



GREEN ADVANTAGE® CERTIFICATION
- EXAM AND PREPARATION -
SUSTAINABLE DESIGN & CONSTRUCTION PROGRAM
AIA/CES PROGRAM – GACEP2



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**This workbook is offered as a supplement to the
Green Advantage Certified Practitioner (GACP) Study Guide.
It is for use of candidates planning to sit for the GACP Exam™**

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PART I

ENVIRONMENTAL AND HUMAN HEALTH PROBLEMS OF CONVENTIONAL BUILDING APPROACHES

- Review Part A of the GACP Study Guide - Environmental and Human Health Problems of Conventional Building Approaches.

For Sites:

- Describe at least three problems related to greenfield development and sprawl.

- 1.

- 2.

- 3.

- Explain a few of the major consequences of the heat island effect, monocultures, and toxic sites.

- List three major environmental impacts of erosion and flooding.

- 1.

- 2.

- 3.

- Describe light pollution.

For Water:

- Give three examples of water scarcity as it relates to buildings.

- 1.

- 2.

- 3.

- Outline how water pollution, inadequate infrastructure, and significant energy use relate to conventional wastewater discharge.

For Energy:

- Name several examples of air-, water-, and land-related consequences of energy sourcing in buildings.

- Describe three ways that conventional design and construction can be counter to green construction energy-related principles.

- Explain how conventional HVAC design and installation can have adverse environmental and human health effects.

- Give at least two examples of energy problems related to conventional:
 - ✓ Water heating and hot water distribution.
 - 1.
 - 2.

 - ✓ Artificial lighting.
 - 1.
 - 2.

For Materials:

- How does material selection relate to building longevity?

- What are several environmental and human health problems that come from using conventional material selection criteria in buildings?

- Describe what is meant by natural resource extraction. How does conventional construction contribute to it?

- Give two examples of excessive energy use and pollution caused by the manufacturing of construction materials.
 - 1.
 - 2.
- Discuss the types of solid waste that are likely to be produced from conventional construction?

For Indoor Environmental Quality:

- Explain how IEQ relates to occupant satisfaction, learning rates, productivity, absenteeism, and employee recruitment.
- What are some examples of human health consequences of poor indoor air and compromised water quality?
- Give 6 examples of diseases related to poor IEQ.
 - 1.
 - 2.
 - 3.
 - 4.
 - 5.
 - 6.
- Name 4 hazardous chemicals found in conventional building materials. In what building material(s) can each be found?
 - 1.
 - 2.
 - 3.
 - 4.

For Green Building Process:

- Describe several problems that can result from failure to attain building performance or budgetary goals on a building project.

- Give two examples of additional hazards that construction workers on green projects are likely to be exposed.
 - 1.
 - 2.

- Cite three adverse environmental impacts that can result from the construction process.
 - 1.
 - 2.
 - 3.

PART II

GREEN BUILDING APPROACHES

- Review Part B of the GACP Study Guide – Green Building Approaches.

For Green Building Context:

- Explain the triple bottom line.

- Discuss the differences between green building rating systems, standards, and codes. Cite two examples of green building codes, three examples of green building standards, and four examples of green building rating systems.

- Compare and contrast Green Globes and LEED.

- Compare and contrast ASHRAE 189.1, IgCC, ICC 700 National Green Building Standard, HERS, Energy Star, Net Zero Energy Buildings, Passive House, Green Globes, LEED, and Living Building Challenge.

- Give examples of the building value, capital costs, and operational costs in relation to green building.

- Compare and contrast Enterprise Green Communities Criteria, CHPS, CALGreen, and EarthCraft.

For Sites:

- List 4 green considerations that are important to site selection.
 - 1.
 - 2.
 - 3.
 - 4.
- Explain the difference between a brownfield and greenfield.

- Read the best practice section related to Smart Growth and describe 5 or more of them.
 - 1.
 - 2.
 - 3.
 - 4.
 - 5.
- Discuss how microclimate can be affected by hardscape, the heat island effect, landscaping, and transpiration.
- Compare and contrast albedo and SRI.
- How is stormwater management baseline measurement useful in site design?
- Explain three site-related strategies that can be used to reduce the heat island effect.
 - 1.
 - 2.
 - 3.
- Name three advantages of a living roof.
 - 1.
 - 2.
 - 3.
- Why is it important to preserve and plant native plants, as opposed to non-native plants? Are all non-native plants considered invasive?

- Describe one or more ecological landscaping best practices that pertain to the following:
 - ✓ Microclimate
 - ✓ Protection and maintenance of vegetation and soil
 - ✓ Tree and vegetation protection and preservation
 - ✓ Invasives
 - ✓ Lawns
 - ✓ Organic certification
 - ✓ Irrigation
 - ✓ Purple pipe water
 - ✓ Mulching
 - ✓ Watering
 - ✓ Onsite soil use and disturbance
- Compare and contrast the following stormwater management technologies:
 - ✓ Porous paving
 - ✓ Bioswale
 - ✓ Infiltration trench
 - ✓ Underground detention vault
 - ✓ Rain garden
 - ✓ Filter strip
 - ✓ Cistern

- Read best practice section that focuses on promoting stormwater management as a long-term resource on a building site and describe three of them.
 - 1.
 - 2.
 - 3.
- Describe two dark sky, exterior lighting best practices.
 - 1.
 - 2.

