

Green Building Rating SystemTM Version 2.0

Leadership in Energy and Environmental Design



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Disclaimer

The LEED Green Building Rating SystemTM 2.0 is the second edition of this standard. The U. S. Green Building Council makes its best effort at promulgating a standard that improves environmental and economic performance of commercial buildings using established or advanced industry principles, practices, materials, and standards. The LEED Green Building SystemTM is intended to be used by commercial building project stakeholders and project teams as a guide for green and sustainable design.

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Sustainable Sites Points

Site Prerequisite:

INTENT:

Required

Erosion and Sedimentation Control Control erosion to reduce negative impacts on water and air quality.

REQUIREMENT:

- □ Design to a site sediment and erosion control plan that conforms to best management practices in the EPA's Storm Water Management for Construction Activities, EPA Document No. EPA-833-R-92-001, Chapter 3, OR local Erosion and Sedimentation Control standards and codes, whichever is more stringent. The plan shall meet the following objectives:
 - •Prevent loss of soil during construction by storm water runoff and/or wind erosion, including protecting topsoil by stockpiling for reuse.
 - •Prevent sedimentation of storm sewer or receiving streams and/or air pollution with dust and particulate matter.

TECHNOLOGIES/STRATEGIES:

The EPA standard lists numerous measures such as silt fencing, sediment traps, construction phasing, stabilization of steep slopes, maintaining vegetated ground cover and providing ground cover that will meet this prerequisite.

Site Credit 1:

INTENT:

1

Site Selection Avoid develo

Avoid development of inappropriate sites and reduce the environmental impact from the location of a building on a site.

REQUIREMENT:

- ☐ Do not develop buildings on portions of sites that meet any one of the following criteria:
 - Prime agricultural land as defined by the Farmland Trust
 - Land whose elevation is lower than 5 feet above the elevation of the 100year flood as defined by FEMA
 - •Land that provides habitat for any species on the Federal or State threatened or endangered list
 - •Within 100 feet of any wetland as defined by 40 CFR, Parts 230-233 and Part 22, OR as defined by local or state rule or law, whichever is more stringent.
 - •Land which prior to acquisition for the project was public parkland, unless land of equal or greater value as parkland is accepted in trade by the public land owner. (Park Authority projects are exempt.)

TECHNOLOGIES/STRATEGIES:

Screen potential building sites for these criteria prior to purchasing the land, and/or ensure that these criteria are addressed by the designer during the conceptual design phase. Utilize landscape architects, ecologists, environmental engineers, civil engineers, and similar professionals for the screening process. New wetlands constructed as part of stormwater mitigation or other site restoration efforts are not affected by the restrictions of this prerequisite.



1

1-4

Site Credit 2: INTENT: **Urban Redevelopment** Channel development to urban areas with existing infrastructure, protecting greenfields and preserving habitat and natural resources. REQUIREMENT: ☐ Increase localized density to conform to existing or desired density goals by utilizing sites that are located within an existing minimum development density of 60,000 square feet per acre (2 story downtown development). TECHNOLOGIES/STRATEGIES: During the site selection process give preference to previously developed sites with urban redevelopment potential. INTENT: Site Credit 3: Rehabilitate damaged sites where development is complicated by real or perceived **Brownfield** environmental contamination, reducing pressure on undeveloped land. Redevelopment REQUIREMENT: ☐ Develop on a site classified as a brownfield and provide remediation as required by EPA's Brownfield Redevelopment program requirements. TECHNOLOGIES/STRATEGIES: Participate in EPA's Brownfield Redevelopment program. Utilize EPA OSWER Directive 9610.17 and ASTM Standard Practice E1739 for site remediation where required. Gain community support by highlighting the social and urban benefits of brownfield redevelopment. Negotiate with local municipalities and landowners for below-market purchase price for brownfield real estate. Obtain tax incentives be meeting geographic requirements for EPA's Brownfield tax credits. INTENT: Site Credit 4: Reduce pollution and land development impacts from automobile use. Alternative Transportation REQUIREMENT: ☐ Locate building within ½ mile of a commuter rail, light rail or subway station or 1/4 mile of 2 or more bus lines. (1 point) ☐ Provide suitable means for securing bicycles, with convenient changing/shower facilities for use by cyclists, for 5% or more of building occupants. (1 point) ☐ Install alternative-fuel refueling station(s) for 3% of the total vehicle parking capacity of the site. Liquid or gaseous fueling facilities must be separately

TECHNOLOGIES/STRATEGIES:

building occupants.

ventilated or located outdoors.

Select sites near public transit served by safe, convenient pedestrian pathways.

☐ Size parking capacity not to exceed minimum local zoning requirements AND provide preferred parking for carpools or van pools capable of serving 5% of the building occupants, OR, add no new parking for rehabilitation projects AND provide preferred parking for carpools or van pools capable of serving 5% of the



(1 point)

(1 point)

Sustainable Sites (cont.)

Points

Site Credit 5: INTENT: 1-2

Reduced Site Disturbance

Conserve existing natural areas and restore damaged areas to provide habitat and promote biodiversity.

REQUIREMENT:

- □ On greenfield sites, limit site disturbance including earthwork and clearing of vegetation to 40 feet beyond the building perimeter, 5 feet beyond primary roadway curbs, walkways, and main utility branch trenches, and 25 feet beyond pervious paving areas that require additional staging areas in order to limit compaction in the paved area; OR, on previously developed sites, restore a minimum of 50% of the remaining open area by planting native or adapted vegetation. (1 point)
- □ Reduce the development footprint (including building, access roads and parking) to exceed the local zoning's open space requirement for the site by 25%. (1 point)

TECHNOLOGIES/STRATEGIES:

Note requirements on plans and in specifications. Establish contractual penalties for destruction of trees and site areas noted for protection. Reduce footprints by tightening program needs and stacking floorplans. Establish clearly marked construction and disturbance boundaries. Delineate laydown, recycling, and disposal areas. Use areas to be paved as staging areas. Work with local horticultural extension services or native plant societies to select indigenous plant species for site restoration and landscaping.

