

INTEGRATIVE PROCESS (IP)

LEED BD+C v4 Credit Summary Sheet

	NAME	INTENT	REQUIREMENTS	ADDITIONAL INFORMATION	STANDARDS	EXEMPLARY PERFORMANCE
P	Integrative Project Planning and Design HC	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.	<p>Use cross-discipline design and decision making, beginning in the programming and pre-design phase. At a minimum, ensure the following process:</p> <p>Owner's Project Requirements Document Prepare an Owner's Project Requirements (OPR) document. Develop a health mission statement and incorporate it in the OPR. The health mission statement must address "triple bottom line" values—economic, environmental and social. Include goals and strategies to safeguard the health of building occupants, the local community and the global environment, while creating a high-performance healing environment for the building's patients, caregivers and staff.</p> <p>Preliminary Rating Goals As early as practical and preferably before schematic design, conduct a preliminary LEED meeting with a minimum of four key project team members and the owner or owner's representative. As part of the meeting, create a LEED® action plan that, at a minimum:</p> <ul style="list-style-type: none"> • Determines the LEED certification level to pursue (Certified, Silver, Gold, or Platinum); • Selects the LEED credits to meet the targeted certification level; and • Identifies the responsible parties to ensure the LEED requirements for each prerequisite and selected credit are met. <p>Integrated Project Team Assemble an integrated project team and include as many of the following professionals as feasible (minimum of four), in addition to the owner or owner's representative.</p> <p>Design Charrette As early as practical and preferably before schematic design, conduct a minimum four-hour , integrated design charrette with the project team as defined above. The goal is to optimize the integration of green strategies across all aspects of building design, construction and operations, drawing on the expertise of all participants.</p>	<p>Triple Bottom Line - People, Planet, Profit</p> <p>A comprehensive, integrative process accounts for the interactions of all building and site systems, relying on an iterative cycle of analysis, workshops, implementation, and performance feedback.</p> <p>owner's project requirements (OPR) a written document that details the ideas, concepts, and criteria determined by the owner to be important to the success of the project.</p> <p>basis of design (BOD) the information necessary to accomplish the owner's project requirements, including system descriptions, indoor environmental quality criteria, design assumptions, and references to applicable codes, standards, regulations, and guidelines.</p>	ANSI Consensus National Standard Guide© 2.0 for Design and Construction of Sustainable Buildings and Communities (February 2, 2012)	N/A
C	Integrative Process NC, CS, S, R, DC, WDC, HOS, HC	To support high performance, cost-effective project outcomes through an early analysis of the interrelationships among systems.	<p>Energy-Related Systems Discovery Perform a preliminary "simple box" energy modeling analysis before the completion of schematic design that explores how to reduce energy loads in the building and accomplish related sustainability goals by questioning default assumptions. Assess at least two potential strategies associated with the following:</p> <ul style="list-style-type: none"> • Site conditions. Assess shading, exterior lighting, hardscape, landscaping, and adjacent site conditions. • Massing and orientation. Assess how massing and orientation affect HVAC sizing, energy consumption, lighting, and renewable energy opportunities. • Basic envelope attributes. Assess insulation values, window-to-wall ratios, glazing characteristics, shading, and window operability. • Lighting levels. Assess interior surface reflectance values and lighting levels in occupied spaces. • Thermal comfort ranges. Assess thermal comfort range options. • Plug and process load needs. Assess reducing plug and process loads through programmatic solutions (e.g., equipment and purchasing policies, layout options). • Programmatic and operational parameters. Assess multifunctioning spaces, operating schedules, space allotment per person, teleworking, reduction of building area, and anticipated operations and maintenance. <p>Implementation Document how the above analysis informed design and building form decisions in the project's OPR and BOD and the eventual design of the project</p> <p>Water-Related Systems Discovery Perform a preliminary water budget analysis before the completion of schematic design that explores how to reduce potable water loads in the building and accomplish related sustainability goals. Assess and estimate the project's potential nonpotable water supply sources and water demand volumes, including the following:</p> <ul style="list-style-type: none"> • Indoor water demand. Assess flow and flush fixture design case demand volumes, calculated in accordance with WE Prerequisite Indoor Water-Use Reduction. • Outdoor water demand. Assess landscape irrigation design case demand volume calculated in accordance with WE Credit Outdoor Water-Use Reduction. • Process water demand. Assess kitchen, laundry, cooling tower, and other equipment demand volumes, as applicable. • Supply sources. Assess all potential nonpotable water supply source volumes, such as on-site rainwater and graywater, municipally supplied nonpotable water, and HVAC equipment condensate <p>Implementation Document how the above analysis informed building and site design decisions in the project's OPR and BOD. Demonstrate how at least one on-site nonpotable water supply source was used to reduce the burden on municipal supply or wastewater treatment systems by contributing to at least two of the water demand components listed above.</p>	<p>Integrative Process</p> <ol style="list-style-type: none"> 1. Discovery 2. Design and Construction 3. Occupancy, operations, and performance feedback 	ANSI Consensus National Standard Guide© 2.0 for Design and Construction of Sustainable Buildings and Communities (February 2, 2012)	No

LOCATION AND TRANSPORTATION (LT)

LEED BD+C v4 Credit Summary Sheet

	NAME	INTENT	REQUIREMENTS	ADDITIONAL INFORMATION	STANDARDS	EXEMPLARY PERFORMANCE			
C	LEED for Neighborhood Development Location NC, CS, S, R, DC, WDC, HOS, HC	To avoid development on inappropriate sites. To reduce vehicles miles traveled. To enhance livability and improve human health by encouraging daily physical activity.	Locate the project within the boundary of a LEED ND certified development. Projects attempting this credit are not eligible to earn points under other Location and Transportation credits. Pilot or 2009 - Stage 2 or Stage 3 LEED v4 - Certified Plan or Certified Project Point total increases with LEED ND certification level - Certified, Silver, Gold Platinum i.e. LEED BD+C - 8 pts, 10 pts, 12 pts, 16 pts	LEED ND - walkability, transit access, sensitive land protection, connectivity, and shared infrastructure. USGBC website for up-to-date lists of LEED ND projects LEED ND project information (name, ID number, rating system and version, certification level, and certification date) Vicinity base map with LEED project boundary and LEED ND certified neighborhood or plan boundary	None	No			
C	Sensitive Land Protection NC, CS, S, R, DC, WDC, HOS, HC	To avoid the development of environmentally sensitive lands and reduce the environmental impact from the location of a building on a site.	<p>Option 1. Locate development footprint on previously developed land.</p> <p>Option 2. If development footprint is on previously undeveloped land, avoid:</p> <p>Prime farmlands Floodplains Habitat 100 ft from a water body, minor improvements are okay 50 feet from a Wetlands, minor improvements are okay</p> <p><u>Minor Improvements</u> Bicycle and pedestrian pathways ≤ 12 feet wide, of which no more than 8 feet may be impervious; Activities to maintain or restore native natural communities and/or natural hydrology; One single-story structure per 300 linear feet on average, not exceeding 500 square feet; Grade changes necessary to ensure public access; Clearings, limited to one per 300 linear feet on average, not exceeding 500 square feet each; Removal of the following tree types: Hazardous trees, up to 75% of dead trees; Trees less than 6 inches diameter at breast height; Up to 20% of trees more than 6 inches diameter at breast height with a condition rating of 40% or higher. Trees under 40% condition rating. The condition rating must be based on an assessment by an arborist certified by the International Society of Arboriculture (ISA) using ISA standard measures, or local equivalent for projects outside the U.S.; Brownfield remediation activities.</p>		<p>U.S. Department of Agriculture, United States Code of Federal Regulations Title 7, Volume 6, Parts 400 to 699, Section 657.5</p> <p>U.S. Fish and Wildlife Service, List of Threatened and Endangered Species</p> <p>NatureServe Heritage Program, GH, G1, and G2 species and ecological communities</p>	No			
C	High-Priority Site NC, CS, S, R, DC, WDC, HOS, HC	To encourage project location in areas with development constraints and promote the health of the surrounding area.	<p>Option 1. Historic District Locate the project on an infill location in a historic district.</p> <p>Option 2. Priority Designation Locate on a site on one of the following priority designations: EPA National Priorities List; Federal Empowerment Zone site; Federal Enterprise Community site; Federal Renewal Community site; Department of the Treasury Community Development Financial Institutions Fund Qualified Low-Income Community; U.S. Department of Housing and Urban Development's Qualified Census Tract (QCT) or Difficult Development Area (DDA);</p> <p>Option 3. Brownfield Remediation Locate on a brownfield where soil or groundwater contamination has been identified, and where the local, state, or national authority (whichever has jurisdiction) requires its remediation. Perform remediation to the satisfaction of that authority.</p>	<p>infill site - 75%+ of surrounding land within 1/2 mile of project boundary is previously developed excluding streets and rights of way.</p> <p>previously developed site - a site that, prior to the project, consisted of at least 75% previously developed land.</p>	<p>EPA, National Priority List U.S. Dept of HUD, Federal Empowerment Zone, Federal Enterprise Community, and Federal Renewal Community</p> <p>U.S. DOT, Community Development Financial Institutions Fund</p> <p>U.S. Dept of HUD, QCT and DDA</p>	Achieve Option 1 AND Option 2 or Option 3			
C	Surrounding Density and Diverse Uses NC, CS, S, R, DC, WDC, HOS, HC	To conserve land and protect farmland and wildlife habitat by encouraging development in areas with existing infrastructure. To promote walkability, and transportation efficiency and reduce vehicle distance traveled. To improve public health by encouraging daily physical activity.	<p>NC, CS, S, R, DC, HOS</p> <p>Option 1. Surrounding Density Surrounding existing density within a 1/4 mile radius of the project boundary meets the density requirements:</p> <table border="1" data-bbox="547 1360 1898 1427"> <tr> <td>Combined 22,000 or 35,000 SF/acre of buildable land</td> <td>Residential 7 or 12 DU/acre</td> <td>Nonresidential 0.5 or 0.8 FAR</td> </tr> </table> <p>AND/OR</p> <p>Option 2. Diverse Uses Building's main entrance is within a 1/2 mile walking distance of the main entrance of four to seven (1 pt) or eight or more (2 pts) existing and publicly available diverse uses.</p> <p><u>WDC</u></p> <p>Option 1. Development and Adjacency Previously developed site used for industrial or commercial purposes OR Both a previously developed and an adjacent site currently used for industrial or commercial purposes.</p> <p>AND/OR</p> <p>Option 2. Transportation Resources Construct or renovate the project on a site that has two or three (1 point) or four (2 points) of the following transportation resources: 10-mile driving distance from a main logistics hub; 1-mile driving distance of an off-ramp to a highway; 1-mile driving distance of an access point to an active freight rail line; Site is served by an active freight rail spur</p> <p><u>HC</u></p> <p>Option 1. Surrounding Density Surrounding existing density within a 1/4 mile radius of the project boundary, at least 7 DU/acre with a 0.5 FAR AND 22,000+ SF of buildable land.</p> <p>OR</p> <p>Option 2. Diverse Uses Building's main entrance is within a 1/2mile walking distance of the main entrance of seven existing and publicly available diverse uses.</p>	Combined 22,000 or 35,000 SF/acre of buildable land	Residential 7 or 12 DU/acre	Nonresidential 0.5 or 0.8 FAR	<p><u>Schools</u> Playing fields and associated buildings used during sporting events only (e.g., concession stands) and playgrounds with play equipment, are excluded from the development density calculations.</p> <p><u>All Projects</u> In all cases, a planned transportation resource must be sited, funded, and under construction by the date of the certificate of occupancy and complete within 24 months of that date.</p> <p><u>HC</u> For previously dvlpd existing rural healthcare campus sites, achieve a min development density of 30,000 sf per acre</p> <p><u>Uses</u> The following restrictions apply.</p> <ul style="list-style-type: none"> A use may be counted as only one type (e.g., a retail store may be counted only once even if it sells products in several categories). No more than two uses in each use type may be counted (e.g., if five restaurants are within walking distance, only two may be counted). The counted uses must represent at least three of the five categories, exclusive of the building's primary use. 	None	No
Combined 22,000 or 35,000 SF/acre of buildable land	Residential 7 or 12 DU/acre	Nonresidential 0.5 or 0.8 FAR							

LOCATION AND TRANSPORTATION (LT)

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	NAME	INTENT	REQUIREMENTS	ADDITIONAL INFORMATION	STANDARDS	EXEMPLARY PERFORMANCE
C	Access to Quality Transit NC, CS, S, R, DC, WDC, HOS, HC	To encourage development in locations shown to have multimodal transportation choices or otherwise reduced motor vehicle use, thereby reducing greenhouse gas emissions, air pollution, and other environmental and public health harms associated with motor vehicle use.	<p><u>NC, CS, S, R, DC, WDC, HOS, HC</u> Locate any functional entry of the project within a 1/4-mile walking distance of existing or planned bus, streetcar, or rideshare stops, or 1/2-mile walking distance of existing or planned bus rapid transit stops, light or heavy rail stations, commuter rail stations, or commuter ferry terminals. Minimum daily trips for transit service (bus, streetcar, rail, or ferry) NC, CS, R, DC, WDC, HOS: Weekday/weekend: 72/40; 144/108; 360/216 S: Weekday: 72; 144; 360 HC: Weekday/weekend: 72/40; 144/108 Minimum daily trips for commuter rail or ferry service only NC, CS, R, DC, WDC, HOS: Weekday/weekend: 24/6; 40/8; 60/12 S: Weekday:24; 40; 60 HC: Weekday/weekend:24/6; 40/8 <u>S</u> Option 1. Transit-Served Location, OR Option 2. Pedestrian Access Project has an attendance boundary such that 50%; 60%; 70%+ live within no more than a 3/4-mile walking distance (for grades 8 and below, or ages 14 and below), and 1-1/2-mile walking distance (for grades 9 and above or ages 15 and above) of a functional entry of a school building. Choose a site that allows pedestrian access to the site from all residential neighborhoods that house the planned student population.</p>	<p>Projects served by two or more transit routes such that no one route provides more than 60% of the prescribed levels may earn one additional point, up to the maximum number of points.</p> <p>If existing transit service is temporarily rerouted outside the required distances for less than two years, the project may meet the requirements, provided the local transit agency has committed to restoring the routes with service at or above the prior level.</p> <p>Private shuttles cannot be used to comply with the requirement.</p>	None	Double the highest transit service point threshold (except for Schools projects using Option 2).
C	Bicycle Facilities NC, CS, S, R, DC, WDC, HOS, HC	To promote bicycling and transportation efficiency and reduce vehicle distance traveled. To improve public health by encouraging utilitarian and recreational physical activity.	<p><u>NC, CS, DC, WDC, HOS</u> Bicycle Network - functional entry or bicycle storage within a 200-yard walking or bicycling distance of at least one of the following: at least 10 diverse uses; a school or employment center, if the project total floor area is 50% or more residential; or a bus rapid transit stop, light or heavy rail station, commuter rail station, or ferry terminal. Bicycle Storage and Shower Rooms Case 1. Commercial or Institutional 2.5% of all peak visitors, short-term bicycle storage, but no fewer than four storage spaces per building 5% of all regular building occupants long-term storage, but no fewer than four storage spaces per building in addition to the short-term spaces. One on-site shower with changing facility for the first 100 regular building occupants and one additional shower for every 150 thereafter. Case 2. Residential 2.5% of all peak visitors, short-term bicycle storage, but no fewer than four storage spaces per building 30% of all regular building occupants long-term storage, but no less than one storage spaces per residential unit. Case 3. Mixed-use Projects Meet the Case 1 and Case 2 storage requirements for the nonresidential and residential portions of the project, respectively. <u>S, R, HC</u> Bicycle Network - functional entry or bicycle storage within a 200-yard walking or bicycling distance of at least one of the following: at least 10 diverse uses; a bus rapid transit stop, light or heavy rail station, commuter rail station, or ferry terminal. S: Provide dedicated bicycle lanes that extend at least to the end of the school property with no barriers (e.g., fences) on school property. Bicycle Storage and Shower Rooms <u>S</u> 5% of all regular building occupants (excluding grade 3 and younger) long-term storage, but no fewer than four storage spaces per building. One on-site shower with changing facility for the first 100 regular building occupants (excluding students) and one additional shower for every 150 thereafter. <u>R</u> At least two short-term bicycle storage spaces for every 5,000 square feet, but no fewer than two storage spaces per building. 5% of all regular building occupants long-term storage, but no fewer than two storage spaces per building in addition to the short-term spaces. Provide a bicycle maintenance program for employees or bicycle route assistance for employees and customers. <u>HC</u> Case 1. Commercial or Institutional 2.5% of all peak visitors, short-term bicycle storage, but no fewer than four storage spaces per building 5% of all regular building occupants (excluding patients) long-term storage, but no fewer than four storage spaces per building in addition to the short-term spaces. One on-site shower with changing facility for the first 100 regular building occupants (excluding patients) and one additional shower for every 150 thereafter. Case 2. Residential 30% of all regular building occupants (excluding patients) provide secure, enclosed bicycle storage for at least measured at peak periods, but no less than one storage space per residential unit.</p> <p><u>All Projects</u> Short-term bicycle storage must be within 100 feet walking distance of any main entrance. Long-term bicycle storage must be within 100 feet walking distance of any functional entry. All destinations must be within a 3-mile bicycling distance of the project boundary. Planned bicycle trails or lanes may be counted if they are fully funded by the date of the certificate of occupancy and are scheduled for completion within one year of that date.</p>	<p>Bicycle network - a continuous network consisting of any combination of the following:</p> <ul style="list-style-type: none"> off-street bicycle paths or trails at least 8 feet wide for a two-way path and at least 5 feet wide for a one-way path Physically designated on-street bicycle lanes at least 5 ft wide Streets designed for a target speed of 25 mph <p>Projects with hotel guests may exclude these occupants from shower calculations.</p> <p>Free access to on-site shower facilities or health club shower facilities within the LEED project boundary may be provided to all occupants in lieu of inhouse facilities. Health club or shower facilities must be accessible to occupants without their having to go outdoors and available during the project's hours of operation.</p>	None	N/A

LOCATION AND TRANSPORTATION (LT)

LEED BD+C v4 Credit Summary Sheet

	NAME	INTENT	REQUIREMENTS	ADDITIONAL INFORMATION	STANDARDS	EXEMPLARY PERFORMANCE
C	Reduced Parking Footprint NC, CS, S, R, DC, WDC, HOS, HC	To minimize the environmental harms associated with parking facilities, including automobile dependence, land consumption, and rainwater runoff.	<p>Do not exceed the minimum local code requirements for parking capacity. Provide parking capacity that is a percentage reduction below the base ratios recommended by the Parking Consultants Council, as shown in the Institute of Transportation Engineers' Transportation Planning Handbook, 3rd edition, Tables 18-2 through 18-4.</p> <p>Case 1. Baseline Location 20% reduction from the base ratios - Projects that have not earned points under LT Credit Surrounding Density and Diverse Uses or LT Credit Access to Quality Transit</p> <p>Case 2. Dense and/or Transit-Served Location 40% reduction from the base ratios - Projects earning 1 or more points under either LT Credit Surrounding Density and Diverse Uses or LT Credit Access to Quality Transit</p> <p><u>For All Projects</u> The credit calculations must include all existing and new off-street parking spaces that are leased or owned by the project, including parking that is outside the project boundary but is used by the project. On-street parking in public rights-of-way is excluded from these calculations.</p> <p>For projects that use pooled parking, calculate compliance using the project's share of the pooled parking.</p> <p>5% of the total parking spaces - Provide preferred parking for carpools after reductions are made from the base ratios. Preferred parking is not required if no off-street parking is provided. Mixed-use projects should determine the percentage reduction by first aggregating the parking amount of each use (as specified by the base ratios) and then determining the percentage reduction from the aggregated parking amount. Do not count parking spaces for fleet and inventory vehicles unless these vehicles are regularly used by employees for commuting as well as business purposes.</p>	<p>Examples of transportation demand management strategies include the following.</p> <p>Telecommuting. Allow employees to work remotely on certain days.</p> <p>Shuttles. Provide shuttle service between transit stops and/or commercial and residential centers. Although shuttles can help reduce parking demand, they cannot be used to earn LT Credit Access to Quality Transit.</p> <p>Shared parking between uses. Size the parking supply so that surrounding uses with different peak occupancies can all use the parking. For example, a commercial office with daytime peak occupancy can share its parking supply with an adjacent movie theater with evening peak occupancy. Doing so will ensure that the parking is maximized throughout the day.</p> <p>Residential units rented or sold separately from parking. Conventionally, a dwelling unit's rent or for-sale price includes one or more parking spaces. Instead, rent or sell parking separately so that occupants internalize the cost of parking and those without automobiles can opt not to have parking spaces. Transit subsidy. Provide building occupants with a subsidy to help pay for transit trips.</p> <p>Compressed workweek schedule. Structure employees' schedules such that some work longer days in exchange for not working on a particular day every one to three weeks.</p>	Institute of Transportation Engineers, Transportation Planning Handbook, 3rd edition, Tables 18-2 through 18-4	Case 1. Achieve a 60% parking reduction from the base ratios. Case 2. Achieve a 80% parking reduction from the base ratios.
C	Green Vehicles NC, CS, S, R, DC, WDC, HOS, HC	To reduce pollution by promoting alternatives to conventionally fueled automobiles.	<p><u>NC, CS, R, DC, HOS, HC</u> 5% of all parking spaces used by the project as preferred parking for green vehicles. Green vehicles must achieve a minimum green score of 45 on the American Council for an Energy Efficient Economy (ACEEE) annual vehicle rating guide. A discounted parking rate of at least 20% for green vehicles is an acceptable substitute for preferred parking spaces. The discounted rate must be publicly posted at the entrance of the parking area and permanently available to every qualifying vehicle. In addition to preferred parking for green vehicles, meet one of the following two options for alternative-fuel fueling stations:</p> <p>Option 1. Electric Vehicle Charging 2% of all parking spaces used by the project - Install electrical vehicle supply equipment (EVSE) OR</p> <p>Option 2. Liquid, gas, or battery facilities Install liquid or gas alternative fuel fueling facilities or a battery switching station capable of refueling a number of vehicles per day equal to at least 2% of all parking spaces.</p> <p><u>S</u> Option 1. Green passenger vehicles (see above) OR</p> <p>Option 2. Liquid, gas, or battery facilities (see above) OR</p> <p>Option 3. Green buses and school-owned vehicles Develop and implement a plan for every bus serving the school to meet the following emissions standards within seven years of the building certificate of occupancy:</p> <ul style="list-style-type: none"> nitrogen oxide (NOx) emissions of 0.50 grams or less per brake horsepower-hour; and particulate matter emissions of 0.01 grams or less per brake horsepower-hour. Emission standards must be met for each bus and not by an average of the entire fleet serving the school. Develop and implement a plan for 100% of all other (non-bus) vehicles owned or leased to serve the school to be green vehicles. Green vehicles must achieve a minimum green score of 45 on the American Council for an Energy Efficient Economy (ACEEE) annual vehicle rating guide <p><u>WDC</u> Option 1. Alternative-Fuel Vehicles (1 point) Provide an on-site fleet with at least one yard tractor that is powered by electricity, propane, or natural gas. Provide on-site charging or refueling stations for the vehicles. Liquid or gas refueling stations must be separately ventilated or located outdoors. OR</p> <p>Option 2. Reduced Truck Idling (1 point) Provide an electrical connection for at least 50% of all dock door locations to limit truck idling at the dock.</p>	<p>Discounted parking rates for green vehicles may be used to achieve this credit in lieu of preferred parking if the following requirements are met:</p> <ul style="list-style-type: none"> The discount must be at least 20%. The discount policy must be publicly posted at the entrance to the parking area and any other locations that may serve to inform building users of the discount. The discount must also be included in building policy documents and occupant advertisements. Projects cannot limit the discounted parking passes available; the discounted parking rate must be available to all building users who drive green vehicles. The discounted rate must be made available to all building users in perpetuity after the project's completion. 	<p>American Council for an Energy Efficient Economy (ACEEE) Green Book</p> <p>Society of Automotive Engineers, SAE Surface Vehicle Recommended Practice J1772, SAE Electric Vehicle Conductive Charge Coupler</p>	No