For Water:

- Explain the importance of water conservation. Use the terms water sourcing, demand, and groundwater in this explanation.
- What is WaterSense?
- Read the best practice section associated with matching water sources with uses and describe at least three of them.
 - 1.
 - 2.
 - 3.
- Read the best practice section related to municipal reclaimed water use and describe at least two of them.
 - 1.
 - 2.
- Describe some of the technologies used to achieve rainwater harvesting.

- Compare and contrast low-water use and waterless technologies.

- Read the low-water use and/or waterless best practices section and describe 4 or more of them.
 - 1.
 - 2.
 - 3.
 - 4.

- Explain the difference between graywater and blackwater.

- Compare and contrast primary, secondary, and tertiary wastewater treatment.

- Read the best practices section associated with ecological water treatment and describe three or more of them.

- Name two onsite "advanced" wastewater treatment technologies. Describe what general owner education is needed for using these technologies.

For Energy:

- List the major contributors to energy sourcing inefficiencies.

- Discuss the difference between source energy and site energy.

- Cite three widely used strategies to reduce the need for source energy.

- Name 5 or more types of technologies used to produce onsite renewable energy.
 - 1.
 - 2.
 - 3.
 - 4.
 - 5.

- Read the best practice section for energy sourcing and describe three or more of the best practices.
 - 1.
 - 2.
 - 3.

- Read the financial best practices that support onsite renewables and state, in your own words, three or more of them.
 - 1.
 - 2.
 - 3.

- Compare and contrast District Heating Systems with Combined Heat and Power Systems.

- Explain the difference between the building envelope and the solar envelope.

- What are the three types of heat transfer?
 - 1.
 - 2.
 - 3.
- What is the air exchange rate of a building?
- Explain how the stack effect moves air in a building.
- Describe 4 or more features of bioclimatic design.
 - 1.
 - 2.
 - 3.
 - 4.
- Read the best practices related to bioclimatic design and describe 5 or more of them.
 - 1.
 - 2.
 - 3.
 - 4.
 - 5.
- Read the best practices related to solar access preservation and describe one or more of them.

- Discuss three types of energy performance testing and their uses.
 - 1.
 - 2.
 - 3.
- Read the best practices for high quality construction and energy performance testing and describe 5 or more of them.
 - 1.
 - 2.
 - 3.
 - 4.
 - 5.
- Compare and contrast HVAC and hydronic systems for heating and cooling.
- Describe what is meant by EER, SEER, COP, and HSPF.
- Compare and contrast temperature, dew point temperature, humidity, and relative humidity.
- Explain the meaning of $W = V \times A$.
- Describe the measures BTU and Db.

- What is meant by the ASHRAE 55 standard for indoor comfort?

- Read the best practices related to environmentally friendly HVAC equipment and recite, in your own words, 5 or more of them.
 - 1.
 - 2.
 - 3.
 - 4.
 - 5.

- Name three or more installation best practices for HVAC equipment.
 - 1.
 - 2.
 - 3.

- Name 5 or more types of environmentally friendly heating systems.
 - 1.
 - 2.
 - 3.
 - 4.
 - 5.

- Read the best practices for environmentally friendly heating systems and state three or more of them in your own words.

- Read the best practices for ventilation systems and describe three or more of them.

- Name 5 or more types of environmentally friendly cooling systems.
 - 1.
 - 2.
 - 3.
 - 4.
 - 5.

- Read the best practices for environmentally friendly air cooling and dehumidification and describe three or more of them.
 - 1.
 - 2.
 - 3.

- Name three types of environmentally friendly conditioning distribution and control systems.
 - 1.
 - 2.
 - 3.

- Read the best practices for environmentally friendly conditioning distribution and control systems and describe 5 or more of them.
 - 1.
 - 2.
 - 3.

- 4.
- 5.
- Name three types of HVAC testing and a best practice associated with each.
 - 1.
 - 2.
 - 3.
- Name three different bulb types and briefly describe their differences.
 - 1.
 - 2.
 - 3.
- Define CRI, CAE, EF, Lm, MEF, and WF.

- After reading the appropriate section, name 4 types of environmentally friendly water heating systems and three types of environmentally friendly water distribution systems.
 - 1.
 - 2.
 - 3.
 - 4.
- Read the best practices for environmentally friendly water heating systems and water distribution systems and, in your own words, recite three or more of them.

- Read the best practices for environmentally friendly artificial lighting, and describe 4 or more of them.

- Read the best practices for environmentally friendly appliances and recite the gist of 5 or more of them.

For Materials:

- Compare and contrast building adaptability, durability, and deconstructability.

- Describe the concepts of embodied energy, greenwashing, LCA, and the precautionary principle.

- Read the chart that describes prominent green product and material rating groups. List the ones mentioned and describe each in your own words.