Site Credit 6:

INTENT:

Stormwater Management

Limit disruption of natural water flows by minimizing storm water runoff, increasing on-site infiltration and reducing contaminants.

REQUIREMENT:

Implement a stormwater management plan that results in:

- □ No net increase in the rate or quantity of stormwater runoff from existing to developed conditions; OR, if existing imperviousness is greater than 50%, implement a stormwater management plan that results in a 25% decrease in the rate and quantity of stormwater runoff. (1 point)
- □ Treatment systems designed to remove 80% of the average annual post development total suspended solids (TSS), and 40% of the average annual post development total phosphorous (TP), by implementing Best Management Practices (BMPs) outlined in EPA's Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters (EPA 840-B-92-002 1/93). (1 point)

TECHNOLOGIES/STRATEGIES:

Significantly reduce impervious surfaces, maximize on-site stormwater infiltration, and retain pervious and vegetated areas. Capture rainwater from impervious areas of the building for groundwater recharge or reuse within building. Use green/vegetated roofs. Utilize biologically-based and innovative stormwater management features for pollutant load reduction such as constructed wetlands, stormwater filtering systems, bioswales, bio-retention basins, and vegetated filterstrips.



1-2

1-2

1

Site Credit 7:

Landscape and Exterior Design to Reduce Heat Islands

INTENT:

Reduce heat islands (thermal gradient differences between developed and undeveloped areas) to minimize impact on microclimate and human and wildlife habitat.

REQUIREMENT:

- ☐ Provide shade (within 5 years) on at least 30% of non-roof impervious surface on the site, including parking lots, walkways, plazas, etc., OR, use light-colored/high-albedo materials (reflectance of at least 0.3) for 30% of the site's non-roof impervious surfaces, OR place a minimum of 50% of parking space underground OR use open-grid pavement system (net impervious area of LESS than 50%) for a minimum of 50% of the parking lot area. (1 point)
- ☐ Use ENERGY STAR Roof compliant, high-reflectance AND low emissivity roofing (initial reflectance of at least .65 and three-year-aged reflectance of at least .5 when tested in accordance with ASTM E408) for a minimum of 75% of the roof surface; OR, install a "green" (vegetated) roof for at least 50% of the roof area. (1 point)

TECHNOLOGIES/STRATEGIES:

Employ design strategies, materials, and landscaping designs that reduce heat absorption of exterior materials. Note albedo/reflectance requirements in the drawings and specifications. Provide shade (calculated on June 21, noon solar time) using native or climate tolerant trees and large shrubs, vegetated trellises, or other exterior structures supporting vegetation. Substitute vegetated surfaces for hard surfaces. Explore elimination of blacktop and the use of new coatings and integral colorants for asphalt to achieve light colored surfaces.

Site Credit 8: Light Pollution Reduction

INTENT:

Eliminate light trespass from the building site, improve night sky access, and reduce development impact on nocturnal environments.

REQUIREMENT:

□Do not exceed Illuminating Engineering Society of North America (IESNA) footcandle level requirements as stated in the Recommended Practise Manual: Lighting for Exterior Environments, AND design interior and exterior lighting such that zero direct-beam illumination leaves the building site.

TECHNOLOGIES/STRATEGIES:

Consult IESNA Recommended Practice Manual: Lighting for Exterior Environments for Commission Internationle de I'Eclairage (CIE) zone and pre and post curfew hour descriptions and associated ambient lighting level requirements. Ambient lighting for pre-curfew hours for CIE zones range between .01 footcandles for areas with dark landscapes such as parks, rural, and residential areas, and 1.5 footcandles for areas with high ambient brightness such as urban areas with high levels of nighttime activity. Design site lighting and select lighting styles and technologies to have a minimal impact off-site and minimal contribution to sky glow. Minimize lighting of architectural and landscape features.



Water Credit 1: INTENT: 1-2

Water Efficient Landscaping

Limit or eliminate the use of potable water for landscape irrigation.

REQUIREMENT:

- □ Use high efficiency irrigation technology, OR, use captured rain or recycled site water to reduce potable water consumption for irrigation by 50% over conventional means.
 (1 point)
 □ Use only captured rain or recycled site water for an additional 50% reduction
- ☐ Use only captured rain or recycled site water for an additional 50% reduction (100% total reduction) of potable water for site irrigation needs, OR, do not install permanent landscape irrigation systems. (1 point)

TECHNOLOGIES/STRATEGIES:

Develop a landscaping water use baseline according to the methodology outlined in the LEED Reference Guide. Specify water-efficient, native or adapted, climate tolerant plantings. High efficiency irrigation technologies include micro irrigation, moisture sensors, or weather data based controllers. Feed irrigation systems with captured rainwater, gray water, or on-site treated wastewater.

Water Credit 2: Innovative Wastewater Technologies

INTENT:

Reduce generation of wastewater and potable water demand, while increasing local aquifer recharge.

REQUIREMENT:

□ Reduce the use of municipally provided potable water for building sewage conveyance by a minimum of 50%, OR, treat 100% of wastewater on site to tertiary standards.