SUSTAINABLE SITES (SS)

LEED BD+C v4 Credit Summary Sheet

	NAME	INTENT	REQUIREMENTS	ADDITIONAL INFORMATION	STANDARDS	EXEMPLARY PERFORMANCE
p	Construction Activity Pollution Prevention NC, CS, S, R, DC, WDC, HOS, HC	To reduce pollution from construction activities by controlling soil erosion, waterway sedimentation, and airborne dust.	Create and implement an erosion and sedimentation control plan for all construction activities associated with the project. The plan must conform to the erosion and sedimentation requirements of the 2012 U.S. Environmental Protection Agency (EPA) Construction General Permit (CGP) or local equivalent, whichever is more stringent. Preserve topsoil, control erosion and sedimentation from runoff, airborne dust control	BMP - Best Management Practices <u>Erosion and Sedimentation</u> Earth Dike Silt fence Sediment trap Sediment basin <u>Stabilization</u> temp seeding perm seeding	Environmental Protection Agency (EPA) Construction General Permit (CGP)	N/A
P	Environmental Site Assessment S, HC	To protect the health of vulnerable populations by ensuring that the site is assessed for environmental contamination and that any environmental contamination has been remediated.	Phase I Environmental Site Assessment as described in ASTM E1527-05 (or a local equivalent) to determine whether environmental contamination exists at the site. Phase II Environmental Site Assessment as described in ASTM E1903-11 (or a local equivalent), if contamination is suspected. If a site is contaminated, remediate the site to meet local, state, or national environmental protection agency region residential (unrestricted) standards, whichever are most stringent.	ASTM Standard E1527-05, Section 4.8, considers a Phase I ESA valid for 180 days. EPA's residential (unrestricted) use standards represent the most rigorous level of cleanup; local equivalent standards must have a similar level of rigor. After remediation, land use must be suitable for residential, school, or hospital use.	ASTM E1527-05 Phase I ESA E1903-11 Phase II ESA 40 CFR Part 312: Standards and Practice for All Appropriate Inquiries; Final Rule	N/A
C	Site Assessment NC, CS, S, R, DC, WDC, HOS, HC	To assess site conditions before design to evaluate sustainable options and inform related decisions about site design.	Complete and document a site survey or assessment ¹ that includes the following information: Topography. Contour mapping, unique topographic features, slope stability risks. Hydrology. Flood hazard areas, delineated wetlands, lakes, streams, shorelines, rainwater collection and reuse opportunities, TR-55 initial water storage capacity of the site (or local equivalent for projects outside the U.S.). Climate. Solar exposure, heat island effect potential, seasonal sun angles, prevailing winds, monthly precipitation and temperature ranges. Vegetation. Primary vegetation types, greenfield area, significant tree mapping, threatened or endangered species, unique habitat, invasive plant species. Soils. Natural Resources Conservation Service soils delineation, U.S. Department of Agriculture prime farmland, healthy soils, previous development, disturbed soils (local equivalent standards may be used for projects outside the U.S.). Human use. Views, adjacent transportation infrastructure, adjacent properties, construction materials with existing recycle or reuse potential. Human health effects. Proximity of vulnerable populations, adjacent physical activity opportunities, proximity to major sources of air pollution. The survey or assessment should demonstrate the relationships between the site features and topics listed above and how these features influenced the project design; give the reasons for not addressing any of those topics.	Plan to complete the assessment before conceptual design starts because the findings will inform the location and orientation of major program elements.	Natural Resources Conservation Service, Soils TR-55 initial water storage capacity	No
C	Site Development—Protect or Restore Habitat NC, CS, S, R, DC, WDC, HOS, HC	To conserve existing natural areas and restore damaged areas to provide habitat and promote biodiversity.	Preserve and protect from all development and construction activity 40% of the greenfield area on the site (if such areas exist). AND Option 1. On-site Restoration Using native or adapted vegetation, restore 30% (including the building footprint) of all portions of the site identified as previously developed. Projects that achieve a density of 1.5 floor-area ratio may include vegetated roof surfaces in this calculation if the plants are native or adapted, provide habitat, and promote biodiversity. Restore all disturbed or compacted soils that will be revegetated within the project's development footprint. Project teams may exclude vegetated landscape areas that are constructed to accommodate rainwater infiltration from the vegetation and soils requirements, provided all such rainwater infiltration areas are treated consistently with SS Credit Rainwater Management. <u>S</u> Dedicated athletic fields that are solely for athletic uses are exempted from the soil restoration criteria. These areas may not count toward the minimum required area. OR Option 2. Financial Support Provide financial support equivalent to at least \$0.40 per square foot for the total site area (including the building footprint). Financial support must be provided to a nationally or locally recognized land trust or conservation organization within the same EPA Level III ecoregion or the project's state (or within 100 miles of the project). For U.S. projects, the land trust must be accredited by the Land Trust Alliance.	Native and adapted plants	U.S. EPA ecoregions Land Trust Alliance accreditation Natural Resources Conservation Service, web soil survey Sustainable Sites Initiative (SITES™)	Option 1. 60% Option 2. \$0.80 per SF
C	Open Space NC, CS, S, R, DC, WDC, HOS, HC	To create exterior open space that encourages interaction with the environment, social interaction, passive recreation, and physical activities.	Provide outdoor space greater than or equal to 30% of the total site area (including building footprint). A minimum of 25% of that outdoor space must be vegetated (turf grass does not count as vegetation) or have overhead vegetated canopy. The outdoor space must be physically accessible and be one or more of the following: • a pedestrian-oriented paving or turf area with physical site elements that accommodate outdoor social activities; • a recreation-oriented paving or turf area with physical site elements that encourage physical activity; • a garden space with a diversity of vegetation types and species that provide opportunities for year-round visual interest; • a garden space dedicated to community gardens or urban food production; • preserved or created habitat that meets the criteria of SS Credit Site Development—Protect or Restore Habitat and also includes elements of human interaction. For projects that achieve a density of 1.5 floor-area ratio (FAR), and are physically accessible, extensive or intensive vegetated roofs can be used toward the minimum 25% vegetation requirement, and qualifying roof-based physically accessible paving areas can be used toward credit compliance. Wetlands or naturally designed ponds may count as open space if the side slope gradients average 1:4 (vertical:horizontal) or less and are vegetated.	For projects that are part of a multitenant complex only Open space can be either adjacent to the building or at another location in the site master plan. The open space may be at another master plan development site as long as it is protected from development. When building occupants have opportunities to connect with the outdoors, they exhibit improved well-being and productivity. Tighten program needs and stack floor plans to reduce the building footprint. Turf areas, including areas of turf grass under overhead tree canopies, can be counted in total open space but do not qualify as vegetated open space. Artificial turf does not count as vegetation or hardscape.	None	No

SUSTAINABLE SITES (SS)

LEED BD+C v4 Credit Summary Sheet

	NAME	INTENT	REQUIREMENTS	ADDITIONAL INFORMATION	STANDARDS	EXEMPLARY PERFORMANCE
C	Rainwater Management NC, CS, S, R, DC, WDC, HOS, HC	To reduce runoff volume and improve water quality by replicating the natural hydrology and water balance of the site, based on historical conditions and undeveloped ecosystems in the region.	<p>Option 1. Percentile of Rainfall Events Path 1. 95th Percentile (2 points except Healthcare, 1 point Healthcare) In a manner best replicating natural site hydrology processes, manage on site the runoff from the developed site for the 95th percentile of regional or local rainfall events using low-impact development (LID) and green infrastructure. OR Path 2. 98th Percentile (3 points except Healthcare, 2 points Healthcare) Achieve Path 1 but for the 98th percentile of regional or local rainfall events, using LID and green infrastructure. OR Path 3. Zero Lot Line projects only—85th Percentile (3 points except Healthcare, 2 points Healthcare) The following requirement applies to zero lot line projects in urban areas with a minimum density of 1.5 FAR. In a manner best replicating natural site hydrology processes, manage on site the runoff from the developed site for the 85th percentile of regional or local rainfall events, using LID and green infrastructure. OR Option 2. Natural Land Cover Conditions (3 points except Healthcare, 2 points Healthcare) Manage on site the annual increase in runoff volume from the natural land cover condition to the postdeveloped condition.</p> <p><u>Projects that are part of a multitenant complex only</u> The credit requirements may be met using a coordinated approach affecting the defined project site that is within the master plan boundary. Distributed techniques based on a watershed approach are then required.</p>	<p>Collect at least 10 years of historical rainfall data.</p> <p>Different methods can be used to calculate the runoff volume. Examples include:</p> <ul style="list-style-type: none"> modified rational method; Natural Resources Conservation Service method (SCS method), as described in Technical Release 55 (TR-55); U.S. EPA Rainwater Management Model (SWMM). 	U.S. EPA Technical Guidance on Implementing the Rainwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act: epa.gov	Manage 100% of rainwater that falls within the project boundary.
C	Heat Island Reduction NC, CS, S, R, DC, WDC, HOS, HC	To minimize effects on microclimates and human and wildlife habitats by reducing heat islands.	<p>Option 1. Nonroof and roof $\frac{\text{Area of Nonroof Measures}}{0.5} + \frac{\text{Area of High-Reflectance Roof}}{0.75} + \frac{\text{Area of Vegetated Roof}}{0.75} \geq \text{Total Site Paving Area} + \text{Total Roof Area}$ Alternatively, an SRI and SR weighted average approach may be used to calculate compliance. Use any combination of the following strategies. <u>Nonroof Measures</u></p> <ul style="list-style-type: none"> Use the existing plant material or install plants that provide shade over paving areas (including playgrounds) on the site within 10 years of planting. Install vegetated planters. Plants must be in place at the time of occupancy permit and cannot include artificial turf. Provide shade with structures covered by energy generation systems, such as solar thermal collectors, photovoltaics, and wind turbines. Provide shade with architectural devices or structures that have a three-year aged solar reflectance (SR) value of at least 0.28. If three-year aged value information is not available, use materials with an initial SR of at least 0.33 at installation. Provide shade with vegetated structures. Use paving materials with a three-year aged solar reflectance (SR) value of at least 0.28. If three-year aged value information is not available, use materials with an initial SR of at least 0.33 at installation. Use an open-grid pavement system (at least 50% unbound). <p><u>High-Reflectance Roof</u> Low-sloped roof ≤ 2:12 Initial SRI = 82 3-Year Aged SRI = 64 Steep-sloped roof > 2:12 Initial SRI = 39 3-Year Aged SRI = 32</p> <p><u>Vegetated Roof</u> Install a vegetated roof. OR Option 2. Parking under Cover (1 point) Place a minimum of 75% of parking spaces under cover. Any roof used to shade or cover parking must: (1) have a three-year aged SRI of at least 32 (if 3-year aged value information is not available, use an initial SRI of at least 39 at installation), (2) be a vegetated roof, or (3) be covered by energy generation systems, such as solar thermal collectors, photovoltaics, and wind turbines.</p>	<p>The most effective measure of a roofing material’s ability to reject solar heat is the solar reflectance index (SRI). However, to measure the solar heat rejection of components that are not roofing materials, or “nonroof”—for example, vegetation, shading devices, and other less reflective components—solar reflectance (SR) is used in this credit instead. SR is a more appropriate way to measure nonroof materials, which have more thermal mass.</p> <p>Hardscape area includes all paved roads, sidewalks, courtyards, and parking lots.</p> <p>Applicable roof area excludes roof area covered by mechanical equipment, solar energy panels, skylights, and any other appurtenances.</p> <p>Include motorcycle parking as vehicle parking spaces. Do not count bicycle parking spaces.</p> <p>Black paint has a solar reflectance of 0; white paint (titanium dioxide) has a solar reflectance of 1.</p> <p>A standard black surface has an initial SRI of 0, and a standard white surface has an initial SRI of 100.</p>	ASTM Standards E903 and E892: astm.org Cool Roof Rating Council Standard (CRRC-1): coolroofs.org	Achieve both Options 1 and 2. Locate 100% of parking under cover.
C	Light Pollution Reduction NC, CS, S, R, DC, WDC, HOS, HC	To increase night sky access, improve nighttime visibility, and reduce the consequences of development for wildlife and people.	<p>Meet uplight and light trespass requirements, using either the backlight-uplight-glare (BUG) method (Option 1) or the calculation method (Option 2). Projects may use different options for uplight and light trespass. Meet these requirements for all exterior luminaires located inside the project boundary (except those listed under “Exemptions”), based on the following:</p> <ul style="list-style-type: none"> photometric characteristics of each luminaire when mounted in the same orientation and tilt as specified in the project design; and lighting zone of the project property (at the time construction begins). Classify the project under one lighting zone using the lighting zones definitions provided in the Illuminating Engineering Society and International Dark Sky Association (IES/IDA) Model Lighting Ordinance (MLO) User Guide. <p>Additionally, meet the internally illuminated signage requirement. Uplight - Option 1. BUG Rating Method or Option 2. Calculation Method Light Trespass - Option 1. BUG Rating Method or Option 2. Calculation Method AND Internally Illuminated Exterior Signage Do not exceed a luminance of 200 cd/m2 (nits) during nighttime hours and 2000 cd/m2 (nits) during daytime hours. Exemptions from Uplight and Light Trespass Requirements: specialized signal, directional, and marker lighting for transportation; lighting that is used solely for façade and landscape lighting in MLO lighting zones 3 and 4, and is automatically turned off from midnight until 6 a.m.; lighting for theatrical purposes for stage, film, and video performances; government-mandated roadway lighting; hospital emergency departments, including associated helipads; lighting for the national flag in MLO lighting zones 2, 3, or 4; and internally illuminated signage</p>	<p>MLO Lighting Zones LZ0 - No ambient lighting (undeveloped areas) LZ1 - Low ambient lighting (single-family residential) LZ2 - Moderate ambient lighting (multifamily residential uses) LZ3 - Moderately high ambient lighting (high-intensity suburban) LZ4 - High ambient lighting (Times Square)</p> <p>When the property boundary abuts a public area that is a walkway, bikeway, plaza, or parking lot, the lighting boundary may be moved to 5 feet beyond the property line.</p> <p>When the property boundary abuts a public roadway or public transit corridor, the lighting boundary may be removed to the center line of that roadway or corridor.</p>	Illuminating Engineering Society and International Dark Sky Association (IES/IDA) Model Lighting Ordinance User Guide and IES TM-15-11, Addendum A: ies.org	No

SUSTAINABLE SITES (SS)

LEED BD+C v4 Credit Summary Sheet

	NAME	INTENT	REQUIREMENTS	ADDITIONAL INFORMATION	STANDARDS	EXEMPLARY PERFORMANCE
C	Site Master Plan S	To ensure that the sustainable site benefits achieved by the project continue, regardless of future changes in programs or demographics.	<p>The project must achieve at least four of the following six credits, using the associated calculation methods. The achieved credits must then be recalculated using the data from the master plan.</p> <p>LT Credit: High Priority Site; SS Credit: Site Development—Protect or Restore Habitat; SS Credit: Open Space; SS Credit: Rainwater Management SS Credit: Heat Island Reduction; SS Credit: Light Pollution Reduction</p> <ul style="list-style-type: none"> A site master plan for the school must be developed in collaboration with school authorities. Previous sustainable site design measures should be considered in all master-planning efforts so that existing infrastructure is retained whenever possible. The master plan must therefore include current construction activity plus future construction (within the building's lifespan) that affects the site. The master plan development footprint must also include parking, paving, and utilities. Projects where no future development is planned are not eligible for this credit. 	Only sites where future development is planned are eligible for this credit.	None	No
C	Tenant Design and Construction Guidelines CS	To educate tenants in implementing sustainable design and construction features in their tenant improvement build-outs.	<p>Publish for tenants an illustrated document with the following content, as applicable:</p> <ul style="list-style-type: none"> a description of the sustainable design and construction features incorporated in the core and shell project and the project's sustainability goals and objectives, including those for tenant spaces; recommendations, including examples, for sustainable strategies, products, materials, and services; and information that enables a tenant to coordinate space design and construction with the building systems when pursuing the following LEED v4 for Interior Design and Construction prerequisites and credits. <p>Provide the guidelines to all tenants before signing the lease.</p>		None	No
C	Places of Respite HC	To provide patients, staff, and visitors with the health benefits of the natural environment by creating outdoor places of respite on the healthcare campus.	<p>5% of the net usable program area of the building, provide places of respite that are accessible to patients and visitors. 2% of the net usable program area of the building, provide additional dedicated places of respite for staff.</p> <p>Places of respite must be outdoors, or be located in interior atria, greenhouses, solaria, or conditioned spaces; such interior spaces may be used to meet up to 30% of the required area if 90% of each qualifying space's gross floor area achieves a direct line of sight to unobstructed views of nature.</p> <p><u>All areas must meet the following requirements.</u></p> <ul style="list-style-type: none"> The area is accessible from within the building or located within 200 feet (60 meters) of a building entrance or access point. The area is located where no medical intervention or direct medical care is delivered. Options for shade or indirect sun are provided, with at least one seating space per 200 square feet of each respite area, with one wheelchair space per five seating spaces. Horticulture therapy and other specific clinical or special-use gardens unavailable to all building occupants may account for no more than 50% of the required area. Universal-access natural trails that are available to visitors, staff, or patients may account for no more than 30% of the required area, provided the trailhead is within 200 feet (60 meters) of a building entrance. <p><u>Additionally, outdoor areas must meet the following requirements.</u></p> <ul style="list-style-type: none"> A minimum of 25% of the total outdoor area must be vegetated at the ground plane (not including turf grass) or have overhead vegetated canopy. The area is open to fresh air, the sky, and the natural elements. Signage must meet the 2010 FGI Guidelines for Design and Construction of Health Care Facilities (Section 1.2-6.3 and Appendix A1.2-6.3:Wayfinding). Places of respite may not be within 25 feet of a smoking area (see EQ Prerequisite Environmental Tobacco Smoke Control). Existing places of respite on the hospital campus may qualify if they otherwise meet the credit requirements. 	net usable program area the sum of all interior areas in the project available to house the project's program. It does not include areas for building equipment, vertical circulation, or structural components.	2010 FGI Guidelines for Design and Construction of Health Care Facilities: fgiguideelines.org	Provide 10% of net usable program area as places of respite for patients and visitors. AND Provide 4% of the net usable program area as places of respite for staff.
C	Direct Exterior Access HC	To provide patients and staff with the health benefits associated with direct access to the natural environment.	<p>75% of all inpatients and 75% of qualifying outpatients whose clinical length of stay (LOS) exceeds four hours, provide direct access to an exterior courtyard, terrace, garden, or balcony. The space must be at least 5 square feet per patient.</p> <p>Patients whose length of stay exceeds four hours, and whose treatment makes them unable to move, such as emergency, stage 1 surgical recovery, and critical care patients, may be excluded.</p> <p>Places of respite outside the building envelope that meet the requirements of SS Credit Places of Respite that are immediately adjacent to clinical areas or with direct access from inpatient units may be included.</p> <p>Qualifying spaces must be designated as nonsmoking The spaces must also meet the requirements for outdoor air contaminant concentrations enumerated in EQ Credit Enhanced Indoor Air Quality Strategies, Option 2 and be located more than 100 feet from building exhaust air locations, loading docks, and roadways with idling vehicles.</p>	inpatient - an individual admitted to a medical, surgical, maternity, specialty, or intensive-care unit for a length of stay exceeding 23 hours	None	No
C	Joint Use of Facilities S	To integrate the school with the community by sharing the building and its playing fields for nonschool events and functions.	<p>Option 1. Make Building Space Open to the General Public (1 point) In collaboration with the school authorities, ensure that at least three of the following types of spaces in the school are accessible to and available for shared use by the general public: auditorium; gymnasium; cafeteria; one or more classrooms; playing fields and stadiums; and joint parking. Provide access to toilets in joint-use areas after normal school hours.</p> <p>OR</p> <p>Option 2. Contract with Specific Organizations to Share Building Space (1 point) In collaboration with the school authorities, contract with community or other organizations to provide at least two types of dedicated-use spaces in the building, such as the following: commercial office; health clinic; community service centers (provided by state or local offices); police office; library or media center; parking lot; and one or more commercial businesses. Provide access to toilets in joint-use areas after normal school hours.</p> <p>OR</p> <p>Option 3. Use Shared Space Owned by Other Organizations (1 point) In collaboration with the school authorities, ensure that at least two of the following six types of spaces that are owned by other organizations or agencies are accessible to students: auditorium; gymnasium; cafeteria; one or more classrooms; swimming pool; and playing fields and stadiums. Provide direct pedestrian access to these spaces from the school. In addition, provide signed joint-use agreements with the other organizations or agencies that stipulate how these spaces will be shared.</p>	Initiate preliminary discussions with the school authorities, ideally before or during the design phase of the project, to identify the best opportunities for shared use in the school.	None	No

