Integrated Process (IP)
GA08 Integrative Process - Pgs. 8-11

Location and Transportation (LT)
GA02 Excerpt LT Overview. LEED BD+C RG v4 - Pgs. 55-57
GA08 Location and Transportation (LT) - Pgs. 12-31
LCCG Section 4. Location and Transportation - Pgs. 52-55

Sustainable Sites (SS)
GA02 Excerpt SS Overview. LEED BD+C RG v4 - Pgs. 137-138
GA08 Sustainable Sites (SS) - Pgs. 32-51
LCCG Section 4. Sustainable Sites - Pgs. 56-60

Integrative Process (IP)

Integrative Process

Adaptation	NC	CS	S	R	DC	WDC	HOS	HC
Total	1	1	1	1	1	1	1	1
Integrative Project Planning and Design	--	--	--	--	--	--	--	req
Integrative Process	1	1	1	1	1	1	1	1

Prerequisite: Integrative Project Planning and Design
Required
This prerequisite applies to: Healthcare

Intent
Maximize opportunities for integrated, cost-effective adoption of green design and construction strategies, emphasizing human health as a fundamental evaluative criterion for building design, construction, and operational strategies. Utilize innovative approaches and techniques for green design and construction.

Requirements
Owner's Project Requirements (OPR) Document
Develop a health mission statement that addresses the "triple bottom line" values - economic, environmental, and social. People – Planet – Profit

Preliminary Rating Goals
LEED meeting – preferable before schematic design
Minimum four key project team members and the Owner or Owner's representative

Integrated Project Team

- Owner's capital budget manager
- Architect or building designer
- Mechanical engineer
- Structural engineer
- Energy modeler
- Equipment planner
- Acoustical consultant
- Telecommunications designer
- Controls designer
- Food Service Consultant
- Infection Control Staff
- Building science or performance testing agents
- Green building or sustainable design consultant
- Facility green teams
- Physician and nursing teams
- Facility managers
- Environmental services staff
- Functional and space programmers
- Commissioning agent
- Community representatives
- Civil engineer
- Landscape architect
- Ecologist
- Land planner
- Construction manager or general contractor
- Life cycle cost analyst; construction cost estimator
- Lighting Designer
- Other disciplines appropriate to the specific project type

Design Charrette

Conduct a minimum four-hour, integrated design charrette with the project team.
Goal - optimize the integration of green strategies across all aspects of building design, construction, and operations, drawing on the expertise of all participants.

Credit: Integrative Process - 1 point
This credit applies to: NC, CS, S, R, DC, WDC, HOS, HC

Intent

To support high-performance, cost-effective, equitable project outcomes through an early analysis of the interrelationships among systems.

Requirements

Discovery: Energy-Related Systems Water-Related Systems	Implementation Develop a Project Team Letter - summarizes the team's integrative process approach and describes the difference that this integrative approach made in terms of improving project team interaction and project performance.

Other Key Points to Remember

Integrative Process

The strategies in the Integrative Process credit are recommended for all LEED projects because they encourage integration during early design stages, when it will be the most effective.

Approaching certification using an integrative process gives the project team the greatest chance of success.

The process includes three phases:
Discovery
Design and Construction
Occupancy, Operations, and performance feedback

LEED Work Plan

Establish Project Goals
Develop the LEED Scorecard

Location and Transportation (LT)

GA02 Excerpt LT Overview. LEED BD+C RG v4 - Pgs. 55-57

Building Location

- Compact development
- Alternative transportation
- Connection to amenities

Existing infrastructure

Public transit, street networks, pedestrian paths, bicycle networks, services and amenities, and existing utilities, such as electricity, water, gas, and sewage

Alternatives to private automobile use:

- Walking
- Biking
- Vehicle shares
- Public transit

Reduce Green House Gas (GHG) Emissions from vehicle use.

Reusing previously developed land, cleaning up brownfield sites, and investing in disadvantaged areas conserve undeveloped land and ensure efficient delivery of services and infrastructure.

Limit Parking.
Provide bicycle storage.
Alternative-fuel facilities.
Preferred parking for green vehicles.

Walking distances must be measured along infrastructure that is safe and comfortable for pedestrians: sidewalks, all-weather-surface footpaths, crosswalks, or equivalent pedestrian facilities.