TECHNOLOGIES/STRATEGIES:

Develop a wastewater baseline according to the methodology outlined in the LEED Reference Guide. Implement decentralized on-site wastewater treatment and reuse systems. Decrease the use of potable water for sewage conveyance by utilizing gray and/or black water systems. Non-potable reuse opportunities include, toilet flushing, landscape irrigation, etc. Provide advanced wastewater treatment after use by employing innovative, ecological, on-site technologies including constructed wetlands, a mechanical recirculating sand filter, or aerobic treatment systems.



Water Efficiency (cont.)

Points

1-2

Water Credit 3: Water Use Reduction

INTENT:

Maximize water efficiency within buildings to reduce the burden on municipal water supply and wastewater systems.

REQUIREMENT:

□ Employ strategies that in aggregate use 20% less water than the water use baseline calculated for the building (not including irrigation) after meeting Energy Policy Act of 1992 fixture performance requirements. (1 point)
 □ Exceed the potable water use reduction by an additional 10% (30% total efficiency increase). (1 point)

TECHNOLOGIES/STRATEGIES:

Develop a water use baseline including all water consuming fixtures, equipment, and seasonal conditions according to methodology guidance outlined in the LEED Reference Guide. Specify water conserving plumbing fixtures that exceed Energy Policy Act of 1992 fixture requirements in combination with ultra high efficiency or dry fixture and control technologies. Specify high water efficiency equipment (dishwashers, laundry, cooling towers, etc.). Use alternatives to potable water for sewage transport water. Use recycled or storm water for HVAC/process make up water.



Energy and Atmosphere

Points

Prerequisite 1:

INTENT:

Required

Fundamental Building Systems Commissioning Verify and ensure that fundamental building elements and systems are designed, installed and calibrated to operate as intended.

REQUIREMENT:

- ☐ Implement all of the following fundamental best practice commissioning procedures.
 - •Engage a commissioning authority.
 - •Develop design intent and basis of design documentation.
 - •Include commissioning requirements in the construction documents.
 - •Develop and utilize a commissioning plan.
 - Verify installation, functional performance, training and documentation.
 - •Complete a commissioning report.

TECHNOLOGIES/STRATEGIES:

Introduce standards and strategies into the design process early, and then carry through selected measures by clearly stating target requirements in the construction documents. Tie contractor final payments to documented system performance. Refer to the LEED Reference Guide for detailed descriptions of required elements and references to additional commissioning guides.

Prerequisite 2: Minimum Energy

Performance

V

INTENT:

Required

Establish the minimum level of energy efficiency for the base building and systems.

REQUIREMENT:

☐ Design to meet building energy efficiency and performance as required by ASHRAE/IESNA 90.1-1999 or the local energy code, which ever is the more stringent. Analyze expected baseline building performance using the System/Component Method.

TECHNOLOGIES/STRATEGIES:

Use building modeling and analysis techniques to establish and document compliance. ASHRAE/IESNA 90.1-1999 provides guidance for establishing building base case development and analysis. Refer to the LEED Reference Guide for a wide variety of energy efficiency strategy resources.



Required

Prerequisite 3: CFC Reduction in **HVAC&R** Equipment INTENT:

Reduce ozone depletion.

REQUIREMENT:

☐ Zero use of CFC-based refrigerants in new base building building HVAC&R systems. When reusing existing base building HVAC equipment, complete a comprehensive CFC phaseout conversion.

TECHNOLOGIES/STRATEGIES:

Specify only non-CFC-based refrigerants in all base building HVAC&R systems.

Energy Credit 1: Optimize Energy Performance.

INTENT:

2-10 Achieve increasing levels of energy performance above the prerequisite standard to

REQUIREMENT:

Reduce design energy cost compared to the energy cost budget for regulated energy components described in the requirements of ASHRAE/IESNA Standard 90.1-1999, as demonstrated by a whole building simulation using the Energy Cost Budget Method described in Section 11.

| New Bldgs. | | <u>Existing Bldgs.</u> | <u>Points.</u> |
|------------|-----|------------------------|----------------|
| | 20% | 10% | 2 |
| | 30% | 20% | 4 |
| | 40% | 30% | 6 |
| | 50% | 40% | 8 |
| | 60% | 50% | 10 |

reduce environmental impacts associated with excessive energy use.

Regulated energy components include HVAC systems, building envelope, service hot water systems, lighting and other regulated systems as defined by ASHRAE.

TECHNOLOGIES/STRATEGIES:

Develop and use building modeling and analysis techniques to establish a base case that meets the minimum prerequisite standard. ASHRAE/IESNA 90.1-1999 provides guidance for establishing building base case development and analysis. Perform interactive energy use analysis for selected design elements that affect energy performance and document compliance.

Unit of measure for performance shall be annual energy cost expressed in dollars. Annual energy costs shall be determined using rates for purchased energy, such as electricity, gas, oil, propane, steam, and chilled water and approved by the adopting authority, OR using the default purchased energy costs set forth in the Reference Guide. Refer to the LEED Reference Guide for a wide variety of energy efficiency resources and strategies including conservation measures, electromechanical energy efficiency technologies, passive heating and cooling strategies, and daylighting.



Energy and Atmosphere (cont.)

Points

Energy Credit 2:

INTENT:

1-3

1

Renewable Energy

Encourage and recognize increasing levels of self-supply through renewable technologies to reduce environmental impacts associated with fossil fuel energy use.

