AP in design integration
(E) Involve the team in different project phases

Durability Planning & Management

Designing for the long term commitment of LEED strategies:

- Using rapidly renewable materials such as bamboo flooring, plywood, cotton batt insulation etc
- Using certified wood
- Extending the life of existing building stock.





Innovation & Design Credits

Paths to this credit

Innovation in Design (1 – 5 points)

-Achieve performance using a strategy addressed in LEED 2009 NC

Exemplary Performance (1 – 3 points)

-Achieve in an Existing LEED credit that allows this

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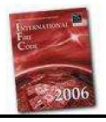
Project teams have to meet local and federal codes that apply to the project. In addition, teaching the public about green building strategies through the design examples in the project is encouraged.



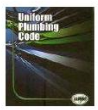
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Codes include:

- Building Codes (ADA and Fire)
- Mechanical Electrical & Plumbing
- Design curricula based on green building strategies for schools





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- Only USGBC and LEED artwork can be used
- Registered trademark: ®
- Marks owned but not registered: TM SM
- Marks can NOT be altered
- Marks can not be used as an endorsement
- Marks can not be used in negative way
- Any material that uses USGBC or GBCI logos must have this statement:

"The GBCI Logo is a registered trademark owned by the Green Building Certification Institute and is used with permission."

Green Associate Exam Prep

- "This workforce solution was funded by a grant awarded by the US Department of Labor's Employment and Training Administration. The solution was created by the grantee and does not necessarily reflect the official position of the US Department of Labor. The Department of Labor makes no guarantees, warrantees, or assurances of any kind, express or implied, with respect to such information on linked sites and including but not limited to, accuracy of the information or its completeness, timeliness, usefulness, adequacy, continued availability, or ownership. This solution is copyrighted by the institution that created it. Internal use by an organization and/or personal use by an individual for non-commercial purposes are permissible. All other uses require the prior authorization of the owner."