- Read the listing of best practices related to green material selection. Recite, using your own words, information describing 4 or more of these best practices.

- Name two of the additional product purchasing groups that offer guidance related to green material selection to the public through their websites.
 - 1.
 - 2.

- Read the definitions, measurements, and standards that are listed within the “commonly used building materials” section. Make a list of these and quiz yourself to make sure you can describe each of them in your own words.

- Read the types, features and best practice information related to concrete, masonry, metals, wood, plastics, and composites, thermal and moisture protection, openings, finishes, cabinets, casework, and countertops, paints and stains, adhesives and sealants, fire suppression, plumbing, and electrical.
 - ✓ List the bolded terms under types, features, and advantages for concrete, masonry, metals, etc. Describe these items in your own words.
 - ✓ List in short phrases the best practices associated with concrete, masonry, metals, etc. Elaborate, in your own words, these practices.

For Indoor Environmental Quality:

- Compare and contrast universal design, accessible design, active design and adaptability. Note how these concepts relate to navigation, wayfinding, and accessibility as described in the IEQ Standards and Measurements Chart.

- Describe the term acoustics and the two types of sound transmission in buildings. Also note how acoustic comfort and privacy are explained in the IEQ Standards and Measurements Chart.

- Give definitions, as they relate to construction, for asbestos, carbon monoxide, formaldehyde, PBTs, chemicals of concern, and VOCs.

- Define and describe daylighting and note how Df is used in the IEQ Standards and Measurements Chart.
- Explain the terms vapor barrier, bentonite, and backdrafting.

- Discuss how potable water and ventilation are outlined in the IEQ Standards and Measurements Chart.

- Briefly discuss in your own words the bolded terms under Indoor Air Quality (both strategies, and types, features, and advantages).

- Review the best practices for IEQ. List the bolded items in abbreviated form and describe each in your own words.

- Discuss the overall strategies of daylighting (see indoor visual quality).

- List the types and features of daylighting strategies; list the concepts that relate to an environmentally friendly approach to color.

- List the terms in bold found under Indoor Water Quality and Indoor Acoustical Quality. Describe each concept in your own words.

- List the terms in bold found under Indoor Navigation. Describe each concept in your own words.

- Name three or more best practices related to Indoor Navigation.

1.

2.

3.

For Green Building Process:

- Compare and contrast in your own words the concepts:

- ✓ Charrette, BIM, Commissioning, IDP, IPD, Lean Construction, POE, and Value Engineering

- ✓ CWMP, Deconstruction, Excavation, and Owner's Manual

- Discuss five or more points related to reducing the business risks of green building through the preparation of personnel.

1.

2.

3.

4.

5.

- Read the best practice section related to the preparation of personnel. List three or more of them.

1.

2.

3.

- Discuss the importance of collaboration across trades.

- Review all of the best practices related to collaboration across trades. Discuss 6 or more of them.

1.

2.

3.

4.

5.

6.

- Read the entire section, including the best practices, that focus on reducing risks by involving the builder in design decisions. Recite each of the major points in your own words, relating them to the best practices listed.
- Discuss the bolded points related to reducing the business risks of green building through administrative tools to improve results, increase efficiencies, and increase profits.
- Review the section on reducing the business risks of green building through legal protections. Make an abbreviated list of the best practices related to the business risks of green building through legal protections. Using the list, describe each of these concepts in more detail.
- Compare and contrast the section describing reducing the risks of green building through owner and occupant education with the best practices described.
- Thoroughly review each of the points and best practices in the section related to protecting the health and safety of green builders. Quiz yourself using the green building category in the chart to prompt you to describe the situation, the risks, as well as the best practice remedy(ies).
- Thoroughly review all of the best practices related to protecting the health and safety of green builders. Make an abbreviated list, and use it to describe in your own words each of the best practices.
- For lightening the environmental impact of the construction process through managing staging and storage, compare and contrast the points made in this section and the best practices.
- For lightening the environmental impact of the construction process through managing waste, make a list of the major points in the section as well as the best practices. Quiz yourself to describe the listed items.
- Read the section on lightening the environmental impact of the construction process through site preparation, excavation, and grading, compare, including the best practices. Give examples of how you would use each of the best practices on a hypothetical project.
- Explain how you would organize a project to ensure that each of the points described in lightening the environmental impact of the construction process through managing transportation during construction, including the best practices, would be achieved.

- Write a paragraph describing how you would oversee the successful implementation of the points related to lightening the environmental impact of the construction process through site lighting during construction, including the best practices.

- Make a quick sketch that illustrates the concepts conveyed in the section that addresses lightening the environmental impact of the construction process through managing storm water during construction. In the sketch make sure you also include symbols or pictures that focus on the best practices.

- For lightening the environmental impact of the construction process through eco-friendly temporary sanitation facilities, compare and contrast the points made in this section and the best practices.

- Make a list of the major points associated with the section that addresses lightening the environmental impact of the construction process through green cleaning during construction, including the best practices. Review the list and describe the concepts in your own words.

Thank you for your time!

This concludes the AIA/CES Workbook program

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