WATER EFFICIENCY (WE)

LEED BD+C v4 Credit Summary Sheet

	NAME	INTENT	REQUIREMENTS	ADDITIONAL INFORMATION	STANDARDS	EXEMPLARY PERFORMANCE
P	Outdoor Water Use Reduction NC, CS, S, R, DC, WDC, HOS, HC	To reduce outdoor water consumption.	Reduce outdoor water use through one of the following options. Nonvegetated surfaces, such as permeable or impermeable pavement, should be excluded from the landscape area calculations. Athletic fields and playgrounds (if vegetated) and food gardens may be included or excluded at the project team's discretion. Option 1. No Irrigation Required Landscape does not require a permanent irrigation system beyond a maximum two-year establishment period. OR Option 2. Reduced Irrigation 30% reduction from the calculated baseline for the site's peak watering month. Reductions must be achieved through plant species selection and irrigation system efficiency, as calculated by the Environmental Protection Agency (EPA) WaterSense Water Budget Tool.	Projects with no landscape area are exempt from this prerequisite. For U.S. projects, the WaterSense Water Budget Tool automatically derives rainfall and evapotranspiration from the project's zip code. Each location's rainfall and evapotranspiration levels determine how much water a project needs. xeriscaping landscaping that does not require routine irrigation	None	N/A
P	Indoor Water Use Reduction NC, CS, S, R, DC, WDC, HOS, HC	To reduce indoor water consumption.	<u>Building Water Use</u> 20% reduction from baseline for the flush and flow fixtures EPAAct 1992 Watercloset - 1.6 gpf; Urinal - 1.0 gpf; Lav faucet - public 0.5 gpm, private 2.2 gpm; kitchen faucet - 2.2 gpm; showerhead - 2.5 gpm All newly installed toilets, urinals, private lavatory faucets, and showerheads that are eligible for labeling must be WaterSense labeled . <u>Appliance and Process Water Use</u> • Appliance Residential clothes washer and dishwashers - ENERGY STAR; Commercial dishwasher - CEE Tier 3A; ice machine - ENERGY STAR; pre-rinse spray valve - ≤ 1.3 gpm • Process Heat rejection and cooling - No once-through cooling with potable water for any equipment or appliances that reject heat Cooling towers and evaporative condensers. Equip with - makeup water meters ; conductivity controllers and overflow alarms ; efficient drift eliminators that reduce drift to maximum of 0.002% of recirculated water volume for counterflow towers and 0.005% of recirculated water flow for cross-flow towers. <u>S, R, HOS, HC</u> • Appliance - Dishwasher, Food Steamer, Combination Oven • Process - Discharge water temperature tempering; Venturi-type flow-through vacuum generators or aspirators	<ul style="list-style-type: none"> The WaterSense label was developed by the U.S. Environmental Protection Agency to identify these efficient fixtures and ensure that higher efficiency does not come at the cost of performance. Using aerators is an acceptable water savings strategy. <u>Usage-Based Calculation - Nonresidential</u> Occupancy Gender Ratio (default 50/50) Days of operation (default 360, schools 195) Women - WC - 3X Men WC - 1X, Urinal - 2X LAV - 3X (30 sec) Kitchen - 1X (25 sec) Shower - 10% (300 sec) Exclude process water sinks, i.e. janitor sinks <u>Residential</u> WC - 5X; LAV - 5X (60 sec); Kitchen - 4X (60 sec); Shower - 1X (480 sec)	Energy Policy Act (EPAAct) of 1992 EPAAct 2005 IAPMO/ANSI UPC 1-2006 Uniform Plumbing Code 2006 International Code Council, International Plumbing Code 2006 ENERGY STAR WaterSense IgCC/ASHRAE 189.1 cooling tower and evaporative condenser requirements	N/A
P	Building-Level Water Metering NC, CS, S, R, DC, WDC, HOS, HC	To support water management and identify opportunities for additional water savings by tracking water consumption.	Building Water Use <ul style="list-style-type: none"> Install permanent water meters that measure the total potable water use for the building and associated grounds. Meter data must be compiled into monthly and annual summaries; meter readings can be manual or automated. Commit to sharing with USGBC the resulting whole-project water usage data for a five-year period beginning on the date the project accepts LEED certification or typical occupancy, whichever comes first. This commitment must carry forward for five years or until the building changes ownership or lessee. 	Examples of potable water sources that must be metered include the following: <ul style="list-style-type: none"> Public water supply On-site well On-site potable water treatment system 	None	N/A
C	Outdoor Water Use Reduction NC, CS, S, R, DC, WDC, HOS, HC	To reduce outdoor water consumption.	Reduce outdoor water use through one of the following options. Nonvegetated surfaces, such as permeable or impermeable pavement, should be excluded from landscape area calculations. Athletic fields and playgrounds (if vegetated) and food gardens may be included or excluded at the project team's discretion. Option 1. No Irrigation Required (2 points except Healthcare, 1 point Healthcare) Show that the landscape does not require a permanent irrigation system beyond a maximum two-year establishment period. OR Option 2. Reduced Irrigation (2 points except Healthcare, 1 point Healthcare) 50% reduction of LWR from the calculated baseline for the site's peak watering month - 1 pt 100% reduction of LWR from the calculated baseline for the site's peak watering month - 2 pts Reductions must first be achieved through plant species selection and irrigation system efficiency as calculated in the Environmental Protection Agency (EPA) WaterSense Water Budget Tool. Additional reductions beyond 30% may be achieved using any combination of: <ul style="list-style-type: none"> efficiency alternative water sources smart scheduling technologies (WaterSense Labeled 15% reduction) 	Alternative water sources include: <ul style="list-style-type: none"> reclaimed wastewater graywater swimming pool backwash filter refrigeration system condensate captured rainwater stormwater and foundation drain water steam system condensate fluid cooler discharge food steamer discharge combination oven discharge industrial process water fire pump test water municipally supplied treated wastewater ice machine condensate. Hot, dry, and windy locations have higher ETo values than cool, humid locations.	None	No
C	Indoor Water Use Reduction NC, CS, S, R, DC, WDC, HOS, HC	To reduce indoor water consumption.	Further reduce fixture and fitting water use from the calculated baseline in WE Prerequisite Indoor Water Use Reduction. 25% - 1 pt; 30% - 2 pts; 35% - 3 pts; 40% - 4 pts; 45% - 5 pts; 50% - 6 pts; ≥ 55% EP Additional potable water savings can be earned above the prerequisite level using alternative water sources. Include fixtures and fittings necessary to meet the needs of the occupants. Some of these fittings and fixtures may be outside the project boundary. Appliance and Process Water Efficiency HOS - Can earn additional 1 pt. S, R, HC - Can earn additional 2 pts To use Table 2, the project must process at least 120,000 lbs of laundry per year. To use Table 3, the project must serve at least 100 meals per day of operation. Additional Appliance - Food waste disposal To use Table 4, the project must be a medical or laboratory facility. To use Table 5, the project must be connected to a municipal or district steam system that does not allow the return of steam condensate.	Untreated water sources ineligible for this credit include raw water from naturally occurring surface bodies of water, streams, rivers, groundwater, well water, seawater, and water discharged from an open-loop geothermal system. Duration-based savings from autocontrol faucets with automatic fixture sensors or metering controls are no longer allowed in the design case.	Energy Policy Act (EPAAct) of 1992 EPAAct 2005 International Code Council (ICC) ENERGY STAR WaterSense IgCC/ASHRAE 189.1 – cooling tower and evaporative condenser requirements	Achieve 55% water use reduction.

WATER EFFICIENCY (WE)

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	NAME	INTENT	REQUIREMENTS	ADDITIONAL INFORMATION	STANDARDS	EXEMPLARY PERFORMANCE														
C	Cooling Tower Water Use NC, CS, S, R, DC, WDC, HOS, HC	To conserve water used for cooling tower makeup while controlling microbes, corrosion, and scale in the condenser water system.	<p>For cooling towers and evaporative condensers, conduct a one-time potable water analysis, measuring at least the five control parameters:</p> <table border="1" data-bbox="562 229 929 419"> <tr> <td>Ca (as CaCO3)</td> <td>1000 PPM</td> </tr> <tr> <td>Total alkalinity</td> <td>1000 PPM</td> </tr> <tr> <td>SiO2</td> <td>100 PPM</td> </tr> <tr> <td>Cl-</td> <td>250 PPM</td> </tr> <tr> <td>Conductivity</td> <td>2000 µS/cm</td> </tr> </table> <p>Calculate the number of cooling tower cycles by dividing the maximum allowed concentration level of each parameter by the actual concentration level of each parameter found in the potable makeup water. Limit cooling tower cycles to avoid exceeding maximum values for any of these parameters.</p> <table border="1" data-bbox="562 560 1656 717"> <tr> <td>Maximum number of cycles achieved without exceeding any filtration levels or affecting operation of condenser water system (up to maximum of 10 cycles)</td> <td>1 pt</td> </tr> <tr> <td>Achieve a minimum 10 cycles by increasing the level of treatment in condenser or make-up water OR Meet the minimum number of cycles to earn 1 point and use a minimum 20% recycled nonpotable water</td> <td>2 pts</td> </tr> </table>	Ca (as CaCO3)	1000 PPM	Total alkalinity	1000 PPM	SiO2	100 PPM	Cl-	250 PPM	Conductivity	2000 µS/cm	Maximum number of cycles achieved without exceeding any filtration levels or affecting operation of condenser water system (up to maximum of 10 cycles)	1 pt	Achieve a minimum 10 cycles by increasing the level of treatment in condenser or make-up water OR Meet the minimum number of cycles to earn 1 point and use a minimum 20% recycled nonpotable water	2 pts	<p>To prevent buildup of deposits, cooling tower and evaporative condenser systems remove a portion of the water through a process called blowdown. Makeup water is then added to replace evaporative losses and blowdown volume. Cooling towers can therefore account for large portions of a building's total water use.</p> <p>Cycles of concentration are the number of times that a volume of water can circulate through a cooling tower system before dissolved minerals become so concentrated (as water is lost to evaporation) that they precipitate and cause scaling—deposits that reduce the efficiency of the cooling system.</p> <p>A higher number of cycles indicates better water efficiency because less makeup water is required.</p> <p>Good nonpotable water sources include the following:</p> <ul style="list-style-type: none"> • Air-conditioner condensate • Rainwater • Steam system condensate • Food steamer discharge water • Fire pump test water • Ice machine condensate <p>Other factors to consider are ease of transport to the cooling tower and required volume of makeup water.</p>	None	No
Ca (as CaCO3)	1000 PPM																			
Total alkalinity	1000 PPM																			
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Cl-	250 PPM																			
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Achieve a minimum 10 cycles by increasing the level of treatment in condenser or make-up water OR Meet the minimum number of cycles to earn 1 point and use a minimum 20% recycled nonpotable water	2 pts																			
C	Advanced Water Metering NC, CS, S, R, DC, WDC, HOS, HC	To support water management and identify opportunities for additional water savings by tracking water consumption.	<p>Install permanent water meters for two or more of the following water subsystems, as applicable to the project:</p> <ul style="list-style-type: none"> • Irrigation. Meter water systems serving at least 80% of the irrigated landscaped area. Calculate the percentage of irrigated landscape area served as the total metered irrigated landscape area divided by the total irrigated landscape area. Landscape areas fully covered with xeriscaping or native vegetation that requires no routine irrigation may be excluded from the calculation. • Indoor plumbing fixtures and fittings. Meter water systems serving at least 80% of the indoor fixtures and fitting described in WE Prerequisite Indoor Water Use Reduction, either directly or by deducting all other measured water use from the measured total water consumption of the building and grounds. • Domestic hot water. Meter water use of at least 80% of the installed domestic hot water heating capacity (including both tanks and on-demand heaters). Boiler with aggregate projected annual water use of 100,000 gallons (378 500 liters) or more, or boiler of more than 500,000 BtuH (150 kW). A single makeup meter may record flows for multiple boilers. • Reclaimed water. Meter reclaimed water, regardless of rate. A reclaimed water system with a makeup water connection must also be metered so that the true reclaimed water component can be determined. • Other process water. Meter at least 80% of expected daily water consumption for process end uses, such as humidification systems, dishwashers, clothes washers, pools, and other subsystems using process water. <p><u>Healthcare Projects only</u> In addition to the requirements above, install water meters in any five of the following:</p> <ul style="list-style-type: none"> • purified water systems (reverse-osmosis, de-ionized); • filter backwash water; • water use in dietary department; • water use in laundry; • water use in laboratory; • water use in central sterile and processing department; • water use in physiotherapy and hydrotherapy and treatment areas; • water use in surgical suite; • closed-looped hydronic system makeup water; and • cold-water makeup for domestic hot water systems. 	If the team is using reclaimed water for irrigation, 100% of this water must be submetered.	None	No														

ENERGY AND ATMOSPHERE (EA)

LEED BD+C v4 Credit Summary Sheet

	NAME	INTENT	REQUIREMENTS	ADDITIONAL INFORMATION	STANDARDS	EXEMPLARY PERFORMANCE				
P	Fundamental Commissioning and Verification NC, CS, S, R, DC, WDC, HOS, HC	To support the design, construction, and eventual operation of a project that meets the owner's project requirements for energy, water, indoor environmental quality, and durability.	<p>Commissioning Process Scope Complete the following commissioning (Cx) process activities:</p> <ul style="list-style-type: none"> • Develop the OPR. • Develop a BOD. <p>The commissioning authority (CxA) must do the following:</p> <table border="1" data-bbox="562 338 1895 516"> <tr> <td data-bbox="562 338 1230 516"> <ul style="list-style-type: none"> • Review the OPR, BOD, and project design. • Develop and implement a Cx plan. • Confirm incorporation of Cx requirements into the construction documents. • Develop construction checklists. • Develop a system test procedure. </td> <td data-bbox="1230 338 1895 516"> <ul style="list-style-type: none"> • Verify system test execution. • Maintain an issues and benefits log throughout the Cx process. • Prepare a final Cx process report. • Document all findings and recommendations and report directly to the owner throughout the process. </td> </tr> </table> <p>The review of the exterior enclosure design may be performed by a qualified member of the design or construction team (or an employee of that firm) who is not directly responsible for design of the building envelope.</p> <p>Commissioning Authority By the end of the design development phase, engage a commissioning authority with the following qualifications:</p> <ul style="list-style-type: none"> • The CxA must have documented commissioning process experience on at least two building projects with a similar scope of work. The experience must extend from early design phase through at least 10 months of occupancy; • The CxA may be a qualified employee of the owner, an independent consultant, or an employee of the design or construction firm who is not part of the project's design or construction team, or a disinterested subcontractor of the design or construction team. <p>For projects smaller than 20,000 square feet (1 860 square meters), the CxA may be a qualified member of the design or construction team. In all cases, the CxA must report his or her findings directly to the owner.</p> <p>Current Facilities Requirements and Operations and Maintenance Plan Prepare and maintain a current facilities requirements and operations and maintenance plan that contains the information necessary to operate the building efficiently. The plan must include the following:</p> <table border="1" data-bbox="562 943 1895 1173"> <tr> <td data-bbox="562 943 1230 1173"> <ul style="list-style-type: none"> • a sequence of operations for the building; • the building occupancy schedule; • equipment run-time schedules; • setpoints for all HVAC equipment; • set lighting levels throughout the building; • minimum outside air requirements; • any changes in schedules or setpoints for different seasons, days of the week, and times of day; </td> <td data-bbox="1230 943 1895 1173"> <ul style="list-style-type: none"> • a systems narrative describing the mechanical and electrical systems and equipment; • a preventive maintenance plan for building equipment described in the systems narrative; and • a commissioning program that includes periodic commissioning requirements, ongoing commissioning tasks, and continuous tasks for critical facilities. </td> </tr> </table> <p>Data Centers only For small projects with computer room peak cooling loads less than 2,000,000 Btu/h (600 kW) or a total computer room peak cooling load less than 600,000 Btu/h (175 kW), the CxA may be a qualified employee of the design or construction team.</p>	<ul style="list-style-type: none"> • Review the OPR, BOD, and project design. • Develop and implement a Cx plan. • Confirm incorporation of Cx requirements into the construction documents. • Develop construction checklists. • Develop a system test procedure. 	<ul style="list-style-type: none"> • Verify system test execution. • Maintain an issues and benefits log throughout the Cx process. • Prepare a final Cx process report. • Document all findings and recommendations and report directly to the owner throughout the process. 	<ul style="list-style-type: none"> • a sequence of operations for the building; • the building occupancy schedule; • equipment run-time schedules; • setpoints for all HVAC equipment; • set lighting levels throughout the building; • minimum outside air requirements; • any changes in schedules or setpoints for different seasons, days of the week, and times of day; 	<ul style="list-style-type: none"> • a systems narrative describing the mechanical and electrical systems and equipment; • a preventive maintenance plan for building equipment described in the systems narrative; and • a commissioning program that includes periodic commissioning requirements, ongoing commissioning tasks, and continuous tasks for critical facilities. 	<p>Systems that must be commissioned for this prerequisite include the following:</p> <ul style="list-style-type: none"> • Mechanical, including HVAC&R equipment and controls • Plumbing, including domestic hot water systems, pumps, and controls • Electrical, including service, distribution, lighting, and controls, including daylighting controls • Renewable energy systems <p>The envelope must be covered in the OPR and BOD, but full envelope commissioning is not required unless the project team pursues EA Credit Enhanced Commissioning, Option 2.</p> <p>Systems that are not required to be commissioned under this prerequisite but may be added to the Cx scope at the request of the owner include the following:</p> <ul style="list-style-type: none"> • Envelope • Life safety systems • Communications and data systems • Fire protection and fire alarm systems • Process equipment <p>Project teams that intend to pursue EA Credit Enhanced Commissioning should note a difference in the CxA qualifications: for the credit, the CxA may not be an employee of the design or construction firm nor a subcontractor to the construction firm.</p> <p>OPR The owner, CxA, and project team must complete the OPR before any contractor submittals for Cx equipment or systems are approved. Ideally, the initial document is completed at the early stages of pre-design. Updates during the design and construction process are the primary responsibility of the owner. The OPR details the functional requirements as well as the expectations of the building's use and operation.</p> <p>BOD The design team must document the basis of design before any contractor submittals for commissioned equipment or systems are approved. Updates during the design and construction process are the primary responsibility of the design team.</p>	ASHRAE Guideline 0–2005, The Commissioning Process ASHRAE Guideline 1.1–2007, HVAC&R Technical Requirements for the Commissioning Process NIBS Guideline 3–2012, Exterior Enclosure Technical Requirements for the Commissioning Process	N/A
<ul style="list-style-type: none"> • Review the OPR, BOD, and project design. • Develop and implement a Cx plan. • Confirm incorporation of Cx requirements into the construction documents. • Develop construction checklists. • Develop a system test procedure. 	<ul style="list-style-type: none"> • Verify system test execution. • Maintain an issues and benefits log throughout the Cx process. • Prepare a final Cx process report. • Document all findings and recommendations and report directly to the owner throughout the process. 									
<ul style="list-style-type: none"> • a sequence of operations for the building; • the building occupancy schedule; • equipment run-time schedules; • setpoints for all HVAC equipment; • set lighting levels throughout the building; • minimum outside air requirements; • any changes in schedules or setpoints for different seasons, days of the week, and times of day; 	<ul style="list-style-type: none"> • a systems narrative describing the mechanical and electrical systems and equipment; • a preventive maintenance plan for building equipment described in the systems narrative; and • a commissioning program that includes periodic commissioning requirements, ongoing commissioning tasks, and continuous tasks for critical facilities. 									
P	Minimum Energy Performance NC, CS, S, R, DC, WDC, HOS, HC	To reduce the environmental and economic harms of excessive energy use by achieving a minimum level of energy efficiency for the building and its systems.	<p>NC, CS, S, R, WDC, HOS, HC</p> <p>Option 1. Whole-Building Energy Simulation 5% improvement for new construction, 3% for major renovations, or 2% for core and shell projects in the proposed building performance rating compared with the baseline building performance rating. Calculate the baseline building performance according to ASHRAE Standard 90.1–2010, Appendix G, with errata, using a simulation model.</p> <p>OR</p> <p>Option 2. Prescriptive Compliance: ASHRAE 50% Advanced Energy Design Guide ASHRAE 50% Advanced Energy Design Guide for Small to Medium Office Buildings, for office buildings smaller than 100,000 square feet; ASHRAE 50% Advanced Energy Design Guide for Medium to Large Box Retail Buildings, for retail buildings with 20,000 to 100,000 square feet; ASHRAE 50% Advanced Energy Design Guide for K–12 School Buildings; or ASHRAE 50% Advanced Energy Design Guide for Large Hospitals. Over 100,000 square feet</p> <p>OR</p> <p>Option 3. Prescriptive Compliance: Advanced Buildings™ Core Performance™ Guide To be eligible for Option 3, the project must be less than 100,000 square feet. Note: Healthcare, Warehouse or Laboratory projects are ineligible for Option 3.</p> <p><u>DC</u> Whole-Building Energy Simulation 5% improvement in the proposed performance rating over the baseline performance rating. To determine total energy cost savings, create two models, one for building energy cost and the other for IT equipment energy cost. Calculate the baseline building performance according to ASHRAE Standard 90.1–2010, Appendix G, with errata, using a simulation model for the whole building and data center modeling guidelines.</p> <p>Determine the power utilization effectiveness (PUE) value of the proposed design. For this prerequisite, a minimum of 2% of the 5% energy savings must come from building power and cooling infrastructure.</p>	<p>If unregulated loads are not identical for both the baseline and the proposed building performance rating, and the simulation model cannot accurately model the savings, follow the exceptional calculation method ASHRAE Standard 90.1–2010, G2.5) to document measures that reduce unregulated loads.</p> <p>Determining the right climate zone for the project is essential, since the requirements are specific to each climate zone. ASHRAE 90.1–2010 defines eight climate zones (Miami is in climate zone 1; Anchorage is in climate zone 8) and three climate types: A (moist), B (dry), and C (marine).</p> <p>To find the project's climate zone and type, consult ASHRAE 90.1–2010, Appendix B, for the appropriate state and county.</p> <p>For EA Prerequisite Minimum Energy Performance, Option 3, the energy performance target must be established using ENERGY STAR's Target Finder and must be greater than a score of 90.</p> <p>Projects that use Option 3 cannot achieve points under EA Credit Optimize Energy Performance.</p>	ASHRAE 90.1–2010 and ASHRAE 90.1–2010 User's Manual ASHRAE 50% Advanced Energy Design Guides Advanced Buildings Core Performance Guide COMNET Commercial Buildings Energy Modeling Guidelines	N/A				