Bicycling distances must be measured along infrastructure that is safe and comfortable for bicyclists: on-street bicycle lanes, off-street bicycle paths or trails, and streets with low target vehicle speed (25 mph or less).

LCCG Section 4. Location and Transportation - Pgs. 52-55

LEED RATING SYSTEMS ADDRESS PROJECT LOCATION AND DESIGN THROUGH THE FOLLOWING TOPICS:

- Location
- Transportation
- Neighborhood pattern and design

Location

STRATEGIES TO ADDRESS LOCATION:

- **CHOOSE REDEVELOPMENT AND INFILL DEVELOPMENT**. Build on previously developed land and brownfield sites.
- **LOCATE NEAR EXISTING INFRASTRUCTURE.** Avoid triggering suburban sprawl and unnecessary materials use by consolidating development along existing roads, power lines, and water supplies.
- **PROTECT HABITAT.** Give preference to locations that do not include sensitive site elements and land types.
- **INCREASE DENSITY.** Create a smaller footprint and maximize the FAR (floor area ratio) or square footage per acre.
- **INCREASE DIVERSITY OF USES.** Provide the services that are most needed within communities and support a balance of jobs and housing.
- **ENCOURAGE MULTIPLE MODES OF TRANSPORTATION.** Enable occupants to walk, bicycle, and use public transit.

Transportation

STRATEGIES TO ADDRESS TRANSPORTATION IN DESIGN AND PLANNING:

- **LOCATE NEAR PUBLIC TRANSIT.** Select a project site within easy walking distance of an existing transportation network.
- **LIMIT PARKING.** The lack of parking spaces on the project site will spark interest in alternative transportation options.
- **ENCOURAGE BICYCLING.** Install secure bike racks and showers for commuters.

STRATEGIES TO ADDRESS TRANSPORTATION IN OPERATIONS AND MAINTENANCE:

- **ENCOURAGE CARPOOLING.** Designate preferred spaces for carpool vehicles in the parking area.
- **PROMOTE ALTERNATIVE-FUEL VEHICLES.** Provide a convenient refueling station on the site.
- **OFFER INCENTIVES.** Develop an alternative commuting incentive program for building occupants.
- **SUPPORT ALTERNATIVE TRANSPORTATION.** Promote alternatives to single-occupant car commuting at the building and/or city level.

STRATEGIES FOR SUSTAINABLE NEIGHBORHOOD PATTERN AND DESIGN:

- **DESIGN WALKABLE STREETS.** Focus on building frontage, ground-level façade, building height-to-street-width ratio, and sidewalks. Limit street speeds.
- **INCLUDE STREET TREES,** shade, benches, and other amenities for pedestrians.
- **USE COMPACT DEVELOPMENT STRATEGIES.** Consolidate development by increasing the number of units of residential space and square feet of commercial space per acre.
- **PROMOTE CONNECTIVITY.** Limit culs-de-sac, prohibit gated communities, and use a street grid pattern.
- **PROVIDE DIVERSE LAND USES.** Include a wide mix of services, such as shops, restaurants, schools, religious centers, grocery stores, parks, civic buildings, and recreational facilities.
- **CREATE A DIVERSE COMMUNITY.** Provide housing types for a wide range of incomes and abilities. Incorporate, rather than segregate, affordable and senior housing.
- **SUPPORT ACCESS TO SUSTAINABLE FOOD.** Include community gardens, farmers markets, urban farms, and community-supported agriculture programs.
- **ENSURE THAT ALL RESIDENTS HAVE EASY ACCESS TO GROCERY STORES** and other food choices beyond fast food.

GA08 Location and Transportation (LT) - Pgs. 12-31

Location and Transportation

Adaptation	NC	CS	S	R	DC	WDC	HOS	HC
Total	16	20	15	16	16	16	16	9
LEED for Neighborhood Development Location	16	20	15	16	16	16	16	9
Sensitive Land Protection	1	2	1	1	1	1	1	1
High Priority Site*	2	3	2	2	2	2	2	2
Surrounding Density and Diverse Uses	5	6	5	5	5	5	5	1
Access to Quality Transit*	5	6	4	5	5	5	5	1
Bicycle Facilities	1	1	1	1	1	1	1	1
Reduced Parking Footprint*	1	1	1	1	1	1	1	1
Green Vehicles	1	1	1	1	1	1	1	1

Sustainable Sites (SS)

GA02 Excerpt SS Overview. LEED BD+C RG v4 - Pgs. 137-138

The Sustainable Sites (SS) category rewards decisions about the environment surrounding the building, with credits that emphasize the vital relationships among buildings, ecosystems, and ecosystem services. It focuses on restoring project site elements, integrating the site with local and regional ecosystems, and preserving the biodiversity that natural systems rely on.