REQUIREMENT:

Supply a net fraction of the building's total energy use (as expressed as a fraction of annual energy cost through the use of on-site renewable energy systems.

| | % of Total Energy Cost in Renewables | Pts Pts |
|---|--------------------------------------|---------|
| | 5% | 1 |
| | 10% | 2 |
| П | 20% | 3 |

TECHNOLOGIES/STRATEGIES:

Employ the use of on-site non-polluting-source renewable technologies contributing to the total energy requirements of the project. Consider and use high temperature solar and/or geothermal, wind, biomass (other than unsustainably harvested wood), and biogas. Passive solar, solar hot water heating, ground-source heat pumps, and daylighting do not qualify for points under this credit. Credit for these strategies is given in Energy & Atmosphere Credit 1: Optimizing Energy Performance.

Energy Credit 3:

Additional Commissioning

INTENT

Verify and ensure that the entire building is designed, constructed, and calibrated to operate as intended.

REQUIREMENT:

- ☐ In addition to the Fundamental Building Commissioning prerequisite, implement the following additional commissioning tasks:
- 1. Conduct a focused review of the design prior to the construction documents phase.
- 2. Conduct a focused review of the construction documents when close to completion.
- 3. Conduct a selective review of contractor submittals of commissioned equipment.
- 4. Develop a system and energy management manual.
- 5. Have a contract in place for a near-warranty end or post occupancy review. Items 1,2, and 3 must be performed by someone other than the designer.

TECHNOLOGIES/STRATEGIES:

Introduce standards and strategies into the design process early, and then carry through selected measures by clearly stating target requirements in the construction documents. Tie contractor final payments to documented system performance. Refer to the LEED Reference Guide for detailed descriptions of required elements and references to additional guidelines.

Energy Credit 4:

INTENT:

1

Elimination of HCFC's and Halons

Reduce ozone depletion and support early compliance with the Montreal Protocol.

REQUIREMENT:

☐ Install base building level HVAC and refrigeration equipment and fire suppression systems that do not contain HCFC's or Halon.

TECHNOLOGIES/STRATEGIES:



Utilize base building HVAC and refrigeration systems that use non ozone damaging liquids for the refrigeration cycle. Refer to the LEED Reference Guide for qualifying alternatives.

Energy Credit 5: Measurement and Verification

INTENT:

Provide for the ongoing accountability and optimization of building energy and water consumption performance over time.

REQUIREMENT:

- ☐ Comply with the installed equipment requirements for continuous metering as stated in Option B: Methods by Technology of the US DOE's International Performance Measurement and Verification Protocol (IPMVP) for the following:
 - •Lighting systems and controls.
 - •Constant and variable motor loads.
 - Variable frequency drive (VFD) operation.
 - •Chiller efficiency at variable loads (kW/ton).
 - •Cooling load.
 - •Air and water economizer and heat recovery cycles.
 - •Air distribution static pressures and ventilation air volumes.
 - ·Boiler efficiencies.
 - •Building specific process energy efficiency systems and equipment.
 - •Indoor water risers and outdoor irrigation systems.

TECHNOLOGIES/STRATEGIES:

Design and specify equipment to be installed in base building systems to allow for comparison, management, and optimization of actual vs. estimated energy and water performance. Employ building automation systems to perform M&V functions where applicable. Tie contractor final payments to documented M&V system performance and include in the commissioning report. Provide for ongoing M&V system maintenance and operating plan in building operations and maintenance manuals. Refer to the LEED Reference Guide for a synopsis of IPMVP options.

INTENT:

Energy Credit 6: Green Power

Encourage the development and use of grid-source, renewable energy technologies on a net zero pollution basis.

REQUIREMENT:

☐ Engage in a two year contract to purchase power generated from renewable sources that meet the Center for Resource Solutions (CRS) Green-E requirements.

TECHNOLOGIES/STRATEGIES:

Purchase power from a provider that guarantees a fraction of its delivered electric power is from net nonpolluting renewable technologies. Begin by contacting local utility companies. If the project is in an open market state, investigate Green Power and Power Marketers licensed to provide power in that state. Grid power that qualifies for this credit originates from solar, wind, geothermal, biomass, or low-impact hydro sources. Low-impact hydro shall comply with the Low Impact Hydropower Certification Program.



1

Required

1-3

Materials Prerequisite:

Storage & Collection of Recyclables

INTENT:

Facilitate the reduction of waste generated by building occupants that is hauled to and disposed of in landfills.

REQUIREMENT:

☐ Provide an easily accessible area that serves the entire building that is dedicated to the separation, collection and storage of materials for recycling including (at a minimum) paper, glass, plastics, and metals.

TECHNOLOGIES/STRATEGIES:

Reserve space for recycling functions early in the building occupancy programming process and show areas dedicated to collection of recycled materials on space utilization plans. Broader recycling support space considerations should allow for collection and storage of the required elements and newspaper, organic waste (food and soiled paper), and dry waste. When collection bins are used, bin(s) should be able to accommodate a 75% diversion rate and be easily accessible to custodial staff and recycling collection workers. Consider bin designs that allow for easy cleaning to avoid health issues.

Materials Credit 1: Building Reuse

INTENT:

Extend the life cycle of existing building stock, conserve resources, retain cultural resources, reduce waste, and reduce environmental impacts of new buildings as they relate to materials manufacturing and transport.

REQUIREMENT:

| Reuse l | large portions of | 'existing structures d | luring renovation o | r redeve | lopment |
|---------|-------------------|------------------------|---------------------|----------|---------|
| project | S. | | | | |

- ☐ Maintain at least 75% of existing building structure and shell (exterior skin and framing excluding window assemblies). (1 point)
- ☐ Maintain an additional 25% (100% total) of existing building structure and shell (exterior skin and framing excluding window assemblies). (1 point)
- ☐ Maintain 100% of existing building structure and shell AND 50% non-shell (walls, floor coverings, and ceiling systems). (1 point)

TECHNOLOGIES/STRATEGIES:

Evaluate retention of existing structure. Consider facade preservation, particularly in urban areas. During programming and space planning, consider adjusting needs and occupant use patterns to fit within existing building structure and interior partition configurations. Identify and effectively address energy, structural, and indoor environmental (lead & asbestos) issues in building reuse planning and deconstruction documents. Percentage of reused non-shell building portions will be calculated as the total area (s.f.) of reused walls, floor covering, and ceiling systems, divided by the existing total area (s.f.) of walls, floor covering, and ceiling systems.