ENERGY AND ATMOSPHERE (EA)

LEED BD+C v4 Credit Summary Sheet

	NAME	INTENT	REQUIREMENTS	ADDITIONAL INFORMATION	STANDARDS	EXEMPLARY PERFORMANCE		
P	Building-Level Energy Metering NC, CS, S, R, DC, WDC, HOS, HC	To support energy management and identify opportunities for additional energy savings by tracking building-level energy use.	<p><u>NC, S, R, DC, WDC, HOS, HC</u> Install new or use existing building-level energy meters, or submeters that can be aggregated to provide building level data representing total building energy consumption (electricity, natural gas, chilled water, steam, fuel oil, propane, biomass, etc). Utility-owned meters capable of aggregating building-level resource use are acceptable.</p> <p><u>CS</u> Install new or use existing base building-level energy meters, or submeters that can be aggregated to provide base building-level data representing total building energy consumption (electricity, natural gas, chilled water, steam, fuel oil, propane, etc.). Utility-owned meters capable of aggregating base building-level resource use are acceptable.</p> <p><u>All Projects</u></p> <ul style="list-style-type: none"> Commit to sharing with USGBC the resulting energy consumption data and electrical demand data (if metered) for a five-year period beginning on the date the project accepts LEED certification or typical occupancy, whichever comes first. At a minimum, energy consumption must be tracked at one-month intervals. This commitment must carry forward for five years or until the building changes ownership or lessee. 	<p>Sources of energy that must be metered include all energy supplied by a utility company or campus central plant, such as the following:</p> <ul style="list-style-type: none"> Electricity Natural gas, synthetic natural gas, propane, fuel oil, diesel fuel, other fossil fuels Biofuels District chilled water, steam, and hot water <p>This prerequisite does not require metering of locally generated sources of energy that are dedicated to the project building, such as the following:</p> <ul style="list-style-type: none"> Solar photovoltaic-generated electricity Wind-generated electricity Solar hot water generation for domestic hot water or heating hot water 	Electricity. American National Standards Institute, ANSI C12.20, Class 0.2 (± 0.2) Natural gas. American National Standards Institute, ANSI B109 Thermal energy (Btu meter or heat meter). EN Standard, EN-1434	N/A		
P	Fundamental Refrigerant Management NC, CS, S, R, DC, WDC, HOS, HC	To reduce stratospheric ozone depletion.	Do not use chlorofluorocarbon (CFC)-based refrigerants in new heating, ventilating, air-conditioning, and refrigeration (HVAC&R) systems. When reusing existing HVAC&R equipment, complete a comprehensive CFC phase-out conversion before project completion. Phase-out plans extending beyond the project completion date will be considered on their merits. Existing small HVAC&R units (defined as containing less than 0.5 pound of refrigerant) and other equipment, such as standard refrigerators, small water coolers, and any other equipment that contains less than 0.5 pound of refrigerant, are exempt.	When CFC-containing equipment is retained, project teams must adhere to the U.S. Environmental Protection Agency Clean Air Act, Title VI, Section 608 (or local equivalent for projects outside the U.S.) to minimize leakage in the building.	U.S. EPA Clean Air Act, Title VI, Section 608, Refrigerant Recycling Rule	N/A		
C	Enhanced Commissioning NC, CS, S, R, DC, WDC, HOS, HC	To further support the design, construction, and eventual operation of a project that meets the owner's project requirements for energy, water, indoor environmental quality, and durability.	<p>Implement, or have in place a contract to implement, the following commissioning process activities in addition to those required under EA Prerequisite Fundamental Commissioning and Verification.</p> <p><u>CxA</u></p> <ul style="list-style-type: none"> Documented commissioning experience on at least two building projects with similar scope. May be a qualified employee of the owner, an independent consultant, or a disinterested subcontractor of the design team. <p>Option 1. Enhanced Systems Commissioning (3-4 points) Path 1: Enhanced Commissioning (3 points)</p> <table border="1" data-bbox="562 993 1892 1165"> <tr> <td> <ul style="list-style-type: none"> Review contractor submittals. Verify inclusion of systems manual requirements in construction documents. Verify inclusion of operator and occupant training requirements in construction documents. Verify systems manual updates and delivery. </td> <td> <ul style="list-style-type: none"> Verify operator and occupant training delivery and effectiveness. Verify seasonal testing. Review building operations 10 months after substantial completion. Develop an on-going commissioning plan. </td> </tr> </table> <p>Include all enhanced commissioning tasks in the OPR and BOD. OR Path 2: Enhanced and Monitoring-Based Commissioning (4 points) Achieve Path 1. AND Develop monitoring-based procedures and identify points to be measured and evaluated to assess performance of energy- and water-consuming systems. AND/OR Option 2. Envelope Commissioning (2 points) Fulfill the requirements in EA Prerequisite Fundamental Commissioning and Verification as they apply to the building's thermal envelope in addition to mechanical and electrical systems and assemblies. Complete the commissioning process (CxP) activities for the building's thermal envelope in accordance with ASHRAE Guideline 0-2005 and the National Institute of Building Sciences (NIBS) Guideline 3-2012, Exterior Enclosure Technical Requirements for the Commissioning Process, as they relate to energy, water, indoor environmental quality, and durability.</p> <p><u>DC</u> Projects that select Option 1 must complete the following commissioning process. For small projects with peak cooling loads less than 2,000,000 Btu/h (600 kW), or a total computer room peak cooling load less than 600,000 Btu/h (175 kW), the CxA must perform the following activities:</p> <ul style="list-style-type: none"> conduct at least one commissioning verification review of the owner's project requirements, basis of design, and design documents before mid-construction documents development; back-check the review comments in all subsequent design submissions; and conduct an additional full verification review at 95% completion of the design documents and basis of design. <p>For projects with peak cooling loads 2,000,000 Btu/h (600 kW) or more, or a total computer room peak cooling load 600,000 Btu/h (175 kW) or more, the CxA must conduct at least three verification reviews of the basis of design:</p> <ul style="list-style-type: none"> one verification review of design documents before the start of design development; one verification review of design documents before midconstruction documents; and one final verification review of 100% complete design documents, verifying achievement of the owner's project requirements and adjudication of previous review comments. 	<ul style="list-style-type: none"> Review contractor submittals. Verify inclusion of systems manual requirements in construction documents. Verify inclusion of operator and occupant training requirements in construction documents. Verify systems manual updates and delivery. 	<ul style="list-style-type: none"> Verify operator and occupant training delivery and effectiveness. Verify seasonal testing. Review building operations 10 months after substantial completion. Develop an on-going commissioning plan. 	commissioning authority (CxA) Monitoring-based commissioning (MBCx) building envelope commissioning (BECx)	ASHRAE Guideline 0-2005, The Commissioning Process ASHRAE Guideline 1.1-2007, HVAC&R Technical Requirements for the Commissioning Process NIBS Guideline 3-2012, Exterior Enclosure Technical Requirements for the Commissioning Process	No
<ul style="list-style-type: none"> Review contractor submittals. Verify inclusion of systems manual requirements in construction documents. Verify inclusion of operator and occupant training requirements in construction documents. Verify systems manual updates and delivery. 	<ul style="list-style-type: none"> Verify operator and occupant training delivery and effectiveness. Verify seasonal testing. Review building operations 10 months after substantial completion. Develop an on-going commissioning plan. 							

ENERGY AND ATMOSPHERE (EA)

LEED BD+C v4 Credit Summary Sheet

	NAME	INTENT	REQUIREMENTS	ADDITIONAL INFORMATION	STANDARDS	EXEMPLARY PERFORMANCE
C	Optimize Energy Performance NC, CS, S, R, DC, WDC, HOS, HC	To achieve increasing levels of energy performance beyond the prerequisite standard to reduce environmental and economic harms associated with excessive energy use.	<p><u>NC, CS, S, R, WDC, HOS, HC</u> Establish an energy performance target no later than the schematic design phase. The target must be established as kBtu per square foot-year of source energy use. Choose one of the options below.</p> <p>Option 1. Whole-Building Energy Simulation (1-18 points) <u>R</u> For all process loads, define a clear baseline for comparison with the proposed improvements. Calculate the baseline and design as follows:</p> <ul style="list-style-type: none"> • Appliances and equipment • Display lighting • Refrigeration <p>Option 2. Prescriptive Compliance: ASHRAE Advanced Energy Design Guide (1–6 points) ASHRAE 50% Advanced Energy Design Guide for Small to Medium Office Buildings, for office buildings smaller than 100,000 square feet; ASHRAE 50% Advanced Energy Design Guide for Medium to Large Box Retail Buildings, for retail buildings with 20,000 to 100,000 square feet; ASHRAE 50% Advanced Energy Design Guide for K–12 School Buildings; or ASHRAE 50% Advanced Energy Design Guide for Large Hospitals. Over 100,000 square feet To be eligible for Option 2, projects must use Option 2 in EA Prerequisite Minimum Energy Performance</p> <p><u>DC</u> Whole-Building Energy Simulation Analyze efficiency measures focused on IT load reduction and HVAC-related strategies (air-side economizers, hot aisle–cold aisle, etc.). Project the potential energy savings and cost implications for all affected systems. Follow the criteria in EA Prerequisite Minimum Energy Performance to demonstrate a percentage improvement in the proposed performance rating compared with the baseline. Use energy cost savings from both the building and IT to determine the total percentage reduction.</p>	<p>The AEDGs were designed around specific building types and sizes by climate zone.</p> <p>Only projects pursuing Option 1 of this credit may count savings from renewable energy systems.</p>	<p>ASHRAE 90.1–2010 and ASHRAE 90.1–2010 User’s Manual</p> <p>ASHRAE 50% Advanced Energy Design Guides</p> <p>COMNET Commercial Buildings Energy Modeling Guidelines</p>	Option 1. NC & CS: Achieve at least 54% energy savings.
C	Advanced Energy Metering NC, CS, S, R, DC, WDC, HOS, HC	To support energy management and identify opportunities for additional energy savings by tracking building-level and system-level energy use.	<p><u>NC, S, R, DC, WDC, HOS, HC</u> Install advanced energy metering for the following:</p> <ul style="list-style-type: none"> • all whole-building energy sources used by the building; and • any individual energy end uses that represent 10% or more of the total annual consumption of the building. <p><u>CS</u> Install meters for future tenant spaces so that tenants will be capable of independently metering energy consumption (electricity, chilled water, etc.) for all systems dedicated to their space. Provide a sufficient number of meters to capture total tenant energy use with a minimum of one meter per energy source per floor.</p> <p><u>All Projects</u> The advanced energy metering must have the following characteristics.</p> <ul style="list-style-type: none"> • Meters must be permanently installed, record at intervals of one hour or less, and transmit data to a remote location. • Electricity meters must record both consumption and demand. Whole-building electricity meters should record the power factor, if appropriate. • The data collection system must use a local area network, building automation system, wireless network, or comparable communication infrastructure. • The system must be capable of storing all meter data for at least 36 months. • The data must be remotely accessible. • All meters in the system must be capable of reporting hourly, daily, monthly, and annual energy use. 	<p>Identifying major energy end uses is the first step in choosing what to meter. Often, in large commercial or industrial buildings, end uses are classified as systems composed of discrete pieces of equipment that can be metered together.</p> <p>For example,</p> <ul style="list-style-type: none"> • Chilled water system: chillers, chilled water pumps • Condenser water system: cooling tower, condenser water pumps • Hot water system (natural gas): boilers • Hot water system (electricity): hot water pumps • Air-handling system: supply fan, return fan, damper motors 	None	No
C	Demand Response NC, CS, S, R, DC, WDC, HOS, HC	To increase participation in demand response technologies and programs that make energy generation and distribution systems more efficient, increase grid reliability, and reduce greenhouse gas emissions.	<p>Design building and equipment for participation in demand response programs through load shedding or shifting. On-site electricity generation does not meet the intent of this credit.</p> <p>Case 1. Demand Response Program Available (2 points)</p> <ul style="list-style-type: none"> • Participate in an existing demand response (DR) program and complete the following activities. Design a system with the capability for real-time, fully-automated DR based on external initiation by a DR Program Provider. Semi-automated DR may be utilized in practice. • Enroll in a minimum one-year DR participation amount contractual commitment with a qualified DR program provider, with the intention of multiyear renewal, for at least 10% of the estimated peak electricity demand. Peak demand is determined under EA Prerequisite Minimum Energy Performance. • Develop a comprehensive plan for meeting the contractual commitment during a Demand Response event. • Include the DR processes in the scope of work for the commissioning authority, including participation in at least one full test of the DR plan. <p>Case 2. Demand Response Program Not Available (1 point) Provide infrastructure to take advantage of future demand response programs or dynamic, real-time pricing programs and complete the following activities.</p> <ul style="list-style-type: none"> • Install interval recording meters with communications and ability for the building automation system to accept an external price or control signal. • Develop a comprehensive plan for shedding at least 10% of building estimated peak electricity demand. Peak demand is determined under EA Prerequisite Minimum Energy Performance. • Include the DR processes in the scope of work for the commissioning authority, including participation in at least one full test of the DR plan. • Contact local utility representatives to discuss participation in future DR programs. 	load shedding an intentional action by a utility to reduce the load on the system. Load shedding is usually conducted during emergency periods, such as capacity shortages, system instability, or voltage control.	None	No

ENERGY AND ATMOSPHERE (EA)

LEED BD+C v4 Credit Summary Sheet

	NAME	INTENT	REQUIREMENTS	ADDITIONAL INFORMATION	STANDARDS	EXEMPLARY PERFORMANCE															
C	Renewable Energy Production NC, CS, S, R, DC, WDC, HOS, HC	To reduce the environmental and economic harms associated with fossil fuel energy by increasing self-supply of renewable energy.	<p>Use renewable energy systems to offset building energy costs. Calculate the percentage of renewable energy with the following equation: $\% \text{ renewable energy} = \frac{\text{Equivalent cost of usable energy produced by the renewable energy system}}{\text{Total building annual energy cost}}$ Use the building's annual energy cost, calculated in EA Prerequisite Minimum Energy Performance, if Option 1 was pursued; otherwise use the U.S. Department of Energy's Commercial Buildings Energy Consumption Survey (CBECS) database to estimate energy use and cost.</p> <p>The use of solar gardens or community renewable energy systems is allowed if both of the following requirements are met.</p> <ul style="list-style-type: none"> The project owns the system or has signed a lease agreement for a period of at least 10 years. The system is located with the same utility service area as the facility claiming the use. <p>Credit is based on the percentage of ownership or percentage of use assigned in the lease agreement.</p> <table border="1" data-bbox="562 479 1028 667"> <thead> <tr> <th>%</th> <th>NC, R, DC, WDC, HOS, HC</th> <th>CS</th> </tr> </thead> <tbody> <tr> <td>1%</td> <td>1</td> <td>1</td> </tr> <tr> <td>3%</td> <td>--</td> <td>2</td> </tr> <tr> <td>5%</td> <td>2</td> <td>3</td> </tr> <tr> <td>10%</td> <td>3</td> <td>--</td> </tr> </tbody> </table>	%	NC, R, DC, WDC, HOS, HC	CS	1%	1	1	3%	--	2	5%	2	3	10%	3	--	<p>Allowable sources for renewable energy:</p> <ul style="list-style-type: none"> Photovoltaic Solar thermal Wind Biofuel (in some cases) Low-impact hydroelectricity Wave and tidal energy Geothermal energy (in some cases) <p>Geothermal energy, such as electricity generated from subterranean steam or heat generated from subterranean steam or hot water, is eligible. However, geothermal energy used in conjunction with vapor compression cycles, as in a ground-source heat pump, is not.</p> <p>Ineligible renewable energy systems:</p> <ul style="list-style-type: none"> architectural features passive solar daylighting <p>The following biofuels are ineligible:</p> <ul style="list-style-type: none"> Combustion of municipal solid waste Forest biomass waste other than mill residue Wood coated with paints, plastics, or laminate Wood treated for preservation with materials containing halogens, chlorine compounds, halide compounds, chromated copper arsenate, or arsenic; if more than 1% of the wood fuel has been treated with these compounds, the energy system is ineligible 	Center for Resource Solutions Green-e Program Commercial Building Energy Consumption Survey (CBECS)	15% of total energy. 10% CS
%	NC, R, DC, WDC, HOS, HC	CS																			
1%	1	1																			
3%	--	2																			
5%	2	3																			
10%	3	--																			
C	Enhanced Refrigerant Management NC, CS, S, R, DC, WDC, HOS, HC	To reduce ozone depletion and support early compliance with the Montreal Protocol while minimizing direct contributions to climate change.	<p>Option 1. No Refrigerants or Low-Impact Refrigerants (1 point) Do not use refrigerants, or use only refrigerants (naturally occurring or synthetic) that have an ozone depletion potential (ODP) of zero and a global warming potential (GWP) of less than 50. OR Option 2. Calculation of Refrigerant Impact (1 point) Select refrigerants that are used in heating, ventilating, air-conditioning, and refrigeration (HVAC&R) equipment to minimize or eliminate the emission of compounds that contribute to ozone depletion and climate change. The combination of all new and existing base building and tenant HVAC&R equipment that serve the project must comply with the following formula: $LCGWP + LCODP \times 105 \leq 100$ R Meet Option 1 or 2 for all HVAC systems. Stores with commercial refrigeration systems must comply with the following.</p> <ul style="list-style-type: none"> Use only non-ozone-depleting refrigerants. Select equipment with an average HFC refrigerant charge of no more than 1.75 pounds of refrigerant per 1,000 Btu/h total evaporator cooling load. Demonstrate a predicted store-wide annual refrigerant emissions rate of no more than 15%. Conduct leak testing using the procedures in GreenChill's best practices guideline for leak tightness at installation. Alternatively, stores with commercial refrigeration systems may provide proof of attainment of EPA GreenChill's silver-level store certification for newly constructed stores. 	<p>Assume that refrigerant leakage rate (Lr) is 2% per year and end-of-life refrigerant loss (Mr) is 10%, for all equipment types.</p> <p>Montreal Protocol of 2010 - Banned the use of CFC refrigerants Montreal Protocol of 2030 - Phases out HCFC refrigerants</p>	None	No															
C	Green Power and Carbon Offsets NC, CS, S, R, DC, WDC, HOS, HC	To encourage the reduction of greenhouse gas emissions through the use of grid-source, renewable energy technologies and carbon mitigation projects.	<p>Engage in a contract for qualified resources that have come online since January 1, 2005, for a minimum of five years, to be delivered at least annually. The contract must specify the provision of at least 50% or 100% of the project's energy from green power, carbon offsets, or renewable energy certificates (RECs). Green power and RECs must be Green-e Energy certified or the equivalent. RECs can only be used to mitigate the effects of Scope 2, electricity use. Carbon offsets may be used to mitigate Scope 1 or Scope 2 emissions on a metric ton of carbon dioxide-equivalent basis and must be Green-e Climate certified, or the equivalent. For U.S. projects, the offsets must be from greenhouse gas emissions reduction projects within the U.S. Determine the percentage of green power or offsets based on the quantity of energy consumed, not the cost. 50% - 1 pt; 100% - 2 pts</p> <p>Use the project's annual energy consumption, calculated in EA Prerequisite Minimum Energy Performance, if Option 1 was pursued; otherwise use the U.S. Department of Energy's Commercial Buildings Energy Consumption Survey (CBECS) database to estimate energy use. <u>Core and Shell Only</u> A core and shell building's energy is defined as the energy usage of the core and shell floor area as defined by the Building Owners and Managers Association (BOMA) standards, but not less than 15% of the project's floor area.</p>	<p>Green power and RECs must be Green-e Energy certified or the equivalent.</p> <p>Carbon offsets must be Green-e Climate certified or the equivalent.</p> <p>Scope 1 emissions are greenhouse gases emitted directly—that is, from sources owned or controlled by the entity.</p> <p>Scope 2 emissions are an entity's greenhouse gases associated with purchased electricity— and also with high temperature hot water, chilled water, or steam—that comes from a utility provider.</p>	Green-e Energy Green-e Climate U.S. Department of Energy's Commercial Buildings Energy Consumption Survey (CBECS) Building Owners and Managers Association (BOMA) ENERGY STAR Portfolio Manager 2006 IPCC Guidelines for National Greenhouse Gas Inventories eGRID2012 Version 1.0—U.S. Environmental Protection Agency WRI-WBCSD Greenhouse Gas Protocol	No															

MATERIALS AND RESOURCES (MR)