Recent trends like exurban development and sprawl encroach on the remaining natural landscapes and farmlands, fragmenting and replacing them with dispersed hardscapes surrounded by nonnative vegetation.

Rainwater runoff carries such pollutants as oil, sediment, chemicals, and lawn fertilizers directly to streams and rivers, where they contribute to eutrophication and harm aquatic ecosystems and species.

SS credits are designed for projects to avoid harming habitat, open space, and water bodies.

Low Impact Development (LID)

- Minimize construction pollution.
- Reduce heat island effects and light pollution.
- Mimic natural water flow patterns to manage rainwater runoff.

Light Pollution Reduction credit	backlight-uplight-glare (BUG) method
Site Development—Protect or Restore Habitat credit	working with conservation organizations to target financial support for off-site habitat protection
Rainwater Management credit	replicating natural site hydrology
Heat Island Reduction credit	using three-year aged SRI values for roofs and SR values for nonroof hardscape

LCCG Section 4. Sustainable Sites - Pgs. 56-60

LEED RATING SYSTEMS ADDRESS PROJECT SITE DESIGN AND MAINTENANCE THROUGH MANY TOPICS, INCLUDING THE FOLLOWING:

- Site design and management
- Rainwater management
- Heat island effect

STRATEGIES FOR DEVELOPING A SUSTAINABLE SITE DESIGN:

- **MINIMIZE HARDSCAPE.** Substitute pervious surfaces for traditional paving.
- **USE NATIVE LANDSCAPING.** Select plants that are native to the area both to reduce water use and to provide habitat for local birds and other species. Incorporate mulch into the landscape to build the soil and naturally suppress weeds.
- **PREVENT LIGHT POLLUTION.** Avoid up-lighting, glare, and trespass by using shielded fixtures and strategic lighting design.
- **PRESERVE OPEN SPACE AND SENSITIVE AREAS.** Consolidate the development footprint and protect and restore natural vegetation, wetland areas, and bodies of water.
- **PROTECT AND RESTORE HABITAT.** Designate areas as protected habitat and open space for the life of the project. Develop a conservation management program to make sure that the natural environment is protected. Consider putting protected areas into a land trust.

STRATEGIES FOR SUSTAINABLE SITE OPERATIONS AND MAINTENANCE:

- **DEVELOP A SUSTAINABLE SITE MANAGEMENT PLAN.** The plan should address the application of chemicals and the cleaning of hardscape and building exterior, and it should include an integrated pest management program.
- **IMPLEMENT CONSERVATION PROGRAMS.** Work with ecologists and nonprofit organizations to implement conservation programs that protect species and habitat.
- **MAINTAIN SITE LIGHTING TO PREVENT LIGHT POLLUTION.** Ensure that fixtures are replaced according to the original design. If higher light levels are needed, include timers that shut them off automatically after hours.

STRATEGIES FOR RAINWATER MANAGEMENT THROUGH DESIGN:

- **MINIMIZE IMPERVIOUS AREAS.** Increase the area of permeable surfaces, such as vegetated roofs, porous pavement, and landscaped areas.
- **CONTROL RAINWATER.** Install dry ponds, rain gardens, bioswales, and similar landscape features designed to hold water and slow the rate of runoff.
- **INCORPORATE RAINWATER MANAGEMENT INTO SITE DESIGN.** Use features that serve multiple functions, such as planters that collect rainwater, streets that include bioswales to capture and hold rainwater, and mulch that both builds soil and holds moisture.