Materials and Resources (cont.)

Points

1-2

1-2

Materials Credit 2: Construction Waste

INTENT:

1

Construction Waste Management

Divert construction, demolition, and land clearing debris from landfill disposal. Redirect recyclable material back to the manufacturing process.

REQUIREMENT:

Develop and implement a waste management plan, quantifying material diversion by weight.

☐ Recycle and/or salvage at least 50% (by weight) of construction, demolition, and land clearing waste. (1 point)

□ Recycle and/or salvage an additional 25% (75% total by weight) of the construction, demolition, and land clearing debris. (1 point)

TECHNOLOGIES/STRATEGIES:

Develop and specify a waste management plan that identifies licensed haulers and processors of recyclables; identifies markets for salvaged materials; employs deconstruction, salvage, and recycling strategies and processes, includes waste auditing; and documents the cost for recycling, salvaging, and reusing materials. Source reduction on the job site should be an integral part of the plan

The plan should address recycling of corrugated cardboard, metals, concrete brick, asphalt, land clearing debris (if applicable), beverage containers, clean dimensional wood, plastic, glass, gypsum board, and carpet, and evaluates the cost-effectiveness of recycling rigid insulation, engineered wood products and other materials. Refer to the LEED Reference Guide for guidelines and references that provide waste management plan development and implementation support including model bid specifications.

Materials Credit 3:

Resource Reuse

INTENT:

Extend the life cycle of targeted building materials, reducing environmental impacts related to materials manufacturing and transport.

REQUIREMENT:

☐ Specify salvaged or refurbished materials for 5% of building materials.

(1 point)

☐ Specify salvaged or refurbished materials for 10% of building materials.

(1 point)

TECHNOLOGIES/STRATEGIES:

Commonly salvaged building materials include wood flooring/ paneling/cabinets, doors and frames, mantels, iron work and decorative lighting fixtures, brick, masonry and heavy timbers. See the LEED Reference Guide for calculation tools and guidelines. Determine percentages in terms of dollar value using the following steps:

- 1. Calculate total dollars* (see exclusions) of the salvaged or refurbished material.
- 2. Calculate total dollars (see exclusions) of all building materials.
- 3. Divide Step 1 by Step 2 to determine the percentage.

Exclusions: In total dollar calculations, exclude; labor costs; all mechanical and electrical material and labor costs; and project overhead and fees.

*If the cost of the salvaged or refurbished material is below market value, use replacement cost to estimate the material value, otherwise use actual cost to the project.



Materials and Resources (cont.)

Points

1-2

Materials Credit 4:

INTENT:

Recycled Content

Increase demand for building products that have incorporated recycled content material, reducing the impacts resulting from extraction of new material.

REQUIREMENT:

- ☐ Specify a minimum of 25% of building materials that contain in aggregate a minimum weighted average of 20% post-consumer recycled content material, OR, a minimum weighted average of 40% post-industrial recycled content material. (1 point)
- ☐ Specify an additional 25% (50% total) of building materials that contain in aggregate, a minimum weighted average of 20% post consumer recycled content material, OR, a minimum weighted average of 40% post-industrial recycled content material. (1 point)

TECHNOLOGIES/STRATEGIES:

Specify building materials containing recycled content for a fraction of total building materials. Start with the materials listed in the EPA's Comprehensive Procurement Guidelines (CPG). Common building materials and products with recycled content include; wall, partition, and ceiling materials and systems; insulation; tiles and carpets; cement, concrete, and reinforcing metals; structural and framing steel. See the LEED Reference Guide for a summary of the EPA guidelines and calculation methodology guidelines. Determine percentages in terms of dollar value using the following steps:

1. Calculate total dollars (see exclusions) of the material that contain recycled content. 2. Calculate total dollars (see exclusions) of all building materials.

3. Divide Step 1 by Step 2 to determine the percentage.

Exclusions: Labor costs; all mechanical and electrical material and labor costs; project overhead and fees)

Materials Credit 5: Local/Regional Materials

INTENT:

1-2

Increase demand for building products that are manufactured locally, reducing the environmental impacts resulting from transportation, and supporting the local economy.

REQUIREMENT:

- □ Specify a minimum of 20% of building materials that are manufactured regionally within a radius of 500 miles. (1 point)
- ☐ Of these regionally manufactured materials, specify a minimum of 50% that are extracted, harvested, or recovered within 500 miles. (1 point)

TECHNOLOGIES/STRATEGIES:

Specify and install regionally extracted, harvested, and manufactured building materials. Contact the state and local waste management boards for information about regional building materials. See the LEED Reference Guide for calculation methodology guidelines. Determine percentages in terms of dollar value using the following steps:

- Calculate total dollars (see exclusions) of material that is locally or regionally manufactured.
- 2. Calculate total dollars (see exclusions) of all building materials.
- 3. Divide Step 1 by Step 2 to determine the percentage.
- Exclusions: Labor costs; all mechanical and electrical material and labor costs; project overhead and fees.



Material Credit 6:

Rapidly Renewable Materials

INTENT:

Reduce the use and depletion of finite raw and long cycle renewable materials by replacing them with rapidly renewable materials.