LEED BD+C v4 Credit Summary Sheet

	NAME	INTENT	REQUIREMENTS	ADDITIONAL INFORMATION	STANDARDS	EXEMPLARY PERFORMANCE																				
p	Storage and Collection of Recyclables NC, CS, S, R, DC, WDC, HOS, HC	To reduce the waste that is generated by building occupants and hauled to and disposed of in landfills.	<p><u>NC, CS, S, DC, WDC, HOS, HC</u></p> <p>Provide dedicated areas accessible to waste haulers and building occupants for the collection and storage of recyclable materials for the entire building. Collection and storage areas may be separate locations. Recyclable materials must include mixed paper, corrugated cardboard, glass, plastics, and metals. Take appropriate measures for the safe collection, storage, and disposal of two of the following: batteries, mercury-containing lamps, and electronic waste.</p> <p><u>R</u></p> <p>Conduct a waste stream study to identify the retail project's top five recyclable waste streams, by either weight or volume, using consistent metrics. Based on the waste stream study, list the top four waste streams for which collection and storage space will be provided. If no information is available on waste streams for the project, use data from similar operations to make projections. Retailers with existing stores of similar size and function can use historical information from their other locations.</p> <p>Provide dedicated areas accessible to waste haulers and building occupants for the separation, collection, and storage of recyclable materials for at least the top four recyclable waste streams identified by the waste study. Locate the collection and storage bins close the source of recyclable waste. If any of the top four waste streams are batteries, mercury-containing lamps, or electronic waste, take appropriate measures for safe collection, storage, and disposal.</p>	In the U.S., paper, food, glass, metals, and plastics—all recyclable—make up approximately 69% of total municipal solid waste.	None	N/A																				
P	Construction and Demolition Waste Management Planning NC, CS, S, R, DC, WDC, HOS, HC	To reduce construction and demolition waste disposed of in landfills and incineration facilities by recovering, reusing, and recycling materials.	<p>Develop and implement a construction and demolition waste management plan:</p> <ul style="list-style-type: none"> Establish waste diversion goals for the project by identifying at least five materials (both structural and nonstructural) targeted for diversion. Approximate a percentage of the overall project waste that these materials represent. Specify whether materials will be separated or commingled and describe the diversion strategies planned for the project. Describe where the material will be taken and how the recycling facility will process the material. <p>Provide a final report detailing all major waste streams generated, including disposal and diversion rates.</p> <p>Alternative daily cover (ADC) does not qualify as material diverted from disposal. Land-clearing debris is not considered construction, demolition, or renovation waste that can contribute to waste diversion.</p> <p>Diversion rate = (Total waste diverted from landfill / Total waste produced by project) × 100</p> <p>Units may be weight or volume but must be consistent throughout.</p> <p>Projects may use a combination of on-site separation and commingled collection, depending on what is appropriate for the project location, material stream, and available facilities and haulers.</p>	<p>Common materials that may be simple to divert:</p> <ul style="list-style-type: none"> drywall wood scrap metals brick, and concrete. <p>Finish materials, such as flooring and ceiling tiles, can often be recycled through the major manufacturers.</p> <p>Wood-derived fuel, or wood combustion, is considered diversion and not subject to the additional requirements for incineration.</p>	<p>European Commission Waste Framework Directive 2008/98/EC</p> <p>European Commission Waste Incineration Directive 2000/76/EC</p>	N/A																				
P	PBT Source Reduction—Mercury HC	To reduce mercury-containing products and devices and mercury release through product substitution, capture, and recycling.	<p>As part of the project's recycling collection system, identify the following:</p> <ul style="list-style-type: none"> types of mercury-containing products and devices to be collected; criteria governing how they are to be handled by a recycling program; and disposal methods for captured mercury. <p>Applicable mercury-containing products and devices include, but are not limited to, lamps (such as linear and circular fluorescents, integrally ballasted and nonintegrally ballasted compact fluorescents and HIDs) and dental wastes (such as scrap amalgam, chair side traps, and separator wastes).</p> <p>In facilities delivering dental care, specify and install amalgam separation devices that meet or exceed the ISO-11143 standard.</p> <p>Comply with the mercury elimination requirements outlined below, from the 2010 FGI Guidelines for Design and Construction of Health Care Facilities, Section A1.3- 4b, Mercury Elimination.</p> <ul style="list-style-type: none"> 4.2.1.1. New construction: healthcare facilities may not use mercury-containing equipment, including thermostats, switching devices, and other building system sources. Lamps are excluded. 4.2.1.2. Renovation: healthcare facilities must develop a plan to phase out mercury-containing products and upgrade current mercury-containing lamps to high-efficiency, low-mercury, or mercury-free lamp technology. <p>Do not specify or install preheat, T-9, T-10, or T-12 fluorescents or mercury vapor high-intensity discharge (HID) lamps in the project. Do not specify probe-start metal halide HID lamps in any interior spaces.</p> <p>Specify and install illuminated exit signs that do not contain mercury and use less than 5 watts of electricity.</p> <p>Fluorescent and high-pressure sodium lamps must meet the criteria in Table 1.</p> <table border="1" data-bbox="547 1542 1494 1923"> <thead> <tr> <th>Lamp</th> <th>Maximum Content</th> </tr> </thead> <tbody> <tr> <td>T-8 fluorescent, eight-foot</td> <td>10 mg mercury</td> </tr> <tr> <td>T-8 fluorescent, four-foot</td> <td>3.5 mg mercury</td> </tr> <tr> <td>T-8 fluorescent, U-bent</td> <td>6 mg mercury</td> </tr> <tr> <td>T-5 fluorescent, linear</td> <td>2.5 mg mercury</td> </tr> <tr> <td>T-5 fluorescent, circular</td> <td>9 mg mercury</td> </tr> <tr> <td>Compact fluorescent, nonintegral ballast</td> <td>3.5 mg mercury</td> </tr> <tr> <td>Compact fluorescent, integral ballast</td> <td>3.5 mg mercury, ENERGY STAR qualified</td> </tr> <tr> <td>High-pressure sodium, up to 400 watts</td> <td>10 mg mercury</td> </tr> <tr> <td>High-pressure sodium, above 400 watts</td> <td>32 mg mercury</td> </tr> </tbody> </table>	Lamp	Maximum Content	T-8 fluorescent, eight-foot	10 mg mercury	T-8 fluorescent, four-foot	3.5 mg mercury	T-8 fluorescent, U-bent	6 mg mercury	T-5 fluorescent, linear	2.5 mg mercury	T-5 fluorescent, circular	9 mg mercury	Compact fluorescent, nonintegral ballast	3.5 mg mercury	Compact fluorescent, integral ballast	3.5 mg mercury, ENERGY STAR qualified	High-pressure sodium, up to 400 watts	10 mg mercury	High-pressure sodium, above 400 watts	32 mg mercury	<p>Mercury is a persistent bioaccumulative toxic (PBT) chemical element and a neurotoxin.</p> <p>The elemental symbol for mercury is Hg, which may appear as the label for mercury content.</p>	<p>Guidelines for the Design and Construction of Health Care Facilities, 2010 Edition Facility Guidelines Institute ISO-11143, Dentistry, Amalgam Separator ENERGY STAR: energystar.gov U.S. Department of Energy ENERGY STAR Qualified Light Bulbs, 2009 Partner Resource Guide Toxicological Effects of Methylmercury, Committee on the Toxicological Effects of Methylmercury, Board on Environmental Studies and Toxicology, National Research Council, 2000</p>	N/A
Lamp	Maximum Content																									
T-8 fluorescent, eight-foot	10 mg mercury																									
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MATERIALS AND RESOURCES (MR)

LEED BD+C v4 Credit Summary Sheet

NAME	INTENT	REQUIREMENTS	ADDITIONAL INFORMATION	STANDARDS	EXEMPLARY PERFORMANCE														
C	Building Life-Cycle Impact Reduction NC, CS, S, R, DC, WDC, HOS, HC	<p>To encourage adaptive reuse and optimize the environmental performance of products and materials.</p> <p>Demonstrate reduced environmental effects during initial project decision-making by reusing existing building resources or demonstrating a reduction in materials use through life-cycle assessment. Achieve one of the following options.</p> <p>Option 1. Historic Building Reuse (5 points BD+C, 6 points Core and Shell) Maintain the existing building structure, envelope, and interior nonstructural elements of a historic building or contributing building in a historic district. OR</p> <p>Option 2. Renovation of Abandoned or Blighted Building (5 points BD+C, 6 points Core and Shell) Maintain at least 50%, by surface area, of the existing building structure, enclosure, and interior structural elements for buildings that meet local criteria of abandoned or are considered blight. The building must be renovated to a state of productive occupancy. Up to 25% of the building surface area may be excluded from credit calculation because of deterioration or damage. OR</p> <p>Option 3. Building and Material Reuse (2–4 points BD+C, 2-5 points Core and Shell) Reuse or salvage building materials from off site or on site as a percentage of the surface area, as listed in Table 1.</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-bottom: 5px;"> <tr> <td style="width: 30%;">Percentage of completed project surface area reused</td> <td style="width: 30%;">NC, S, R, DC, WDC, HOS, HC</td> <td style="width: 30%;">CS</td> </tr> <tr> <td>25%</td> <td>2</td> <td>2</td> </tr> <tr> <td>50%</td> <td>3</td> <td>3</td> </tr> <tr> <td>75%</td> <td>4</td> <td>5</td> </tr> </table> <p>Include structural elements (e.g., floors, roof decking), enclosure materials (e.g., skin, framing), and permanently installed interior elements (e.g., walls, doors, floor coverings, ceiling systems). Exclude from the calculation window assemblies and any hazardous materials that are remediated as a part of the project. Materials contributing toward this credit may not contribute toward MR Credit Material Disclosure and Optimization. OR</p> <p>Option 4. Whole-Building Life-Cycle Assessment (3 points) For new construction (buildings or portions of buildings), conduct a life-cycle assessment of the project’s structure and enclosure that demonstrates a minimum of 10% reduction, compared with a baseline building, in at least three of the six impact categories listed below, one of which must be global warming potential. No impact category assessed as part of the life-cycle assessment may increase by more than 5% compared with the baseline building. The baseline and proposed buildings must be of comparable size, function, orientation, and operating energy performance as defined in EA Prerequisite Minimum Energy Performance. The service life of the baseline and proposed buildings must be the same and at least 60 years to fully account for maintenance and replacement. Use the same life-cycle assessment software tools and data sets to evaluate both the baseline building and the proposed building, and report all listed impact categories. Data sets must be compliant with ISO 14044. Select at least three of the following impact categories for reduction:</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-bottom: 5px;"> <tr> <td style="width: 50%; vertical-align: top;"> <ul style="list-style-type: none"> global warming potential (greenhouse gases), in CO₂e; depletion of the stratospheric ozone layer, in kg CFC-11; acidification of land and water sources, in moles H⁺ or kg SO₂; </td> <td style="width: 50%; vertical-align: top;"> <ul style="list-style-type: none"> eutrophication, in kg nitrogen or kg phosphate; formation of tropospheric ozone, in kg NO_x or kg ethene; and depletion of nonrenewable energy resources, in MJ. </td> </tr> </table> <p>HEALTHCARE only For all options in this credit, building materials demolished to create courtyards to increase daylighting may be counted as retained in calculations, provided the new courtyards meet the requirements of EQ Credits Daylight and Quality Views.</p>	Percentage of completed project surface area reused	NC, S, R, DC, WDC, HOS, HC	CS	25%	2	2	50%	3	3	75%	4	5	<ul style="list-style-type: none"> global warming potential (greenhouse gases), in CO₂e; depletion of the stratospheric ozone layer, in kg CFC-11; acidification of land and water sources, in moles H⁺ or kg SO₂; 	<ul style="list-style-type: none"> eutrophication, in kg nitrogen or kg phosphate; formation of tropospheric ozone, in kg NO_x or kg ethene; and depletion of nonrenewable energy resources, in MJ. 	<p>life-cycle assessment an evaluation of the environmental effects of a product from cradle to grave, as defined by ISO 14040–2006 and ISO 14044–2006</p> <p>LCA is a “compilation and evaluation of the inputs and outputs and the potential environmental impacts of a product system throughout its life cycle.” The entire life cycle of a product (or building) is examined, the processes and constituents identified, and their environmental effects assessed—both upstream, from the point of manufacture or raw materials extraction, and downstream, including transportation, use, maintenance, and end of life. This approach is sometimes called “cradle to grave.” Going even further, “cradle to cradle” emphasizes recycling and reuse at the end of life rather than disposal.</p> <p>Furniture is not required to be included in credit calculations. However, if furniture is included in MR credit calculations, all furniture must be included consistently in all cost-based credits.</p> <p>Special equipment, such as elevators, escalators, process equipment, and fire suppression, systems, is excluded from the credit calculations. Also excluded are products purchased for temporary use on the project, like formwork for concrete.</p> <p>Paints of different gloss levels are separate products. Different colors of the same paint are not separate products Carpets of different pile heights are separate products. The same carpet in a different color is not a separate product.</p> <p>To calculate the total materials cost of a project, use either: Actual materials cost. This is the cost of all materials being used on the project site, excluding labor but including delivery and taxes. Default materials cost. The alternative way to determine the total materials cost is to calculate 45% of total construction costs.</p> <p>Products and materials that are extracted, manufactured, and purchased within 100 miles of the project are valued at 200% of their cost (i.e., the valuation factor is 2).</p>	<p>ISO 14044</p> <p>National Register of Historic Places</p> <p>Secretary of Interior’s Standards for the Treatment of Historic Properties</p>	<p>Option 1. N/A Option 2. N/A Option 3. 95% Option 4. Achieve any improvement over the required credit thresholds in all six impact measures.</p>
Percentage of completed project surface area reused	NC, S, R, DC, WDC, HOS, HC	CS																	
25%	2	2																	
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C	Building Product Disclosure and Optimization—Environmental Product Declarations	<p>Achieve one or more of the options below, for a maximum of 2 points.</p> <p>Option 1. Environmental Product Declaration (EPD) (1 point) ≥ 20 different permanently installed products sourced from at least five different manufacturers that meet one of the disclosure criteria below. Product-specific declaration.</p> <ul style="list-style-type: none"> 1/4 of a product - publicly available, critically reviewed LCA conforming to ISO 14044 that have at least a cradle to gate scoper. EPD which conform to ISO 14025, 14040, 14044, and EN 15804 or ISO 21930 and have at least a cradle to gate scope. 1/2 of a product - Industry-wide (generic) EPD -- Products with third-party certification (Type III) 1.0 of a product - Product-specific Type III EPD -- Products with third-party certification (Type III) <p>USGBC approved program – Products that comply with other USGBC approved environmental product declaration frameworks.</p> <p>Option 2. Multi-Attribute Optimization (1 point) 50%, by cost, of the total value of permanently installed products in the project. Products will be valued as below. Third party certified products that demonstrate impact reduction below industry average in at least three of the following categories are valued at 100% of their cost for credit achievement calculations.</p> <ul style="list-style-type: none"> global warming potential (greenhouse gases), in CO₂e; depletion of the stratospheric ozone layer, in kg CFC-11; acidification of land and water sources, in moles H⁺ or kg SO₂; eutrophication, in kg nitrogen or kg phosphate; formation of tropospheric ozone, in kg NO_x or kg ethene; and depletion of nonrenewable energy resources, in MJ. <p>USGBC approved program -- Products that comply with other USGBC approved multi-attribute frameworks.</p> <p>Products sourced (extracted, manufactured, purchased) within 100 miles of the project site are valued at 200% of their base contributing cost. Structure and enclosure materials may not constitute more than 30% of the value of compliant building products.</p>	<p>Environmental product declarations (EPDs) are a standardized way of communicating the environmental effects associated with a product or system’s raw material extraction, energy use, chemical makeup, waste generation, and emissions to air, soil, and water.</p> <p>Credit requires that EPDs come from program operators who follow the International Organization for Standardization (ISO) standards.</p> <p>A product category rule (PCR) defines how to standardize this information for a specific product type, such as flooring. The PCR defines scope, system boundary, measurement procedures, impact measures and other technical requirements.</p>	<p>ISO CEN Federal Trade Commission, Guides for the Use of Environmental Marketing Claims, 16 CFR 260.7 (e)</p>	<p>Option 1. 40 Option 2. 75%</p>														

MATERIALS AND RESOURCES (MR)

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	NAME	INTENT	REQUIREMENTS	ADDITIONAL INFORMATION	STANDARDS	EXEMPLARY PERFORMANCE
C	Building Product Disclosure and Optimization—Sourcing of Raw Materials	To encourage the use of products and materials for which life cycle information is available and that have environmentally, economically, and socially preferable life cycle impacts. To reward project teams for selecting products verified to have been extracted or sourced in a responsible manner.	<p>Option 1. Raw Material Source and Extraction Reporting (1 point) ≥ 20 different permanently installed products from at least five different manufacturers, publicly released report from raw material suppliers</p> <ul style="list-style-type: none"> • 1/2 of a product - Products sourced from manufacturers with self-declared reports • 1.0 of a product - Third-party verified corporate sustainability reports (CSR) <p>Acceptable CSR frameworks include the following: Global Reporting Initiative (GRI) Sustainability Report Organisation for Economic Co-operation and Development (OECD) Guidelines for Multinational Enterprises U.N. Global Compact: Communication of Progress ISO 26000: 2010 Guidance on Social Responsibility USGBC approved program: Other USGBC approved programs meeting the CSR criteria.</p> <p>Option 2. Leadership Extraction Practices (1 point) 25% by cost of the total value of permanently installed building products - meet at least one of the responsible extraction criteria</p> <ul style="list-style-type: none"> • 50% Extended producer responsibility. • 100% Bio-based materials. - Sustainable Agriculture Network’s Sustainable Agriculture Standard. Bio-based raw materials must be tested using ASTM Test Method D6866 and be legally harvested, as defined by the exporting and receiving country. Exclude hide products, such as leather and other animal skin material. • 100% Wood products - Forest Stewardship Council or USGBC-approved equivalent • 100% Materials reuse - salvaged, refurbished, or reused • 100% Recycled content (Recycled content = ∑ postconsumer recycled content + 1/2 ∑ preconsumer recycled content) • USGBC approved program <p>Products sourced (extracted, manufactured, purchased) within 100 miles of the project site are valued at 200% of their base contributing cost. Base contributing cost of individual products compliant with multiple responsible extraction criteria is not permitted to exceed 100% its total actual cost (before regional multipliers) and double counting of single product components compliant with multiple responsible extraction criteria is not permitted and in no case is a product permitted to contribute more than 200% of its total actual cost. Structure and enclosure materials may not constitute more than 30% of the value of compliant building products.</p>	<p>Chain-of-Custody (CoC) certification requirements are established by Forest Stewardship Council Chain of Custody Standard 40-004 v2-1. FSC-certified products must be itemized on the vendor’s invoice. FSC 100% (FSC Pure) contribute 100% FSC Mix Credit (FSC Mixed Credit) contribute 100% FSC Mix [NN]% (FSC Mixed [NN]%) contribute % indicated FSC Recycled Credit contribute 100% postconsumer recycled FSC Recycled [NN] % contribute the % postconsumer recycled</p> <p>Default recycled content for steel products where no recycled content information is available, assume the recycled content to be 25% postconsumer.</p>	<p>Global Reporting Initiative (GRI) Sustainability Report</p> <p>Organisation for Economic Co-operation and Development (OECD) Guidelines for Multinational Enterprises</p> <p>U.N. Global Compact, Communication of Progress</p> <p>ISO 26000—2010 Guidance on Social Responsibility</p> <p>Forest Stewardship Council Sustainable Agriculture Network The Rainforest Alliance ASTM Test Method D6866 International Standards ISO 14021—1999, Environmental Labels and Declarations—Self Declared Environmental Claims (Type II Environmental Labeling)</p>	<p>Option 1. 40 Option 2. 50 %</p>
C	Building Product Disclosure and Optimization—Material Ingredients	To encourage the use of products and materials for which life-cycle information is available and that have environmentally, economically, and socially preferable life-cycle impacts. To reward project teams for selecting products for which the chemical ingredients in the product are inventoried using an accepted methodology and for selecting products verified to minimize the use and generation of harmful substances. To reward raw material manufacturers who produce products verified to have improved life-cycle impacts.	<p>Option 1. Material Ingredient Reporting (1 point) ≥ 20 different permanently installed products from ≥ five different manufacturers, demonstrate chemical inventory to at least 0.1% (1000 ppm).</p> <p>Manufacturer Inventory. The manufacturer has published complete content inventory for the product following these guidelines: A publicly available inventory of all ingredients identified by name and Chemical Abstract Service Registration Number (CASRN) Materials defined as trade secret or intellectual property may withhold the name and/or CASRN but must disclose role, amount and GreenScreen benchmark, as defined in GreenScreen v1.2.</p> <p>Health Product Declaration. The end use product has a published, complete Health Product Declaration with full disclosure of known hazards</p> <p>Cradle to Cradle. The end use product has been certified at the Cradle to Cradle v2 Basic level or Cradle to Cradle v3 Bronze level.</p> <p>USGBC approved program. Other USGBC approved programs meeting the material ingredient reporting criteria.</p> <p>and/or</p> <p>Option 2. Material Ingredient Optimization (1 point) 25% by cost of the total value of permanently installed building products - that document their material ingredient optimization</p> <p>GreenScreen v1.2 Benchmark. Products that have fully inventoried chemical ingredients to 100 ppm that have no Benchmark 1 hazards:</p> <ul style="list-style-type: none"> • 100% of cost - If any ingredients are assessed with the GreenScreen List Translator. • 150% of cost - If all ingredients are have undergone a full GreenScreen Assessment. <p>Cradle to Cradle Certified. End use products are certified Cradle to Cradle. Products will be valued as follows:</p> <ul style="list-style-type: none"> • 100% of cost - Cradle to Cradle v2 Gold • 150% of cost - Cradle to Cradle v2 Platinum • 100% of cost - Cradle to Cradle v3 Silver • 150% of cost - Cradle to Cradle v3 Gold or Platinum <p>International Alternative Compliance Path – REACH Optimization.</p> <ul style="list-style-type: none"> • 100% of cost - If the product contains no ingredients listed on the REACH Authorization or Candidate list. <p>USGBC approved program. Products that comply with USGGBC approved building product optimization criteria.</p> <p>and/or</p> <p>Option 3. Product Manufacturer Supply Chain Optimization (1 point) 25% by cost of the total value of permanently installed building products that are:</p> <ul style="list-style-type: none"> • Sourced from product manufacturers who engage in validated and robust safety, health, hazard, and risk programs which at a minimum document at least 99% (by weight) of the ingredients used to make the building product or building material, and • Sourced from product manufacturers with independent third party verification of their supply chain that at a minimum verifies: <ul style="list-style-type: none"> Processes are in place to: <ul style="list-style-type: none"> communicate and transparently prioritize chemical ingredients along the supply chain according to available hazard, exposure and use information to identify those that require more detailed evaluation identify, document, and communicate information on health, safety and environmental characteristics of chemical ingredients implement measures to manage the health, safety and environmental hazard and risk of chemical ingredients optimize health, safety and environmental impacts when designing and improving chemical ingredients communicate, receive and evaluate chemical ingredient safety and stewardship information along the supply chain Safety and stewardship information about the chemical ingredients is publicly available from all points along the supply chain <p>Products meeting Option 3 criteria are valued at 100% of their cost. Options 2 and 3, products sourced (extracted, manufactured, purchased) within 100 miles of the project site are valued at 200% of their base. Option 2 or 3 can be combined to reach the 25% threshold but products compliant with both option 2 and 3 may only be counted once.</p>	<p>Structure and enclosure materials may not constitute more than 30% of the value of compliant building products.</p>	<p>Chemical Abstracts Service</p> <p>Health Product Declaration</p> <p>Cradle-to-Cradle Certified™ Product Standard</p> <p>Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)</p> <p>GreenScreen</p>	<p>Option 1. 40 Option 2. 50%</p>