STRATEGIES FOR RAINWATER MANAGEMENT IN OPERATIONS AND MAINTENANCE:

- **REDIRECT RAINWATER.** Direct runoff into rain gardens, bioswales, and other landscape features that retain water.
- **HARVEST RAINWATER.** In many jurisdictions, collected water can be used as process water, to flush toilets, or to provide irrigation.

Increase infiltration of rainfall into the ground, capture and reuse it, and use natural processes to treat the remaining water that runs off the property.

Heat Island Effect

STRATEGIES FOR REDUCING THE HEAT ISLAND EFFECT:

- **INSTALL REFLECTIVE ROOF SURFACES.** Light-colored roofs absorb less heat.
- **REDUCE THE AREA OF PAVED SURFACES EXPOSED TO SUNLIGHT.** Limit the amount of hardscape, design narrow roads, use light-colored paving, shade hardscape with greenery, and locate parking underground.
- **PLANT AN URBAN FOREST OR A GREEN ROOF.** Use street trees, shrubs, and landscaping to reduce heat island effects through evapotranspiration and provide shade.

https://www.usgbc.org/glossary

heat island effect the thermal absorption by hardscape, such as dark, nonreflective pavement and buildings, and its subsequent radiation to surrounding areas. Other contributing factors may include vehicle exhaust, air conditioners, and street equipment. Tall buildings and narrow streets reduce airflow and exacerbate the effect.

infrared (thermal) emittance a value between 0 and 1 (or 0% and 100%) that indicates the ability of a material to shed infrared radiation (heat). A cool roof should have a high thermal emittance. The wavelength range for radiant energy is roughly 5 to 40 micrometers. Most building materials (including glass) are opaque in this part of the spectrum and have an emittance of roughly 0.9, or 90%. Clean, bare metals, such as untarnished galvanized steel, have a low emittance and are the most important exceptions to the 0.9 rule. In contrast, aluminum roof coatings have intermediate emittance levels. (Adapted from Lawrence Berkeley National Laboratory)

solar reflectance (SR) the fraction of solar energy that is reflected by a surface on a scale of 0 to 1. Black paint has a solar reflectance of 0; white paint (titanium dioxide) has a solar reflectance of 1. The standard technique for its determination uses spectrophotometric measurements, with an integrating sphere to determine the reflectance at each wavelength. Determine the SR of a material by using the Cool Roof Rating Council Standard (CRRC-1).

solar reflectance index (SRI) a measure of the constructed surface's ability to stay cool in the sun by reflecting solar radiation and emitting thermal radiation. It is defined such that a standard black surface (initial solar reflectance 0.05, initial thermal emittance 0.90) has an initial SRI of 0, and a standard white surface (initial solar reflectance 0.80, initial thermal emittance 0.90) has an initial SRI of 100. To calculate the SRI for a given material, obtain its solar reflectance and thermal emittance via the Cool Roof Rating Council Standard (CRRC-1). SRI is calculated according to ASTM E 1980. Calculation of the aged SRI is based on the aged tested values of solar reflectance and thermal emittance.

three-year aged SR or SRI value a solar reflectance or solar reflectance index rating that is measured after three years of weather exposure

thermal emittance the ratio of the radiant heat flux emitted by a specimen to that emitted by a blackbody radiator at the same temperature (adapted from Cool Roof Rating Council)

GA08 Sustainable Sites (SS) - Pgs. 32-51

Sustainable Sites

Adaptation	NC	CS	S	R	DC	WDC	HOS	HC
Total	10	11	12	12	11	11	10	9
Construction Activity Pollution Prevention	req	req	req	req	req	req	req	req
Environmental Site Assessment	--	--	req	--	--	--	--	req
Site Assessment	1	1	1	1	1	1	1	1
Protect or Restore Habitat*	2	2	2	2	2	2	2	1
Open Space	1	1	1	1	1	1	1	1
Rainwater Management*	3	3	3	3	3	3	3	2
Heat Island Reduction*	2	2	2	2	2	2	2	1
Light Pollution Reduction	1	1	1	1	1	1	1	1
Site Master Plan	--	--	1	--	--	--	--	--
Tenant Design and Construction Guidelines	--	1	--	--	--	--	--	--
Places of Respite*	--	--	--	--	--	--	--	1
Direct Exterior Access	--	--	--	--	--	--	--	1
Joint Use of Facilities	--	--	1	--	--	--	--	--