REQUIREMENT:

☐ Specify rapidly renewable building materials for 5% of total building materials.

TECHNOLOGIES/STRATEGIES:

Rapidly renewable resources are those materials that substantially replenish themselves faster than traditional extraction demand (e.g. planted and harvested in less than a 10 year cycle) and do not result in significant biodiversity loss, increase erosion, air quality impacts, and that are sustainably managed. See the LEED Reference Guide for calculation methodology guidelines.

Determine percentages in terms of dollar value using the following steps:

- 1. Calculate total dollars (see exclusions) of materials that are considered to be rapidly renewable.
- 2. Calculate total dollars (see exclusions) of all building materials.
- 3. Divide Step 1 by Step 2 to determine the percentage.

Exclusions: Labor costs; all mechanical and electrical material and labor costs; project overhead and fees.

Material Credit 7: Certified Wood

1

INTENT:

Encourage environmentally responsible forest management.

REQUIREMENT:

☐ Use a minimum of 50% of wood-based materials certified in accordance with the Forest Stewardship Council guidelines for wood building components including but not limited to framing, flooring, finishes, furnishings, and non-rented temporary construction applications such as bracing, concrete form work and pedestrian barriers.

TECHNOLOGIES/STRATEGIES:

Refer to the Forest Stewardship Council guidelines for wood building components that qualify for compliance to the requirements and incorporate into material selection for the project.



Required

IEQ Prerequisite 1: Required

Minimum IAQ Performance

INTENT:

Establish minimum IAQ performance to prevent the development of indoor air quality problems in buildings, maintaining the health and well being of the occupants.

REQUIREMENT:

☐ Meet the minimum requirements of voluntary consensus standard ASHRAE 62-1999, Ventilation for Acceptable Indoor Air Quality and approved Addenda.

TECHNOLOGIES/STRATEGIES:

Include proactive design details that will eliminate some of the common causes of indoor air quality problems in buildings. Introduce standards into the design process early. Incorporate references to targets in plans and specifications. Ensure ventilation system outdoor air capacity can meet standards in all modes of operation. Locate building outdoor air intakes away from loading areas, building exhaust fans, cooling towers, and other sources of contamination. Include operational testing in the building commissioning report. Design cooling coil drain pans to ensure complete draining.

IEQ Prerequisite 2:

Environmental Tobacco Smoke (ETS) Control

INTENT:

Prevent exposure of building occupants and systems to Environmental Tobacco Smoke (ETS).

REQUIREMENT:

□Zero exposure of nonsmokers to ETS by prohibition of smoking in the building, OR, by providing a designated smoking room designed to effectively contain, capture and remove ETS from the building. At a minimum, the smoking room shall be directly exhausted to the outdoors with no recirculation of ETS-containing air to the non-smoking area of the building, enclosed with impermeable structural deck-to-deck partitions and operated at a negative pressure compared with the surrounding spaces of at least 7 Pa (0.03 inches of water gauge). Performance of smoking rooms shall be verified using tracer gas testing methods as described in ASHRAE Standard 129-1997. Acceptable exposure in non-smoking areas is defined as less than 1% of the tracer gas concentration in the smoking room detectable in the adjoining non-smoking areas. Smoking room testing as described in the ASHRAE Standard 129-1997 is required in the contract documents and critical smoking facility systems testing results must be included in the building commissioning plan and report or as a separate document.

TECHNOLOGIES/STRATEGIES:

Prohibit smoking in the building and/or provide designated smoking areas outside the building in locations where ETS can not reenter the building or ventilation system and away from high building occupant or pedestrian traffic.



1

IEQ Credit 1:

 $\begin{array}{l} Carbon \, Dioxide \, (CO_2) \\ Monitoring \end{array}$

INTENT:

Provide capacity for indoor air quality (IAQ) monitoring to sustain long term occupant health and comfort.

REQUIREMENT:

☐ Install a permanent carbon dioxide (CO₂) monitoring system that provides feedback on space ventilation performance in a form that affords operational adjustments, AND specify initial operational set point parameters that maintain indoor carbon dioxide levels no higher than outdoor levels by more than 530 parts per million at any time.

TECHNOLOGIES/STRATEGIES:

Install an independent system or make CO_2 monitoring a function of the building automation system. Situate monitoring locations in areas of the building with high occupant densities and at the ends of the longest runs of the distribution ductwork. Specify that system operation manuals require calibration of all of the sensors per manufacturer recommendations but not less than one year. Include sensor and system operational testing and initial set point adjustment in the commissioning plan and report.

IEQ Credit 2:

Increase Ventilation Effectiveness

INTENT:

Provide for the effective delivery and mixing of fresh air to building occupants to support their health, safety, and comfort.

REQUIREMENT:

□For mechanically ventilated buildings, design ventilation systems that result in an air change effectiveness (E) greater than or equal to 0.9 as determined by ASHRAE 129-1997. For naturally ventilated spaces demonstrate a distribution and laminar flow pattern that involves not less than 90% of the room or zone area in the direction of air flow for at least 95% of hours of occupancy.

TECHNOLOGIES/STRATEGIES:

Employ architectural and HVAC design strategies to increase ventilation effectiveness and prevent short-circuiting of airflow delivery. Techniques available include use of displacement ventilation, low velocity, and laminar flow ventilation (under floor or near floor delivery) and natural ventilation. Operable windows with an architectural strategy for natural ventilation, cross ventilation, or stack effect can be appropriate options with study of inlet areas and locations. See the LEED Reference Guide for compliance methodology guidelines.



1-2

IEQ Credit 3: Construction IAQ Management Plan

INTENT:

Prevent indoor air quality problems resulting from the construction/renovation process, to sustain long term installer and occupant health and comfort.