MATERIALS AND RESOURCES (MR)

LEED BD+C v4 Credit Summary Sheet

	NAME	INTENT	REQUIREMENTS	ADDITIONAL INFORMATION	STANDARDS	EXEMPLARY PERFORMANCE
C	PBT Source Reduction—Mercury HC	To reduce the release of persistent, bioaccumulative, and toxic (PBTs) chemicals associated with the life cycle of building materials.	Specify and install fluorescent lamps with both low mercury content (MR Prerequisite PBT Source Reduction—Mercury) and long lamp life. Do not specify or install circular fluorescent lamps or probe start metal halide lamps.	Hg - symbol for mercury	None	No
C	PBT Source Reduction—Lead, Cadmium, and Copper HC	To reduce the release of persistent, bioaccumulative, and toxic (PBT) chemicals associated with the life cycle of building materials.	<p>Specify substitutes for materials manufactured with lead and cadmium, as follows.</p> <p>Lead For water intended for human consumption, specify and use:</p> <ul style="list-style-type: none"> solder and flux that meet the California law AB1953; lead-free roofing and flashing; electrical wire and cable with lead content less than 300 parts per million; Specify no use of interior or exterior paints containing lead; For renovation projects, ensure the removal and appropriate disposal of disconnected wires with lead stabilizers, consistent with the 2002 National Electric Code requirements. <p>Lead used for radiation shielding and copper used for MRI shielding are exempt.</p> <p>Cadmium</p> <ul style="list-style-type: none"> Specify no use of interior or exterior paints containing intentionally added cadmium. <p>Copper</p> <ul style="list-style-type: none"> For copper pipe applications, reduce or eliminate joint-related sources of copper corrosion: use mechanically crimped copper joint systems; or specify that all solder joints comply with ASTM B828 2002, and specify and use ASTM B813 2010 for flux. 	<p>The “lead free” label as defined by the Safe Drinking Water Act (SDWA) does not provide adequate screening for the purposes of this credit because the SDWA defines “lead free” as solders and flux containing 0.2% lead or less.</p> <p>California AB1953 standard, which specifies that solder not contain more than 0.2% lead, and flux not more than a weighted average of 0.25% lead for wetted surfaces</p>	<p>ASTM B813 for copper flux</p> <p>ASTM B828, Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings</p> <p>California AB1953 standard for lead water pipes used to convey water for human consumption</p> <p>GreenSeal</p> <p>2002 National Electric Code requirements for removal and disposal of disconnected wires with lead stabilizers</p>	No
C	Furniture and Medical Furnishings HC	To enhance the environmental and human health performance attributes associated with freestanding furniture and medical furnishings.	<p>30% (1 point) or 40% (2 points), by cost, of all freestanding furniture and medical furnishings (e.g., mattresses, foams, panel fabrics, cubicle curtains, window coverings, other textiles) that meets the criteria in one of the following three options. Include built-in casework and built-in millwork in the base building calculations, even if manufactured off site. The dollar value of any individual product may be included in the total qualifying value if the product meets the requirements.</p> <p>Option 1. Minimal Chemical Content All components that constitute at least 5%, by weight, of a furniture or medical furnishing assembly, including textiles, finishes, and dyes, must contain less than 100 parts per million (ppm) of at least four of the five following chemical groups:</p> <ul style="list-style-type: none"> urea formaldehyde; heavy metals, including mercury, cadmium, lead, and antimony; hexavalent chromium in plated finishes consistent with the European Union Directive on the Restriction of the Use of Certain Hazardous Substances (EU RoHS); stain and nonstick treatments derived from perfluorinated compounds (PFCs), including perfluorooctanoic acid (PFOA); and added antimicrobial treatments. <p>and/or</p> <p>Option 2. Testing and Modeling of Chemical Content All components of a furniture or medical furnishing assembly, including textiles, finishes, and dyes, must contain less than 100 parts per million (ppm) of at least two of the five chemicals or materials listed in Option 1. New furniture or medical furnishing assemblies must be in accordance with ANSI/BIFMA Standard Method M7.1–2011. Comply with ANSI/BIFMA e3-2010 Furniture Sustainability Standard, Sections 7.6.1 and 7.6.2, using either the concentration modeling approach or the emissions factor approach. Model the test results using the open plan, private office, or seating scenario in ANSI/BIFMA M7.1, as appropriate. USGBC-approved equivalent testing methodologies and contaminant thresholds are also acceptable. Documentation submitted for furniture must indicate the modeling scenario used to determine compliance. Salvaged and reused furniture more than one year old at the time of use is considered compliant, provided it meets the requirements for any site-applied paints, coatings, adhesives, and sealants.</p> <p>and/or</p> <p>Option 3. Multi-Attribute Assessment of Products Use products that meet at least one of the criteria below. Each product can receive credit for each criterion met. The scope of any environmental product declaration (EPD) must be at least cradle to gate. Product-specific declaration.</p> <ul style="list-style-type: none"> 1/4 of a product - publicly available, critically reviewed LCA conforming to ISO 14044 that have at least a cradle to gate scoper. EPD which conform to ISO 14025, 14040, 14044, and EN 15804 or ISO 21930 and have at least a cradle to gate scope. 1/2 of a product - Industry-wide (generic) EPD -- Products with third-party certification (Type III) 1.0 of a product - Product-specific Type III EPD -- Products with third-party certification (Type III) <p>Materials reuse. salvaged, refurbished, or reused</p> <p>Recycled content. (Recycled content = \sum postconsumer recycled content + $1/2 \sum$ preconsumer recycled content)</p> <p>Extended producer responsibility.</p> <p>Bio-based materials. Sustainable Agriculture Network’s Sustainable Agriculture Standard. Bio-based raw materials must be tested using ASTM Test Method D6866 and be legally harvested, as defined by the exporting and receiving country. Exclude hide products, such as leather and other animal skin material.</p> <p>Wood products. Forest Stewardship Council or USGBC-approved equivalent</p> <p>Products sourced (extracted, manufactured, purchased) within 100 miles (160 km) of the project site are valued at 200% of their base contributing cost</p>	<p>Product cost = cost of the product contributing toward credit.</p> <p>For assemblies, the cost amount contributing toward credit is based on weight.</p> <p>Criterion valuation factor = multiplier assigned to each sourcing criterion:</p> <ul style="list-style-type: none"> Products with product specific declarations, value .25, by cost Products with industry wide (generic) EPD, value .5, by cost Products with product specific Type III EPD, value 1.0, by cost Materials reuse, value 1.0, by cost Postconsumer recycled materials, value 1.0, by cost Preconsumer recycled materials, value 0.5, by cost Extended producer responsibility is valued at 50%; that is, the valuation factor is 0.5. Products that are part of an extended producer responsibility program may be counted in their entirety even if only part of the product is recycled. Biobased nonwood products meeting Sustainable Agriculture Standard, 1.0 value New wood products certified to FSC, value 1.0, by cost <p>Location valuation factor = multiplier for the extraction, manufacture, and purchase location</p>	<p>Restriction of the Use of Certain Hazardous Substances of the European Union Directive (EU RoHS)</p> <p>American National Standard and The Business and Institutional Furniture Manufacturers Association Standard M7.1–2011: ANSI/BIFMA M7.1–2011</p> <p>Furniture Sustainability Standard and level™ Certification Program. American National Standard and The Business and Institutional Furniture Manufacturers Association Standard e3–2011 for Furniture Sustainability: ANSI/BIFMA e3–2011</p> <p>International Standard ISO 14025–2006, Environmental labels and declarations, Type III environmental declarations, Principles and procedures</p> <p>International Standard ISO 14040–2006, Environmental management, Life cycle assessment principals and frameworks</p> <p>International Standard ISO 14044–2006, Environmental management, Life cycle assessment Requirements and guidelines</p> <p>International Standard ISO 21930–2007, Sustainability in building construction, Environmental declaration of building products</p>	50%

MATERIALS AND RESOURCES (MR)

LEED BD+C v4 Credit Summary Sheet

	NAME	INTENT	REQUIREMENTS	ADDITIONAL INFORMATION	STANDARDS	EXEMPLARY PERFORMANCE
C	Design for Flexibility HC	Conserve resources associated with the construction and management of buildings by designing for flexibility and ease of future adaptation and for the service life of components and assemblies.	<p>Increase building flexibility and ease of adaptive use over the life of the structure by employing at least three of the following strategies.</p> <ul style="list-style-type: none"> • Use interstitial space. Design distribution zone utility systems and equipment including HVAC, plumbing, electrical, information technology, medical gases, and life safety systems to serve the occupied zones and have the capacity to control multiple zones in clinical spaces. • Provide programmed soft space, such as administration or storage, equal to at least 5% of departmental gross area (DGA). Locate soft space adjacent to clinical departments that anticipate growth. Determine a strategy for future accommodation of displaced soft space. • Provide shell space equal to at least 5% of DGA. Locate it such that it can be occupied without displacing occupied space. • Identify horizontal expansion capacity for diagnostic and treatment or other clinical space equal to at least 30% of existing floor area (excluding inpatient units) without demolition of occupied space (other than at the connection point). Reconfiguration of additional existing occupied space that has been constructed with demountable partition systems is permitted. • Design for future vertical expansion on at least 75% of the roof, ensuring that existing operations and service systems can continue at or near capacity during the expansion. • Designate space for future above-grade parking structures equal to 50% of existing on-grade parking capacity, with direct access to the main hospital lobby or circulation. Vertical transportation pathways that lead directly to the main hospital lobby or circulation are acceptable. • Use demountable partitions for 50% of applicable areas. • Use movable or modular casework for at least 50% of casework and custom millwork. Base the calculation on the combined value of casework and millwork, as determined by the cost estimator or contractor. 	<p>Health care facilities intentionally designed for adaptive use are easier to renovate, reducing the resource inputs and waste generation associated with renovation. Movable wall partitions, for example, reduce the solid waste generated by demolition of permanent walls while avoiding raw material extraction for new walls.</p> <p>When determining which areas have linear surface applicable for demountable partitions, exclude the following:</p> <ul style="list-style-type: none"> • Areas that require medical staff to have emergency access to patients or where safety is a concern. These may be areas where drapery and screens are more appropriate privacy devices than walls. • Walls that have life, safety, or health requirements by code, such as fire separation, detention, or smoke control. Examples include inpatient nursing units (such as ICU), surgery theaters, postanesthesia care units, emergency department treatment areas, and acute trauma. If other areas are excluded, provide the rationale. 	None	No
C	Construction and Demolition Waste Management NC, CS, S, R, DC, WDC, HOS, HC	To reduce construction and demolition waste disposed of in landfills and incineration facilities by recovering, reusing, and recycling materials.	<p>Recycle and/or salvage nonhazardous construction and demolition materials. Calculations can be by weight or volume but must be consistent throughout. Exclude excavated soil, land-clearing debris, and alternative daily cover (ADC). Include wood waste converted to fuel (biofuel) in the calculations; other types of waste-to-energy are not considered diversion for this credit. However, for projects that cannot meet credit requirements using reuse and recycling methods, waste-to-energy systems may be considered waste diversion if the European Commission Waste Framework Directive 2008/98/EC and Waste Incineration Directive 2000/76/EC are followed and Waste to Energy facilities meet applicable European Committee for Standardization (CEN) EN 303 standards.</p> <p>Option 1. Diversion (1–2 points) Path 1. Divert 50% and Three Material Streams (1 point) Divert at least 50% of the total construction and demolition material; diverted materials must include at least three material streams. or Path 2. Divert 75% and Four Material Streams (2 points) Divert at least 75% of the total construction and demolition material; diverted materials must include at least four material streams. or Option 2. Reduction of Total Waste Material (2 points) Do not generate more than 2.5 pounds of construction waste per square foot of the building’s floor area.</p> $\text{Diversion rate} = \frac{\text{Total waste diverted from landfill}}{\text{Total waste produced by project}} \times 100$	<ul style="list-style-type: none"> • Ensure that units are consistent for all materials, in either weight or volume. • Diverted waste includes all recycled, salvaged, reused, and donated materials. • ADC does not count as diversion but must be included in total construction and demolition waste. • Exclude hazardous waste, land-clearing debris, soil, and landscaping materials. <p>Projects that cannot meet the credit threshold via reuse or recycling are eligible to claim diversion through waste-to-energy systems, provided they meet applicable standards and requirements</p>	<p>Certification of Sustainable Recyclers</p> <p>European Commission Waste Framework Directive 2008/98/EC</p> <p>European Commission Waste Incineration Directive 2000/76/EC</p> <p>EN 303-1—1999/A1—2003, Heating boilers with forced draught burners, Terminology, general requirements, testing and marking</p> <p>EN 303-2—1998/A1—2003, Heating boilers with forced draught burners, Special requirements for boilers with atomizing oil burners</p> <p>EN 303-3—1998/AC—2006, Gas-fired central heating boilers, Assembly comprising a boiler body and a forced draught burner</p> <p>EN 303-4—1999, Heating boilers with forced draught burners, Special requirements for boilers with forced draught oil burners with outputs up to 70 kW and a maximum operating pressure of 3 bar, Terminology, special requirements, testing and marking</p> <p>EN 303-5—2012, Heating boilers for solid fuels, manually and automatically stoked, nominal heat output of up to 500 kW</p>	Achieve both Option 1 (either Path 1 or Path 2) and Option 2.

INDOOR ENVIRONMENTAL QUALITY (EQ)

LEED BD+C v4 Credit Summary Sheet

	NAME	INTENT	REQUIREMENTS	ADDITIONAL INFORMATION	STANDARDS	EXEMPLARY PERFORMANCE
P	Minimum Indoor Air Quality Performance NC, CS, S, R, DC, WDC, HOS, HC	To contribute to the comfort and well-being of building occupants by establishing minimum standards for indoor air quality (IAQ).	<p>Ventilation <u>Mechanically Ventilated Spaces</u> Option 1. ASHRAE Standard 62.1–2010 ASHRAE 62.1–2010 - ventilation rate procedure. Meet the minimum outdoor air intake flow; or local code, more stringent. Option 2. CEN Standards EN 15251–2007 and EN 13779–2007 Projects outside the U.S. may instead meet the minimum outdoor air requirements of Annex B of Comité Européen de Normalisation (CEN) <u>Naturally Ventilated Spaces</u> ASHRAE 62.1–2010 - natural ventilation procedure. Meet minimum outdoor air opening and space configuration requirements. Verify flow diagram using the Chartered Institution of Building Services Engineers (CIBSE) Applications Manual AM10; or local code, more stringent.</p> <p>Monitoring <u>Mechanically Ventilated Spaces</u> Monitor outdoor air intake flow as follows:</p> <ul style="list-style-type: none"> VAV systems - direct outdoor airflow measurement device capable of measuring the minimum outdoor air intake flow. Accuracy of +/-10% of the design minimum outdoor airflow rate. An alarm must indicate when the outdoor airflow value varies by 15% or more. CV systems - balance outdoor airflow. Install a current transducer on the supply fan, an airflow switch, or similar monitoring device. <p><u>Naturally Ventilated Spaces</u> Comply with at least one of the following strategies.</p> <ul style="list-style-type: none"> Provide a direct exhaust airflow measurement device. Accuracy of +/-10%. An alarm must indicate when airflow values vary by 15% or more. Provide automatic indication devices on all natural ventilation openings intended to meet the minimum opening requirements. An alarm must indicate when any one of the openings is closed during occupied hours. Monitor carbon dioxide (CO₂) concentrations within each thermal zone. CO₂ monitors must be between 3 and 6 feet above the floor and within the thermal zone. CO₂ monitors must have an audible or visual indicator or alert the building automation system if the sensed CO₂ concentration exceeds the setpoint by more than 10%. Calculate appropriate CO₂ setpoints using the methods in ASHRAE 62.1–2010. <p><u>CS</u> Mechanical ventilation systems installed must be capable of meeting projected ventilation levels and monitoring for anticipated future tenants. <u>Residential only</u> In addition to the requirements above, each dwelling unit must meet all of the following requirements.</p> <ul style="list-style-type: none"> Unvented combustion appliances (e.g., decorative logs) are not allowed. Carbon monoxide (CO) monitors must be installed on each floor of each unit. All indoor fireplaces and woodstoves must have solid glass enclosures or doors that seal when closed. Any indoor fireplaces and woodstoves that are not closed combustion or power-vented must pass a backdraft potential test to ensure that depressurization of the combustion appliance zone is less than 5 Pa. Space- and water-heating equipment that involves combustion must be designed and installed with closed combustion (i.e., sealed supply air and exhaust ducting) or with power-vented exhaust, or located in a detached utility building or open-air facility. For projects in high-risk areas for radon, EPA Radon Zone 1, design and construct any dwelling unit on levels one through four above grade with radon-resistant construction techniques. <p><u>HC</u> Meet the following requirements for both ventilation and monitoring. Mechanically Ventilated Spaces - ASHRAE Standard 170–2008, Section 7; 2010 FGI Guidelines for Design and Construction of Health Care Facilities; or a local equivalent, whichever is more stringent. Naturally Ventilated Spaces ASHRAE Standard 62.1–2010 (with errata); or a local equivalent, whichever is more stringent.</p>	<p>Occupied and Occupiable Spaces</p> <p>A densely occupied space has a design occupant density of 25 people or more per 1,000 square feet, or 40 square feet or less per person. Occupied spaces with a lower density are nondensely occupied.</p> <p>The indoor air quality procedure defined in ASHRAE Standard 62.1–2010 may not be used to comply with this prerequisite.</p> <p>ASHRAE 62.1- 2010 Ventilation Rate Procedure zone air distribution effectiveness (Ez); design airflow rate at condition analyzed (Ds); the primary air fraction of supply air at condition analyzed (Ep); the system ventilation efficiency (Ev); fraction of local recirculated air that is representative of system return air (Er).</p> <p>For multiple-zone systems, use the 62MZCalc spreadsheet.</p> <p>There are three main types of mechanical ventilation systems. Single-zone system This system delivers a mixture of outdoor air and recirculated air to only one ventilation zone.</p> <p>100% outdoor air system This type of system delivers only outdoor air directly to one or more ventilation zones. The ventilation air cannot contain any recirculated air.</p> <p>Multiple-zone recirculating system This type of system delivers a mixture of outdoor air and recirculated air to more than one ventilation zone.</p> <p>Because of the complexity of the calculations for multiple-zone recirculating systems, project teams must use the 62MZCalc spreadsheet, or energy modeling software to perform the ventilation rate procedure calculations and determine the amount of outdoor air required at the system level.</p>	<p>ASHRAE 62.1–2010</p> <p>ASHRAE Standard 170–2008</p> <p>2010 FGI Guidelines for Design and Construction of Health Care Facilities</p> <p>CEN Standard EN 15251–2007</p> <p>CEN Standard EN 13779–2007</p> <p>CIBSE Applications Manual AM10, March 2005</p>	N/A
P	Environmental Tobacco Smoke Control NC, CS, S, R, DC, WDC, HOS, HC	To prevent or minimize exposure of building occupants, indoor surfaces, and ventilation air distribution systems to environmental tobacco smoke.	<p>NC, CS, R, DC, WDC, HOS, HC</p> <ul style="list-style-type: none"> Prohibit smoking inside the building. Prohibit smoking outside the building except in designated smoking areas located at least 25 feet from all entries, outdoor air intakes, and operable windows. Also prohibit smoking outside the property line in spaces used for business purposes. Signage must be posted within 10 feet of all building entrances indicating the no-smoking policy. <p><u>Residential only</u> Option 1. No Smoking (Meet the requirements above.) Option 2. Compartmentalization of Smoking Areas</p> <ul style="list-style-type: none"> Prohibit smoking inside all common areas; communicated in building rental or lease agreements or condo or coop association covenants and restrictions. Make provisions for enforcement. Prohibit smoking outside the building except in designated smoking areas located at least 25 feet from all entries, outdoor air intakes, and operable windows. The no-smoking policy also applies to spaces outside the property line used for business purposes. Signage must be posted within 10 feet of all building entrances indicating the no-smoking policy. <p><u>Each unit must be compartmentalized to prevent excessive leakage between units:</u></p> <ul style="list-style-type: none"> Weather-strip all exterior doors and operable windows in the residential units to minimize leakage from outdoors. Weather-strip all doors leading from residential units into common hallways. Minimize uncontrolled pathways for the transfer of smoke and other indoor air pollutants between residential units by sealing penetrations in the walls, ceilings, and floors and by sealing vertical chases adjacent to the units. Demonstrate a maximum leakage of 0.23 cubic feet per minute per square foot at 50 Pa of enclosure (i.e., all surfaces enclosing the apartment, including exterior and party walls, floors, and ceilings). <p><u>S</u></p> <ul style="list-style-type: none"> Prohibit smoking on site. Signage must be posted at the property line indicating the no-smoking policy. 	<p>If the requirement to prohibit smoking within 25 feet cannot be implemented because of code, provide documentation of these regulations.</p> <p>Public sidewalks are not considered used for business purposes, but smoking must still be prohibited on sidewalks within 25 feet of openings.</p>	<p>Standard Test Method for Determining Air Leakage Rate by Fan Pressurization, ASTM E779-03</p> <p>Standard Test Methods for Determining Airtightness of Buildings Using an Orifice Blower Door, ASTM E1827-11</p> <p>Nondestructive testing, Leak testing—Criteria for method and technique selection, CEN Standard EN 1779—1999</p> <p>Nondestructive testing, Leak testing, Tracer gas method, CEN Standard EN 13185—2001</p> <p>Nondestructive testing, Leak testing, Calibration of reference leaks for gases, CEN Standard EN 13192—2001</p> <p>RESNET Standards</p> <p>ENERGY STAR Multifamily Testing Protocol</p>	N/A