REQUIREMENT:

Develop and implement an Indoor Air Quality (IAQ) Management Plan for the construction and pre-occupancy phases of the building as follows:

- □ During construction meet or exceed the minimum requirements of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guideline for Occupied Buildings under Construction, 1995, AND protect stored on-site or installed absorptive materials from moisture damage, AND replace all filtration media immediately prior to occupancy (Filtration media shall have a Minimum Efficiency Reporting Value (MERV) of 13 as determined by ASHRAE 52.2-1999). (1 point)
- □Conduct a minimum two-week building flushout with new filtration media at 100% outside air after construction ends and prior to occupancy, OR, conduct a baseline indoor air quality testing procedure consistent with current EPA protocol for Environmental Requirements, Baseline IAQ and Materials, for the Research Triangle Park Campus, Section 01445. (1 point)

TECHNOLOGIES/STRATEGIES:

Specify containment control strategies including protecting the HVAC system, controlling pollutant sources, interrupting pathways for contamination, enforcing proper housekeeping and coordinating schedules to minimize disruption. Specify the construction sequencing to install absorptive materials after the prescribed dry or cure time of wet finishes to minimize adverse impacts on indoor air quality. Materials directly exposed to moisture through precipitation, plumbing leaks, or condensation from the HVAC system are susceptible to microbial contamination. Absorptive materials to protect and sequence installation include; insulation, carpeting, ceiling tiles, and gypsum products. Appoint an IEQ Manager with owner's authority to inspect IEQ problems and require mitigation as necessary.



IEQ Credit 4:

INTENT:

1-4

Low-Emitting Materials

Reduce the quantity of indoor air contaminants that are odorous or potentially irritating to provide installer and occupant health and comfort.

REQUIREMENT:

Meet or exceed VOC limits for adhesives, sealants, paints, composite wood products, and carpet systems as follows:

- ☐ Adhesives must meet or exceed the VOC limits of South Coast Air Quality Management District Rule #1168 by, AND all sealants used as a filler must meet or exceed Bay Area Air Resources Board Reg. 8, Rule 51 (1 point)
- ☐ Paints and coatings must meet or exceed the VOC and chemical component limits of Green Seal requirements. (1 point)
- ☐ Carpet systems must meet or exceed the Carpet and Rug Institute Green Label Indoor Air Quality Test Program. (1 point)
- ☐ Composite wood or agrifiber products must contain no added urea-formaldehyde resins. (1 point)

TECHNOLOGIES/STRATEGIES:

Evaluate and preferentially specify materials that are low emitting, non-irritating, nontoxic and chemically inert. Request and evaluate emissions test data from manufacturers for comparative products. Ensure that VOC limits are clearly stated in specifications, in General Conditions, or in each section where adhesives, sealants, coatings, carpets, and composite woods are addressed.

IEQ Credit 5: Indoor Chemical and Pollutant Source Control

1

Avoid exposure of building occupants to potentially hazardous chemicals that adversely impact air quality.

REQUIREMENT:

Design to minimize cross-contamination of regularly occupied areas by chemical pollutants:

☐ Employ permanent entryway systems (grills, grates, etc.) to capture dirt, particulates, etc. from entering the building at all high volume entryways, AND provide areas with structural deck to deck partitions with separate outside exhausting, no air recirculation and negative pressure where chemical use occurs (including housekeeping areas and copying/print rooms), AND provide drains plumbed for appropriate disposal of liquid waste in spaces where water and chemical concentrate mixing occurs.

TECHNOLOGIES/STRATEGIES:

Design to physically isolate activities associated with chemical contaminants from other locations in the building, providing dedicated systems to contain and remove chemical pollutants from source emitters at source locations.

Applicable measures include eliminating or isolating high hazard areas; designing all housekeeping chemical storage and mixing areas (central storage facilities and janitors closets) to allow for secure product storage; designing copy/fax/printer/printing rooms with structural deck to deck partitions and dedicated exhaust ventilation systems; and including permanent architectural entryway system(s) to catch and hold particles to keep them from entering and contaminating the building interior.



Indoor Environmental Quality (cont.)

Points

1-2

1-2

IEQ Credit 6:Controllability of Systems

INTENT:

Provide a high level of individual occupant control of thermal, ventilation, and lighting systems to support optimum health, productivity, and comfort conditions.

REQUIREMENT:

☐ Provide a minimum of one operable window and one lighting control zone per 200 s.f. for all occupied areas within 15 feet of the perimeter wall.

(1 point)

☐ Provide controls for each individual for airflow, temperature, and lighting for 50% of the non perimeter, regularly occupied areas. (1 point)

TECHNOLOGIES/STRATEGIES:

Provide individual or integrated controls systems that control lighting, airflow, and temperature in individual rooms and/or work areas. Consider combinations of ambient and task lighting control and operable windows for perimeter and VAV systems for non perimeter with a 1:1: 2 terminal box to controller to occupant ratio.

IEQ Credit 7: Thermal Comfort

INTENT:

Provide for a thermally comfortable environment that supports the productive and healthy performance of the building occupants.

REQUIREMENT:

- ☐ Comply with ASHRAE Standard 55-1992, Addenda 1995 for thermal comfort standards including humidity control within established ranges per climate zone. (1 point)
- ☐ Install a permanent temperature and humidity monitoring system configured to provide operators control over thermal comfort performance and effectiveness of humidification and/or dehumidification systems in the building.

(1 point)

TECHNOLOGIES/STRATEGIES:

Integrated envelope and HVAC system design strategies that achieve thermal comfort conditions based on mean radiant temperature, local air velocity, relative humidity, and air temperature. Install and maintain a temperature and humidity monitoring system for key areas of the building (i.e., at the perimeter, and spaces provided with humidity control). This function can be satisfied by the building automation system. Specify in system operation manuals that all sensors require quarterly calibration. Include criteria verification and system operation in commissioning plan and report.



1-2

IEQ Credit 8: Daylight and Views

INTENT:

Provide a connection between indoor spaces and the outdoor environment through the introduction of sunlight and views into the occupied areas of the building.

REQUIREMENT:

- □Achieve a minimum Daylight Factor of 2% (excluding all direct sunlight penetration) in 75% of all space occupied for critical visual tasks, not including copy rooms, storage areas, mechanical, laundry, and other low occupancy support areas. Exceptions include those spaces where tasks would be hindered by the use of daylight or where accomplishing the specific tasks within a space would be enhanced by the direct penetration of sunlight. (1 point)
- ☐ Direct line of sight to vision glazing from 90% of all regularly occupied spaces, not including copy rooms, storage areas, mechanical, laundry, and other low occupancy support areas. (1 point)

TECHNOLOGIES/STRATEGIES:

Implement design strategies to provide access to daylight and views to the outdoors in a glare-free way using exterior sun shading, interior light shelves, and /or window treatments. Orient buildings to maximize daylighting options. Consider shallow or narrow building footprints. Employ courtyards, atriums, clerestory windows, skylights, and light shelves to achieve daylight penetration (from other than direct effect or direct rays from the sun) deep into regularly occupied areas of the building.



Innovation Credits and Design/Build Process

Points

LEED Innovation Credits

INTENT:

1-4

To provide design teams and projects the opportunity to be awarded points for exceptional performance above requirements set by the LEED Green Buildings System and/or innovative performance in Green Building categories not specifically addressed by the LEED Green Building Rating System.

REQUIREMENT:

In writing, using the LEED Credit Equivalence process, identify the INTENT of the proposed innovation credit, the proposed REQUIREMENT for compliance, the proposed DOCUMENTATION to demonstrate compliance, and the TECHNOLOGIES/STRATEGIES used to meet the required elements.

SUGGESTED USES:

- •Responses to regional sustainability issues.
- •Unique project types and locations.
- Emerging sustainable design topics and innovations.

LEED Accredited Professional

INTENT:

1

To support and encourage the design integration required by a LEED Green Building project and to streamline the application and certification process.

REQUIREMENT:

☐ At least one principal participant of the project team that has successfully completed the LEED Accredited Professional exam.

STRATEGY:

Attend a LEED Accredited Professional training workshop in preparation to take and pass the LEED Accredited Professional exam.



LEED™ Scorecard



Purpose of Form: Use this form to score your project against the LEED $^{\text{TM}}$ Green Building Rating System. Fill it out at the time of registration. It will help you, and us, to keep track of the prerequisites and applicable credits on your project. It will also be used to track compliance when that documentation is submitted to the US Green Building Council.

| 14 Sustainable Sites | | |
|--|---|--|
| □Prerequisite: Erosion and Sedimentation Control □□□Credit 1: Site Selection □□□Credit 2: Urban Redvelopment □□□Credit 3: Brownfield Redevelopment □□□Credit 4: Alternative Transportation | □□□Credit 5: Reduced Site Disturbance □□□Credit 6: Stormwater Management □□□Credit 7: Landscape and Exterior Design to Reduce Heat Islands □□□Credit 8: Light Pollution Reduction | |
| 5 Water Efficiency | | |
| □□□Credit 1: Water Efficient Landscaping □□□Credit 2: Innovative Wastewater Technologies □□□Credit 3: Water Use Reduction | | |
| 17 Energy and Atmosphere | | |
| □Prerequisite 1: Fundamental Building Systems Commissioning □Prerequisite 2: Minimum Energy Performance □Prerequisite 3: CFC Reduction in HVAC&R Equipment | □□□Credit 1: Optimize Energy Performance □□□Credit 2: Renewable Energy □□□Credit 3: Additional Commissioning □□□Credit 4: Elimination of HCFC's and Halons □□□Credit 5: Measurement and Verification □□□Credit 6: Green Power | |
| 13 Materials and Resources | | |
| □Prerequisite: Storage & Collection of Recyclables □□□Credit 1: Building Reuse □□□Credit 2: Construction Waste Management □□□Credit 3: Resource Reuse | □□□Credit 4: Recycled Content □□□Credit 5: Local/Regional Materials □□□Credit 6: Rapidly Renewable Materials □□□Credit 7: Certified Wood | |
| 15 Indoor Environmental Quality | | |
| □Prerequisite 1: Minimum IAQ Performance □Prerequisite 2: Environmental Tobacco Smoke (ETS) Control □□□Credit 1: Carbon Dioxide (CO2) Monitoring □□□Credit 2: Increase Ventilation Effectiveness □□□Credit 3: Construction IAQ Management Plan | □□□Credit 4: Low-Emitting Materials □□□Credit 5: Indoor Chemical and Pollutant Source Control □□□Credit 6: Controllability of Systems □□□Credit 7: Thermal Comfort □□□Credit 8: Daylight and Views | |
| 64 Total Core LEED Rating System Points | | |
| 5 Innovation and Design Process Points □□□LEED Innovation Credits □□□LEED Accredited Professional Total Points Scored | LEED Green Building Certification LevelsLEED Certified= 26 - 32 PointsLEED Certified Silver Level= 33 - 38 PointsLEED Certified Gold Level= 39 - 51 PointsLEED Certified Platinum Level= 52+ Points | |