INDOOR ENVIRONMENTAL QUALITY (EQ)

LEED BD+C v4 Credit Summary Sheet

NAME	INTENT	REQUIREMENTS	ADDITIONAL INFORMATION	STANDARDS	EXEMPLARY PERFORMANCE							
P	Minimum Acoustic Performance S	To provide classrooms that facilitate teacher-to-student and student-to-student communication through effective acoustic design.	<p>HVAC Background Noise Achieve a maximum background noise level of 40 dBA from HVAC systems in classrooms and other core learning spaces.</p> <p>Exterior Noise For high-noise sites (peak-hour Leq above 60 dBA during school hours), implement acoustic treatment and other measures to minimize noise intrusion from exterior sources and control sound transmission between classrooms and other core learning spaces. Projects at least one-half mile from any significant noise source (e.g., aircraft overflights, highways, trains, industry) are exempt.</p> <p>Reverberation Time <u>Classrooms and Core Learning Spaces < 20,000 Cubic Feet</u> Design classrooms and other core learning spaces to include sufficient sound-absorptive finishes for compliance with the reverberation time requirements specified in ANSI Standard S12.60–2010 Option 1 - For each room, confirm that the total surface area of acoustic wall panels, ceiling finishes, and other sound-absorbent finishes equals or exceeds the total ceiling area of the room (excluding lights, diffusers, and grilles). Materials must have an NRC of 0.70 or higher. OR Option 2 - Confirm through calculations described in ANSI Standard S12.60-2010 that rooms are designed to meet reverberation time requirements as specified in that standard. <u>Classrooms and Core Learning Spaces ≥ 20,000 Cubic Feet</u> Meet the recommended reverberation times for classrooms and core learning spaces described in the NRC-CNRC Construction Technology Update No. 51, Acoustical Design of Rooms for Speech (2002), or a local equivalent for projects outside the U.S. Exceptions Exceptions to the requirements because of a limited scope of work or to observe historic preservation requirements will be considered.</p>	<p>reverberation often reduces speech intelligibility and clarity of sound</p> <p>Peak-hour Leq is the equivalent continuous noise level (Leq) for the peak hour.</p> <p>Determine sound absorption properties (sound absorption coefficients at 500 Hz, 1000 Hz and 2,000 Hz and/or noise reduction coefficients) for absorptive materials.</p> <p>Reverberation time must be verified at 500, 1000, and 2000 Hz using calculations or measurements.</p>	<p>AHRI Standard 885–2008, Procedure for Estimating Occupied Space Sound Levels in the Application of Air Terminals and Air Outlets</p> <p>American National Standards Institute (ANSI)/ASHRAE Standard S12.60–2010, Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools</p> <p>2011 HVAC Applications, ASHRAE Handbook, Chapter 48, Noise and Vibration Control: ashrae.org NRC-CNRC Construction Technology Update No. 51, Acoustic Design of Rooms for Speech, 2002</p>	N/A						
C	Enhanced Indoor Air Quality Strategies NC, CS, S, R, DC, WDC, HOS, HC	To promote occupants' comfort, well-being, and productivity by improving indoor air quality.	<p>Option 1. Enhanced IAQ Strategies (1 point) Comply with the following requirements, as applicable.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">Mechanically ventilated spaces: A. entryway systems; B. interior cross-contamination prevention; and C. filtration.</td> <td style="width: 33%;">Naturally ventilated spaces: A. entryway systems; and B. natural ventilation design calculations.</td> <td style="width: 33%;">Mixed-mode systems: A. entryway systems; B. interior cross-contamination prevention; C. filtration; D. natural ventilation design calculations; and E. mixed-mode design calculations.</td> </tr> </table> <p>A. Entryway Systems Permanently installed grates, grilles, slotted systems that allow for cleaning underneath, rollout mats. 10 feet long in the primary direction of travel. Maintain Weekly.</p> <p>B. Interior Cross-Contamination Prevention Sufficiently exhaust each space where hazardous gases or chemicals may be present or used. Minimum of 0.5 cfm per SF. Negative pressure when doors closed. Self-closing doors and deck-to-deck partitions or a hard-lid ceiling.</p> <p>C. Filtration MERV 13 or higher for each ventilation system that supplies outdoor air to occupied spaces. Replace all air filtration media after completion of construction and before occupancy.</p> <p>D. Natural Ventilation Design Calculations Chartered Institution of Building Services Engineers (CIBSE) Applications Manual AM10 - system design for occupied spaces</p> <p>E. Mixed-Mode Design Calculations CIBSE Applications Manual 13–2000, Mixed Mode Ventilation.</p> <p>Option 2. Additional Enhanced IAQ Strategies (1 point) Comply with the following requirements, as applicable.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">Mechanically ventilated spaces (select one): A. exterior contamination prevention; B. increased ventilation; C. carbon dioxide monitoring; or D. additional source control and monitoring.</td> <td style="width: 33%;">Naturally ventilated spaces (select one): A. exterior contamination prevention; B. additional source control and monitoring; or C. natural ventilation room by room calculations.</td> <td style="width: 33%;">Mixed-mode systems (select one): A. exterior contamination prevention; B. increased ventilation; C. additional source control and monitoring; or D. natural ventilation room-by-room calculations.</td> </tr> </table> <p>A. Exterior Contamination Prevention Design the project to minimize and control the entry of pollutants into the building. Use Gaussian dispersion analyses, wind tunnel modeling, or tracer gas modeling to ensure that outdoor air contaminant concentrations at outdoor air intakes are below the thresholds.</p> <p>B. Increased Ventilation Increase breathing zone outdoor air ventilation rates to all occupied spaces by at least 30% above the minimum rates EQ Prereq Min IAG.</p> <p>C. Carbon Dioxide Monitoring Monitor CO₂ concentrations within all densely occupied spaces. CO₂ monitors must be between 3 and 6 feet above the floor. 10% alarm</p> <p>D. Additional Source Control and Monitoring For spaces where air contaminants are likely, evaluate potential sources of additional air contaminants besides CO₂. Develop and implement a materials-handling plan to reduce the likelihood of contaminant release. Install monitoring systems with sensors designed to detect the specific contaminants. An alarm must indicate any unusual or unsafe conditions.</p> <p>E. Natural Ventilation Room-by-Room Calculations Follow CIBSE AM10, Section 4, Design Calculations, to predict that room-by-room airflows will provide effective natural ventilation.</p>	Mechanically ventilated spaces: A. entryway systems; B. interior cross-contamination prevention; and C. filtration.	Naturally ventilated spaces: A. entryway systems; and B. natural ventilation design calculations.	Mixed-mode systems: A. entryway systems; B. interior cross-contamination prevention; C. filtration; D. natural ventilation design calculations; and E. mixed-mode design calculations.	Mechanically ventilated spaces (select one): A. exterior contamination prevention; B. increased ventilation; C. carbon dioxide monitoring; or D. additional source control and monitoring.	Naturally ventilated spaces (select one): A. exterior contamination prevention; B. additional source control and monitoring; or C. natural ventilation room by room calculations.	Mixed-mode systems (select one): A. exterior contamination prevention; B. increased ventilation; C. additional source control and monitoring; or D. natural ventilation room-by-room calculations.	<p>Interior cross-contamination prevention</p> <ul style="list-style-type: none"> • Include housekeeping and laundry areas even if green cleaning policies are adopted. • Copying and printing rooms with convenience printers and copiers only may be excluded. <p>Typical building carpeting is not an acceptable permanent entryway system.</p> <p>Warehouses and Distribution Centers</p> <ul style="list-style-type: none"> • For Option 1 Entryway Systems, exterior entrances to loading docks and garages are not required to have entryway systems. • Regularly used entrances from these areas into adjacent spaces in the building (typically office areas of the building) must have entryway systems. <p>Healthcare</p> <ul style="list-style-type: none"> • For Option 1 Entryway Systems, in addition to the entryway system, provide pressurized entryway vestibules at high volume building entrances. <p>Data Centers</p> <ul style="list-style-type: none"> • For Option 1 Filtration, the requirements apply only to ventilation systems serving regularly occupied spaces <p>Residential Projects</p> <ul style="list-style-type: none"> • For Option 1 Entryway Systems, the systems are required only at the ground level, for each residential entrance from the outdoors. 	<p>ASHRAE Standard 52.2–2007</p> <p>CEN Standard EN 779–2002</p> <p>ASHRAE Standard 62.1—2010</p> <p>Chartered Institution of Building Services Engineers (CIBSE) Applications Manual AM10, March 2005</p> <p>Chartered Institution of Building Services Engineers (CIBSE) Applications Manual 13, 2000</p> <p>National Ambient Air Quality Standards (NAAQS)</p>	Achieve both Option 1 and Option 2 and incorporate an additional Option 2 strategy.
Mechanically ventilated spaces: A. entryway systems; B. interior cross-contamination prevention; and C. filtration.	Naturally ventilated spaces: A. entryway systems; and B. natural ventilation design calculations.	Mixed-mode systems: A. entryway systems; B. interior cross-contamination prevention; C. filtration; D. natural ventilation design calculations; and E. mixed-mode design calculations.										
Mechanically ventilated spaces (select one): A. exterior contamination prevention; B. increased ventilation; C. carbon dioxide monitoring; or D. additional source control and monitoring.	Naturally ventilated spaces (select one): A. exterior contamination prevention; B. additional source control and monitoring; or C. natural ventilation room by room calculations.	Mixed-mode systems (select one): A. exterior contamination prevention; B. increased ventilation; C. additional source control and monitoring; or D. natural ventilation room-by-room calculations.										

INDOOR ENVIRONMENTAL QUALITY (EQ)

LEED BD+C v4 Credit Summary Sheet

NAME	INTENT	REQUIREMENTS	ADDITIONAL INFORMATION	STANDARDS	EXEMPLARY PERFORMANCE																																
C	Low-Emitting Materials NC, CS, S, R, DC, WDC, HOS, HC	<p>To reduce concentrations of chemical contaminants that can damage air quality, human health, productivity, and the environment.</p> <p>Option 1. Product Category Calculations Achieve the threshold level of compliance with emissions and content standards for the number of product categories listed.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;">Category</th> <th style="width: 30%;">Threshold</th> <th style="width: 40%;">Emissions and content requirements</th> </tr> </thead> <tbody> <tr> <td>Interior paints and coatings applied on site</td> <td>At least 90%, by volume, for emissions; 100% for VOC content</td> <td>General Emissions Evaluation for paints and coatings applied to walls, floors, and ceilings VOC content requirements for wet applied products</td> </tr> <tr> <td>Interior adhesives and sealants applied on site (including flooring adhesive)</td> <td>At least 90%, by volume, for emissions; 100% for VOC content</td> <td>General Emissions Evaluation VOC content requirements for wet applied products</td> </tr> <tr> <td>Flooring</td> <td>100%</td> <td>General Emissions Evaluation</td> </tr> <tr> <td>Composite Wood</td> <td>100% not covered by other categories</td> <td>Composite Wood Evaluation</td> </tr> <tr> <td>Ceilings, walls, thermal, and acoustic insulation</td> <td>100%</td> <td>General Emissions Evaluation Healthcare, Schools only Additional insulation requirements</td> </tr> <tr> <td>Furniture (include in calculations if part of scope of work)</td> <td>At least 90%, by cost</td> <td>Furniture Evaluation</td> </tr> <tr> <td>Healthcare and Schools Projects only: Exterior applied products</td> <td>At least 90%, by volume</td> <td>Exterior Applied Products</td> </tr> </tbody> </table> <p>Option 2. Budget Calculation Method If some products in a category do not meet the criteria, project teams may use the budget calculation method.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 70%;">Percentage of Total</th> <th style="width: 30%;">Points</th> </tr> </thead> <tbody> <tr> <td>≥ 50% and < 70%</td> <td>1</td> </tr> <tr> <td>≥ 70% and < 90%</td> <td>2</td> </tr> <tr> <td>≥ 90%</td> <td>3</td> </tr> </tbody> </table> <ul style="list-style-type: none"> The budget method organizes the building interior into six assemblies: flooring; ceilings; walls; thermal and acoustic insulation; furniture; and Healthcare, Schools only: exterior applied products. Include furniture in the calculations if it is part of the scope of work. Walls, ceilings, and flooring are defined as building interior products; each layer of the assembly, including paints, coatings, adhesives, and sealants, must be evaluated for compliance. Insulation is tracked separately. Calculate surface area of assembly layers based on the manufacturer's documentation for application. <p>General emissions evaluation. Building products must be tested and determined compliant in accordance with California Department of Public Health (CDPH) Standard Method v1.1–2010, using the applicable exposure scenario. The default scenario is the private office scenario.</p> <p>Additional VOC content requirements for wet-applied products.</p> <ul style="list-style-type: none"> Paints and coatings wet-applied on site must meet the applicable VOC limits of CARB or SQAQMD Rule 1113 Adhesives and sealants wet-applied on site must meet the applicable chemical content requirements of SCAQMD Rule 1168 <p>Composite wood evaluation - CARB. ultra-low-emitting formaldehyde (ULEF) resins or no added formaldehyde resins</p> <p>Furniture evaluation. New furniture and furnishing items must be tested in accordance with ANSI/BIFMA Standard Method M7.1–2011.</p> <p>S, HC</p> <p>Additional insulation requirements. Batt insulation products may contain no added formaldehyde, including urea formaldehyde, phenol formaldehyde, and urea-extended phenol formaldehyde.</p> <p>Exterior applied products. Adhesives, sealants, coatings, roofing, and waterproofing materials applied on site must meet the VOC limits of California Air Resources Board (CARB) 2007 Suggested Control Measure (SCM) for Architectural Coatings, and SCAQMD, Rule 1168. Two materials are prohibited and do not count toward total percentage compliance: hot-mopped asphalt for roofing, and coal tar sealants for parking lots and other paved surfaces.</p>	Category	Threshold	Emissions and content requirements	Interior paints and coatings applied on site	At least 90%, by volume, for emissions; 100% for VOC content	General Emissions Evaluation for paints and coatings applied to walls, floors, and ceilings VOC content requirements for wet applied products	Interior adhesives and sealants applied on site (including flooring adhesive)	At least 90%, by volume, for emissions; 100% for VOC content	General Emissions Evaluation VOC content requirements for wet applied products	Flooring	100%	General Emissions Evaluation	Composite Wood	100% not covered by other categories	Composite Wood Evaluation	Ceilings, walls, thermal, and acoustic insulation	100%	General Emissions Evaluation Healthcare, Schools only Additional insulation requirements	Furniture (include in calculations if part of scope of work)	At least 90%, by cost	Furniture Evaluation	Healthcare and Schools Projects only: Exterior applied products	At least 90%, by volume	Exterior Applied Products	Percentage of Total	Points	≥ 50% and < 70%	1	≥ 70% and < 90%	2	≥ 90%	3	<p>This credit includes requirements for product manufacturing as well as project teams. It covers volatile organic compound (VOC) emissions into indoor air and the VOC content of materials, as well as the testing methods by which indoor VOC emissions are determined. Different materials must meet different requirements to be considered compliant for this credit. The building interior and exterior are organized in seven categories, each with different thresholds of compliance. The building interior is defined as everything within the waterproofing membrane. The building exterior is defined as everything outside and inclusive of the primary and secondary weatherproofing system, such as waterproofing membranes and air- and water-resistive barrier materials.</p> <p>Inherently nonemitting sources. Products that are inherently nonemitting sources of VOCs (stone, ceramic, powder-coated metals, plated or anodized metal, glass, concrete, clay brick, and unfinished or untreated solid wood flooring) are considered fully compliant without any VOC emissions testing if they do not include integral organicbased surface coatings, binders, or sealants.</p> <p>If 90% of an assembly meets the criteria, the system counts as 100% compliant. If less than 50% of an assembly meets the criteria, the assembly counts as 0% compliant.</p> <p>If some layers of an assembly are noncompliant, calculate the weighted average.</p> <p>Salvaged and reused architectural millwork more than one year old at the time of occupancy is considered compliant, provided it meets the requirements for any site-applied paints, coatings, adhesives, and sealants.</p> <p>Salvaged and reused furniture more than one year old at the time of use is considered compliant, provided it meets the requirements for any site-applied paints, coatings, adhesives, and sealants.</p> <p>material safety data sheets (MSDS)</p> <p>The values used in the comparison calculation are the g/L of VOCs contained in the product.</p> <p>If a product with high VOC levels is applied unintentionally, use the VOC budget approach to determine whether compliance can nevertheless be attained.</p>	<p>CDPH Standard Method v1.1–2010</p> <p>ISO 17025</p> <p>ISO Guide 65</p> <p>AgBB—2010</p> <p>ISO 16000 parts 3, 6, 7, 11</p> <p>South Coast Air Quality Management District (SCAQMD) Rule 1168</p> <p>South Coast Air Quality Management District (SCAQMD) Rule 1113</p> <p>European Decopaint Directive</p> <p>Canadian VOC Concentration Limits for Architectural Coatings</p> <p>Hong Kong Air Pollution Control Regulation</p> <p>CARB 93120 ATCM</p> <p>ANSI/BIFMA M7.1 Standard Test Method for Determining VOC Emissions from Office Furniture Systems, Components and Seating</p> <p>ANSI/BIFMA e3–2011 Furniture Sustainability Standard</p>	<p>Option 1. Earn all points and reach 100% of products.</p> <p>Option 2. Reach 100% of products.</p>
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C	Construction Indoor Air Quality Management Plan NC, CS, S, R, DC, WDC, HOS, HC	<p>Develop and implement an IAQ management plan for the construction and preoccupancy phases of the building. The plan must address:</p> <ul style="list-style-type: none"> Meet or exceed all applicable recommended control measures of the SMACNA IAQ Guidelines for Occupied Buildings under Construction. Protect absorptive materials stored on-site and installed from moisture damage. Do not operate permanently installed air-handling equipment during construction unless filtration media with MERV of 8 or higher. Immediately before occupancy, replace all filtration media with the final design filtration media. Prohibit the use of tobacco products inside the building and within 25 feet of the building entrance. <p>HC</p> <p>Moisture - Develop and implement a plan to protect stored on-site and installed absorptive materials from moisture damage. Remove/Replace</p> <p>Particulates - Do not operate permanently installed air-handling equipment during construction unless filtration media with a MERV of 8</p> <p>VOCs - Schedule construction procedures to minimize exposure of absorbent materials to VOC emissions.</p> <p>Outdoor emissions - outdoor activities that generate high VOC emissions, develop a plan to manage fumes and avoid infiltration</p> <p>Tobacco - Prohibit the use of tobacco products inside the building and within 25 feet of the building entrance during construction.</p> <p>Noise and vibration - Develop a plan to reduce noise emissions and vibrations from construction equipment and other nonroad engines.</p> <p>Infection control - FGI 2010 Guidelines for Design and Construction of Health Care Facilities to establish an integrative infection control team.</p>	<p>SMACNA IAQ Strategies:</p> <p>HVAC protection</p> <p>Source control</p> <p>Pathway interruption</p> <p>Housekeeping</p> <p>Scheduling</p> <ul style="list-style-type: none"> Photograph each IAQ measure and annotate the images for documentation. Photograph the methods employed to protect stored and installed absorptive materials from moisture damage during construction and preoccupancy Record the filtration media used in HVAC equipment. 	<p>SMACNA IAQ Guidelines</p> <p>ASHRAE 52.2–2007</p> <p>CEN Standard EN 779–2002</p> <p>British Standard 5228—2009</p> <p>ICRA Standard, published by ASHE and CDC</p> <p>NIOSH, Asphalt Fume Exposure</p>	No																																

INDOOR ENVIRONMENTAL QUALITY (EQ)

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	NAME	INTENT	REQUIREMENTS	ADDITIONAL INFORMATION	STANDARDS	EXEMPLARY PERFORMANCE
C	Indoor Air Quality Assessment NC, CS, S, R, DC, WDC, HOS, HC	To establish better quality indoor air in the building after construction and during occupancy.	<p>Option 1. Flush-Out (1 point) Path 1. Before Occupancy Install new filtration media and perform a building flush-out by supplying a total air volume of 14,000 cubic feet of outdoor air per square foot of gross floor area while maintaining an internal temperature of at least 60°F and no higher than 80°F and relative humidity no higher than 60%. Path 2. During Occupancy If occupancy is desired before the flush-out is completed, the space may be occupied only after delivery of a minimum of 3,500 cubic feet of outdoor air per square foot of gross floor area while maintaining an internal temperature of at least 60°F and no higher than 80°F and relative humidity no higher than 60%. Once the space is occupied, it must be ventilated at a minimum rate of 0.30 cubic foot per minute (cfm) per square foot of outdoor air or the design minimum outdoor air rate determined in EQ Prerequisite Minimum Indoor Air Quality Performance, whichever is greater. During each day of the flush-out period, ventilation must begin at least three hours before occupancy and continue during occupancy. These conditions must be maintained until a total of 14,000 cubic feet per square foot of outdoor air has been delivered to the space.</p> <p>Option 2. Air Testing (2 points) After construction ends and before occupancy, but under ventilation conditions typical for occupancy, conduct baseline IAQ testing using protocols consistent with the methods listed: ASTM, EPA, ISO Formaldehyde, Particulates, Ozone, TVOCs, Target chemicals listed in CDPH Standard, Carbon monoxide (CO) Conduct all measurements before occupancy but during normal occupied hours, with the building ventilation system started at the normal daily start time and operated at the minimum outdoor airflow rate for the occupied mode throughout the test.</p>	<ul style="list-style-type: none"> Install all finishes, furniture, and furnishings before testing or beginning a flush-out. Ensure that all owner-provided furniture has been installed in residential projects. Complete all punch-list items that would generate VOCs or other contaminants. Complete testing and balancing of the HVAC system. <p><u>Air Testing</u></p> <ul style="list-style-type: none"> Test at least one location per ventilation system for each occupied space type. There must be a minimum of one test per floor. For offices, retail, schools, hospitality, and multifamily residential projects, test areas no larger than 5,000 square feet. For WDC limit of 50,000 square feet. 	<p>ASTM D5197–09e1 Standard Test Method for Determination of Formaldehyde and Other Carbonyl Compounds in Air (Active Sampler Methodology)</p> <p>ASTM D5149–02(2008) Standard Test Method for Ozone in the Atmosphere: Continuous Measurement by Ethylene Chemiluminescence</p> <p>ISO</p> <p>EPA</p> <p>CDPH</p>	No
C	Thermal Comfort NC, CS, S, R, DC, WDC, HOS, HC	To promote occupants' productivity, comfort, and well-being by providing quality thermal comfort.	<p>Thermal Comfort Design Option 1. ASHRAE Standard 55-2010 Design heating, ventilating, and air-conditioning (HVAC) systems and the building envelope to meet the requirements of ASHRAE Standard 55–2010, Thermal Comfort Conditions for Human Occupancy, with errata or a local equivalent. OR Option 2. ISO and CEN Standards <u>DC</u> Meet the above requirements for regularly occupied spaces. <u>WDC</u> Meet the above requirements for office portions of the building. In regularly occupied areas of the building's bulk storage, sorting, and distribution areas, include one or more of the following design alternatives: <ul style="list-style-type: none"> radiant flooring; circulating fans; passive systems, such as nighttime air, heat venting, or wind flow; localized active cooling (refrigerant or evaporative-based systems) or heating systems; and localized, hard-wired fans that provide air movement for occupants' comfort. other equivalent thermal comfort strategy. Thermal Comfort Control Provide individual thermal comfort controls for at least 50% of individual occupant spaces. Provide group thermal comfort controls for all shared multioccupant spaces. Thermal comfort controls allow occupants, whether in individual spaces or shared multioccupant spaces, to adjust at least one of the following in their local environment: air temperature, radiant temperature, air speed, and humidity. <u>HOS</u> Guest rooms are assumed to provide adequate thermal comfort controls and are therefore not included in the credit calculations. <u>R</u> Meet the above requirements for at least 50% of the individual occupant spaces in office and administrative areas. <u>HC</u> Provide individual thermal comfort controls for every patient room and at least 50% of the remaining individual occupant spaces. Provide group thermal comfort controls for all shared multioccupant spaces.</p>	<p>Six factors of human comfort:</p> <ul style="list-style-type: none"> Air temperature Radiant temperature (surface temperature) Humidity Air movement (air speed) Metabolic rate Clothing <p>Thermal Comfort Controls:</p> <ul style="list-style-type: none"> Operable windows Adjustable underfloor diffuser Thermostat <p>Natoriums - indoor swimming pool building</p>	<p>ASHRAE Standard 55–2010</p> <p>ASHRAE HVAC Applications Handbook, 2011 edition, Chapter 5, Places of Assembly, Typical Natatorium Design Conditions</p> <p>ISO 7730–2005 Ergonomics of the thermal environment, Analytical determination and interpretation of thermal comfort using calculation of the PMV and PPD indices and local thermal comfort criteria</p> <p>EuropeanStandard EN 15251</p>	No
C	Interior Lighting NC, CS, S, R, DC, WDC, HOS, HC	To promote occupants' productivity, comfort, and well-being by providing high-quality lighting.	<p>Option 1. Lighting Control (1 point) 90% of individual occupant spaces, provide individual lighting controls with at least three lighting levels or scenes (on, off, midlevel). For all shared multioccupant spaces, meet all of the following requirements.</p> <ul style="list-style-type: none"> Multizone control systems that enable occupants to adjust the lighting to meet group needs and preferences, with at least three lighting levels Lighting for any presentation or projection wall must be separately controlled. Switches or manual controls must be located in the same space as the controlled luminaires. A person operating the controls must have a direct line of sight to the controlled luminaires. <p><u>HOS</u> Guest rooms are assumed to provide adequate lighting controls and are therefore not included in the credit calculations.</p> <p>Option 2. Lighting Quality (1 point) Choose four of the following strategies.</p> <p>A. Light fixture luminance - All light fixtures in regularly occupied spaces. Luminance of < 2,500 cd/m² between 45 and 90 degrees from nadir B. Color rendering index (CRI) - All light fixtures. CRI of 80 or higher C. Lamp life - 75% connected lighting load. Rated life (or L70 for LED sources) of at least 24,000 hours D. Direct overhead light - 25% connected lighting load. E. Surface reflectance: ceilings, walls, floors - 90% of regularly occupied floor area. 85% for ceilings, 60% for walls, and 25% for floors F. Surface reflectance: furnishings - Used for work surfaces. Surface reflectance: 45% for work surfaces, and 50% for movable partitions. G. Surface illuminance ratio: wall to work surface. 75% regularly occupied floor area. Illuminance that does not exceed 1:10. H. Surface illuminance ratio: ceiling to work surface. 75% regularly occupied floor area. Illuminance that does not exceed 1:10.</p>	<p>Task lighting may be used to meet the credit requirements for individual occupant spaces. Task lights are not required to be hardwired.</p> <p>Residential For Option 1, residential units must have one lighting control for each individual occupant and multioccupant space. For example, a bedroom is listed as individual occupancy. A task light in the bedroom or an overhead light with manual dimmable control would be acceptable.</p>	<p>The Lighting Handbook, 10th edition, Illuminating Engineering Society of North America</p>	No

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	NAME	INTENT	REQUIREMENTS	ADDITIONAL INFORMATION	STANDARDS	EXEMPLARY PERFORMANCE																
C	Daylight NC, CS, S, R, DC, WDC, HOS, HC	To connect building occupants with the outdoors, reinforce circadian rhythms, and reduce the use of electrical lighting by introducing daylight into the space.	<p>Provide manual or automatic (with manual override) glare-control devices for all regularly occupied spaces. Select one of the following three options.</p> <p>Option 1. Simulation: Spatial Daylight Autonomy and Annual Sunlight Exposure (2–3 points, 1-2 points Healthcare) Demonstrate through annual computer simulations that spatial daylight autonomy_{300/50%} (sDA300/50%) of at least 55%, 75%, or 90% is achieved. Use regularly occupied floor area. Healthcare projects should use the perimeter area determined under EQ Credit Quality Views.</p> <table border="1" data-bbox="562 338 1423 491"> <thead> <tr> <th colspan="2">NC, CS, S, R, DC, WDC, HOS</th> <th colspan="2">HC</th> </tr> <tr> <th>sDA (for regularly occupied floor area)</th> <th>Points</th> <th>sDA (for perimeter floor area)</th> <th>Points</th> </tr> </thead> <tbody> <tr> <td>55%</td> <td>1</td> <td>75%</td> <td>1</td> </tr> <tr> <td>75%</td> <td>2</td> <td>90%</td> <td>2</td> </tr> </tbody> </table> <p>AND</p> <p>Demonstrate through annual computer simulations that annual sunlight exposure_{1000,250} (ASE1000,250) of no more than 10% is achieved. Use the regularly occupied floor area that is daylit per the sDA_{300/50%} simulations. The sDA and ASE calculation grids should be no more than 2 feet square and laid out across the regularly occupied area at a work plane height of 30 inches above finished floor (unless otherwise defined). Use an hourly time-step analysis based on typical meteorological year data, or an equivalent, for the nearest available weather station. Include any permanent interior obstructions. Moveable furniture and partitions may be excluded.</p> <p>CS If the finishes in the space will not be completed, use the following default surface reflectances: 80% for ceilings, 20% for floors, and 50% for walls. Assume that the entire floor plate, except for the core, will be regularly occupied space.</p> <p>Option 2. Simulation: Illuminance Calculations (1–2 points) Demonstrate through computer modeling that illuminance levels will be between 300 lux and 3,000 lux for 9 a.m. and 3 p.m., both on a clear-sky day at the equinox, for the floor area (HC, perimeter): 75% (1pt), 90% (2pts). Use regularly occupied floor area. Healthcare projects should use the perimeter area determined under EQ Credit Quality Views. Calculate illuminance intensity for sun (direct component) and sky (diffuse component) for clear-sky conditions as follows:</p> <ul style="list-style-type: none"> Use typical meteorological year data, or an equivalent, for the nearest available weather station. Select one day within 15 days of September 21 and one day within 15 days of March 21 that represent the clearest sky condition. Use the average of the hourly value for the two selected days. <p>Exclude blinds or shades from the model. Include any permanent interior obstructions. Moveable furniture and partitions may be excluded.</p> <p>CS Assume the following default surface reflectances if the finishes in the space will not be completed: 80% for ceilings, 20% for floors, and 50% for walls. Assume that the entire floor plate, except for the core, will be regularly occupied space.</p> <p>OR</p> <p>Option 3. Measurement (2-3 points, 1-2 points Healthcare) Achieve illuminance levels between 300 lux and 3,000 lux for the floor area (HC, perimeter): 75% (1 pt), 90% (2 pts) With furniture, fixtures, and equipment in place, measure illuminance levels as follows:</p> <ul style="list-style-type: none"> Measure at appropriate work plane height during any hour between 9 a.m. and 3 p.m. Take one measurement in any regularly occupied month, and take a second as indicated in Table 4. (see reference guide, pg. 725) For spaces larger than 150 square feet, take measurements on a maximum 10 foot square grid. For spaces 150 square feet or smaller, take measurements on a maximum 3 foot square grid. 	NC, CS, S, R, DC, WDC, HOS		HC		sDA (for regularly occupied floor area)	Points	sDA (for perimeter floor area)	Points	55%	1	75%	1	75%	2	90%	2	<p>All glare-control devices must be operable by the building’s occupants to address unpredicted glare.</p> <p>Automatic devices with user override are acceptable.</p> <p>Acceptable glare-control devices include interior window blinds, shades, curtains, movable exterior louvers, movable screens, and movable awnings.</p> <p>Systems not acceptable as glare-control devices include fixed exterior overhangs, fixed fins and louvers, dark-colored glazing, and frit and other glazing treatments.</p> <p>Diffused and translucent glazing systems do not require glare-control devices.</p> <p>Period of analysis. The analysis is performed at 9 A.M. and 3 P.M. on the equinox (September 21 or March 21), adjusted for daylight savings time and longitude.</p> <p>When performing daylight measurements, determine whether the measurements will be taken at solar or local time.</p> <p>Both are acceptable, but solar time may be more appropriate because it is based on the position of the sun in the sky.</p>	<p>IES Lighting Measurements (LM) 83-12, Approved Method: IES Spatial Daylight Autonomy (sDA) and Annual Sunlight Exposure (ASE)</p> <p>The Lighting Handbook, 10th edition, Illuminating Engineering Society</p>	No
NC, CS, S, R, DC, WDC, HOS		HC																				
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55%	1	75%	1																			
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C	Quality Views NC, CS, S, R, DC, WDC, HOS, HC	To give building occupants a connection to the natural outdoor environment by providing quality views.	<p>Achieve a direct line of sight to the outdoors via vision glazing for 75% of all regularly occupied floor area. View glazing in the contributing area must provide a clear image of the exterior, not obstructed by frits, fibers, patterned glazing, or added tints that distort color balance. Additionally, 75% of all regularly occupied floor area must have at least two of the following four kinds of views:</p> <ul style="list-style-type: none"> multiple lines of sight to vision glazing in different directions at least 90 degrees apart; views that include at least two of the following: (1) flora, fauna, or sky; (2) movement; and (3) objects at least 25 feet from the exterior of the glazing; unobstructed views located within the distance of three times the head height of the vision glazing; and views with a view factor of 3 or greater, as defined in “Windows and Offices; A Study of Office Worker Performance and the Indoor Environment.” <p>Include in the calculations any permanent interior obstructions. Movable furniture and partitions may be excluded. Views into interior atria may be used to meet up to 30% of the required area.</p> <p>WDC</p> <ul style="list-style-type: none"> For the office portion of the building, meet the requirements above. For the bulk storage, sorting, and distribution portions of the building, meet the requirements above for 25% of the regularly occupied floor area. <p>HC</p> <ul style="list-style-type: none"> For inpatient units (IPUs), meet the requirements above (1 point). For other areas, configure the building floor plates such that the floor area within 15 feet (4.5 meters) of the perimeter exceeds the perimeter area requirement (Table 1), and meet the requirements above for the perimeter area (1 point). 	<p>Building occupants who can visually connect with outdoor environments while performing everyday tasks experience greater satisfaction, attentiveness, and productivity.</p> <p>In open-plan offices, select low partitions or incorporate glazed panels to provide views in multiple directions.</p> <p>Pay particular attention to maintaining views for spaces near the core. One successful strategy is to locate open-plan areas, including classrooms, at the perimeter, while placing private offices and unoccupied areas near the core.</p> <p>Perimeter Area: The perimeter area is all floor area within 15 feet of a perimeter wall that is capable of providing a view.</p>	<p>Windows and Offices: A Study of Office Worker Performance and the Indoor Environment</p>	<p>NC, CS, S, R, DC, HOS: 90%</p> <p>WDC: 90% office portion, 50% distribution portions.</p> <p>HC: 90% inpatient areas, exceed by 10% noninpatient areas.</p>																

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	NAME	INTENT	REQUIREMENTS	ADDITIONAL INFORMATION	STANDARDS	EXEMPLARY PERFORMANCE
C	Acoustic Performance NC, S, R, DC, WDC, HOS, HC	To provide workspaces and classrooms that promote occupants' wellbeing, productivity, and communications through effective acoustic design.	<p><u>NC, DC, WDC, HOS</u> All occupied spaces, meet the following requirements, as applicable, for HVAC background noise, sound isolation, reverberation time, and sound reinforcement and masking.</p> <p>HVAC Background Noise</p> <ul style="list-style-type: none"> Achieve maximum background noise levels from HVAC systems per 2011 ASHRAE Handbook, HVAC Applications, Chapter 48, Table 1; AHRI Standard 885-2008, Table 15; or a local equivalent. Calculate or measure sound levels. Use a sound level meter that conforms to ANSI S1.4 for type 1 (precision) or type 2 (general purpose) sound measurement instrumentation, or a local equivalent. Comply with design criteria for HVAC noise levels resulting from the sound transmission paths listed in ASHRAE 2011 Applications Handbook, Table 6; or a local equivalent. <p>Sound Transmission</p> <ul style="list-style-type: none"> Meet the composite sound transmission class (STCC) ratings listed in Table 1, or local building code, whichever is more stringent. <p>Reverberation Time</p> <ul style="list-style-type: none"> Meet the reverberation time requirements in Table 2. <p>Sound Reinforcement and Masking Systems</p> <p>Sound Reinforcement</p> <ul style="list-style-type: none"> For all large conference rooms and auditoriums seating more than 50 persons, evaluate whether sound reinforcement and AV playback capabilities are needed. <p><u>If needed, the sound reinforcement systems must meet the following criteria:</u></p> <ul style="list-style-type: none"> Achieve a speech transmission index (STI) of at least 0.60 or common intelligibility scale (CIS) rating of at least 0.77 at representative points within the area of coverage to provide acceptable intelligibility. Have a minimum sound level of 70 dBA. Maintain sound-level coverage within +/-3 dB at the 2000 Hz octave band throughout the space. <p>Masking Systems</p> <ul style="list-style-type: none"> For projects that use masking systems, the design levels must not exceed 48 dBA. Ensure that loudspeaker coverage provides uniformity of +/-2 dBA and that speech spectra are effectively masked. <p><u>S</u></p> <p>HVAC Background noise</p> <ul style="list-style-type: none"> 35 dBA or less from HVAC systems in classrooms and other core learning spaces. <p>Sound Transmission</p> <ul style="list-style-type: none"> Design classrooms and other core learning spaces to meet the sound transmission class (STC) requirements of ANSI S12.60-2010 Part 1, or a local equivalent. Exterior windows must have an STC rating of at least 35, unless outdoor and indoor noise levels can be verified to justify a lower rating. <p><u>HC</u> Design the facility to meet or exceed the sound and vibration criteria adapted from the 2010 FGI</p> <p>Option 1. Speech Privacy, Sound Isolation, and Background Noise (1 point)</p> <p>Speech Privacy and Sound Isolation</p> <ul style="list-style-type: none"> Design sound isolation to achieve speech privacy, acoustical comfort, and minimal annoyance from noise-producing sources. Consider sound levels at both source and receiver locations, the background sound at receiver locations, and the occupants' acoustical privacy and acoustical comfort needs. Speech privacy is defined as "techniques...to render speech unintelligible to casual listeners" Design the facility to meet the criteria outlined in the sections of Table 1.2-3, Design Criteria for Minimum Sound Isolation Performance between Enclosed Rooms, and Table 1.2-4 Speech Privacy for Enclosed Room and Open-Plan Spaces. Calculate or measure sound isolation and speech privacy descriptors achieved for representative adjacencies as necessary to confirm compliance with the criteria in the 2010 FGI Guidelines, Sections 1.2-6.1.5 and 1.2-6.1.6, and the 2010 SV Guidelines (including the appendix). <p>Background Noise</p> <ul style="list-style-type: none"> Consider background noise levels generated by all building mechanical-electrical-plumbing systems, air distribution systems and other facility noise sources under the purview of the project building design-construction team. <p>Option 2. Acoustical Finishes and Site Exterior Noise (1 point)</p> <p>Meet the requirements for acoustical finishes and site exterior noise.</p> <p>Acoustical Finishes - Specify materials, products systems installation details, and other design features to meet the 2010 FGI Guidelines</p> <p>Site Exterior Noise - Minimize the effect on building occupants of site exterior noise produced by road traffic, aircraft flyovers, railroads, on-site heliports, emergency power generators during maintenance testing, outdoor facility MEP and building services equipment, etc.</p>	<p>Reverberation Time Equation 1 must be calculated separately for each frequency: 500, 1,000, and 2,000 Hz. The calculation should include all finish materials in the room. Equation 1. Total sound absorption for room $A = (\alpha S_1 + \alpha S_2 + \dots + \alpha S_n)$ where α is the sound absorption coefficient for a material at a specific frequency S is the total surface area for that material in square feet.</p> <p>Reverberation times must be calculated for all rooms at each of the three frequencies; all must meet the specified T60 requirement in Table 2 in the credit requirements.</p> <p>Equation 2. Reverberation time (IP) $RT = 0.049 \times V / A$ where V is the room volume in cubic feet A is the total sound absorption in the room (from Equation 1).</p> <p>Sound reinforcement may be needed for meeting, open office, public, or presentation spaces that seat more than 50 people, depending on their function.</p> <p>Sound masking is a technology that uses artificially produced sound to cover or mask unwanted environmental noise.</p>	<p>ASHRAE 2011, HVAC Applications Handbook, Chapter 48, Noise and Vibration Control</p> <p>AHRI Standard 885-2008</p> <p>ANSI S1.4, Performance Measurement Protocols for Commercial Buildings</p> <p>2010 Noise and Vibration Guidelines for Health Care</p>	No

INNOVATION (IN)

LEED BD+C v4 Credit Summary Sheet

	NAME	INTENT	REQUIREMENTS	ADDITIONAL INFORMATION	STANDARDS	EXEMPLARY PERFORMANCE
C	Innovation NC, CS, S, R, DC, WDC, HOS, HC	To encourage projects to achieve exceptional or innovative performance.	<p>Option 1. Innovation (1 point) Achieve significant, measurable environmental performance using a strategy not addressed in the LEED green building rating system. Identify the following:</p> <ul style="list-style-type: none"> the intent of the proposed innovation credit; proposed requirements for compliance; proposed submittals to demonstrate compliance; and the design approach or strategies used to meet the requirements. <p>AND/OR</p> <p>Option 2. Pilot (1 point) Achieve one pilot credit from USGBC's LEED Pilot Credit Library</p> <p>AND/OR</p> <p>Option 3. Additional Strategies Innovation (1-3 points)</p> <ul style="list-style-type: none"> Defined in Option 1 above. <p>Pilot (1-3 points)</p> <ul style="list-style-type: none"> Meet the requirements of Option 2. <p>Exemplary Performance (1-2 points)</p> <ul style="list-style-type: none"> Achieve exemplary performance in an existing LEED v4 prerequisite or credit that allows exemplary performance, as specified in the LEED Reference Guide, v4 edition. An exemplary performance point is typically earned for achieving double the credit requirements or the next incremental percentage threshold. 	<p>Discuss pilot credits, green housekeeping, public education, and other opportunities for innovation.</p> <p><u>Pilot credit</u> Select credit Register pilot credit Implement credit Provide feedback Document credit</p> <p>Innovation credits are not awarded for the use of a particular product or design strategy if the technology aids in the achievement of an existing LEED credit, even if the project is not attempting to earn that credit.</p>	None	No
C	LEED Accredited Professional NC, CS, S, R, DC, WDC, HOS, HC	To encourage the team integration required by a LEED project and to streamline the application and certification process.	At least one principal participant of the project team must be a LEED Accredited Professional (AP) with a specialty appropriate for the project.	A LEED Accredited Professional (LEED AP) with specialty can be a valuable resource in the LEED certification process. The presence of a LEED AP with specialty helps project team members understand the rating system, the importance of interactions among the prerequisites and credits, and the LEED application process.	None	No

REGIONAL PRIORITY (RP)

LEED BD+C v4 Credit Summary Sheet

	NAME	INTENT	REQUIREMENTS	ADDITIONAL INFORMATION	STANDARDS	EXEMPLARY PERFORMANCE
C	Regional Priority NC, CS, S, R, DC, WDC, HOS, HC	To provide an incentive for the achievement of credits that address geographically specific environmental, social equity, and public health priorities.	<p>Earn up to four of the six Regional Priority credits. These credits have been identified by the USGBC regional councils and chapters as having additional regional importance for the project's region. A database of Regional Priority credits and their geographic applicability is available on the USGBC website, http://www.usgbc.org.</p> <p>One point is awarded for each Regional Priority credit achieved, up to a maximum of four.</p>	No additional documentation is required to earn Regional Priority credits. Document compliance for the selected credits, and the related RP bonus points for their achievement will be awarded automatically.	None	No